

**DON'T  
GET LEFT  
IN THE  
DARK**

**LIGHTING AND SAFETY**

**SAFETY**

**365**

We are required to have arrangements in place to cover all aspects of health and safety. This includes lighting – which needs to meet the requirements of the Work Place (Health Safety and Welfare) Regulations 1992.

**Lighting at work is very important for the health and safety of everyone in the workplace.**

**The quicker and easier it is to see a hazard, the more easily it is avoided.**

**The types of hazard present (and the work being carried out) determine the lighting requirements for safe operation.**

# LIGHTING EXPLAINED

## Terminology

### **Lux**

The measure of light intensity – the higher the lux the brighter the light

### **Glare**

Discomfort or impairment of vision experienced due to excessive light

### **Strike Up**

The time from start up to full light output

## Light types

### **Halogen**

Warm white intense light

### **Metal Halide**

Bright cold white light – strike up time approx 10 mins

### **Fluorescent**

Warm white light – less intense

# Choosing lights

## THERE ARE SIX KEY FACTORS TO CONSIDER WHEN CHOOSING TEMPORARY SITE LIGHTING

### WHAT AREA DO YOU NEED TO ILLUMINATE?

Both the size of the area to be lit and the conditions of the ground need to be considered – large open areas of track for example would require different lighting to a narrow access point.

### WHAT TYPE OF WORK ACTIVITY WILL BE GOING ON?

Different activities require different levels of lighting – more detailed work requires brighter lighting than that required for walking to and from a work site. This is covered in more detail later. Some work will require secondary lighting.

### WHAT POWER SOURCE IS AVAILABLE?

Some lights come with their own source of power built in. For those that don't, suitable generators also need to be provided. Generally we have two sizes of generator – the 3KVA and the 5KVA. In some cases mains electricity may also be available for use, but **it must always be transformed** down to 110V.

Finally when planning the lighting requirements and prior to installing temporary lighting on site **ALWAYS** consider the risks of electrocution from **OVERHEAD LINE** and **THIRD RAIL**.



## **ARE ENVIRONMENTAL NOISE AND LIGHT LEVELS AN ISSUE?**

When temporary site lighting is used adjacent to built up residential areas there will be a need to keep noise levels to a minimum. Similarly, as far as is practical lighting will need to be directed away from residential areas. This can be achieved by considering placement of the lights and generators, and screening generators to reduce emitted noise levels from the site.

## **IS THE AREA WELL VENTILATED?**

Generators should only be used in a well ventilated area, as emissions from these in a confined area could lead to hazardous build up of exhaust fumes – with the associated health risks.

Where the working area does not have adequate ventilation (e.g. tunnels) the generator should be sited away from the work, and sufficient cable made available and run out safely to power the lights thus avoiding tripping hazards.

## **DOES SHADOWING AND GLARE NEED TO BE CONSIDERED?**

For working environments where shadowing may create problems it may be beneficial to consider lighting that emits a softer diffused light (fluorescent). Lighting should always be positioned to prevent glare. Consideration should also be given to the extent of engineering trains/ machinery, proximity of overhanging trees etc. Vegetation clearance may be required prior to installation of light systems.

**IN ALL CASES CARRY OUT A SURVEY OF THE SITE AND RECORD YOUR FINDINGS.**

# Guidance on lighting levels

**REQUIRED  
BY LAW**

**Good lighting whether natural or artificial, is essential to the health, safety and general comfort of our staff at all places of work.**

The quicker and easier it is to see a hazard the higher the likelihood of avoiding it.

The types of dangers present at work therefore determines the lighting requirements for safe operation.

Providing the correct level of lighting is particularly important when working at night. Consider the diversity of the tasks that our staff perform in the hours of darkness.

Poor lighting can represent significant risks to our business – not only in the form of time off work as a result of accident and injury, but through reduced staff efficiency and productivity.

## The HSE specify the following minimum lighting levels in HSG 38 Lighting at Work

ACTIVITY	TYPICAL LOCATIONS/ TYPE OF WORK	AVERAGE ILLUMINANCE (LUX)	MINIMUM MEASURED ILLUMINANCE (LUX)
Movement of people machines and vehicles	Car parks, circulation routes and walking routes	20	5
Movement of people machines and vehicles in hazardous areas; rough work not requiring any perception to detail	Construction site clearance, excavation and soil work, loading and distribution points	50	20
Work requiring limited perception of detail	General factory type work, assembling large components	100	50
Work requiring perception to detail	Electrical work, fine detail carpentry, surveying etc	200	100
Work requiring perception of fine detail	Viewing site plans, fine detail electrical work	500	200

Table based on HSE guidance Lighting At Work HSG38

The **minimum** lighting levels that are therefore important for our work are:

**5 lux** for getting to and from the worksites

**20-50 lux** for general P Way work

**100 lux** for S&T and E&P type activity where a degree of perception to detail is required

It should be noted that the requirement for lux values in excess of 50 lux is to avoid visual fatigue; the illuminance values quoted below this figure are adequate for general safety purposes.

## FOUR HEAD METAL HALIDE LIGHTING TOWER

POWER	N/A
POWER SOURCE	Integral Generator
MAST HEIGHT	9m
WEIGHT	1050kg

This unit provides up to four times the light capability of traditional tungsten bulbs. It is a road towable lighting tower that features four metal halide bulbs to produce bright, white light for a variety of applications.

- Lights can be arranged in various configurations
- Rotating mast head reaches up to 9 metres in height
- Unit is self powered diesel and can run continuously for up to 60 hours
- Quiet running @ 63 dB(A)

**This lighting solution is best suited for renewals and larger maintenance sites. Although it is easily transportable by road it is not best suited for short duration work on the infrastructure due to the logistics problems of getting the units trackside.**

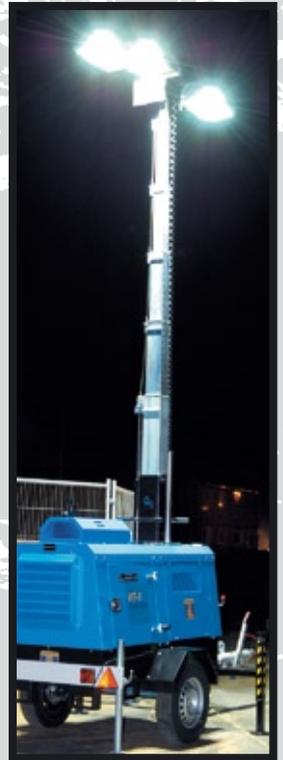


Photo © HSS

## LINKABLE LIGHTING TOWERS

POWER	1600W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	7m
WEIGHT	226kg

This unit is a linkable tower lighting system that allows up to four units to be connected together and powered by one single point generator or mains connection.

- Link towers are very compact and around twelve units can be transported on a transit type flatbed truck
- Lighting is provided by four metal halide bulbs
- The linkable lighting towers provide a coverage of approximately 5 lux at a 25 metre radius. Obviously the lighting level significantly increases the closer you get to the source with 50 lux being achieved at a 15 metre radius

**This lighting solution is best suited for larger renewal sites. Although it is easily transportable by road it is not best suited for short duration work on the infrastructure due to the logistics problems of getting the units to the worksite.**



<b>TRIPOD TYPE</b>	<b>POWER</b>	1000/600W
<b>TWIN HEAD</b>	<b>POWER SOURCE</b>	3KVA Generator (min.)
<b>HALOGEN</b>	<b>MAST HEIGHT</b>	1.5 – 2m
<b>FLOODLIGHT</b>	<b>WEIGHT</b>	7kg

Tripod type halogen lights are fitted with 300W bulbs depending on the task they are being used for.

Glare can be a problem with halogen lights and where there are no height restrictions (overhead power lines, structural restrictions) the units should be extended to their maximum potential.

The reality for a large part of the infrastructure is we do have overhead line issues and therefore standard units will be provided with the 300W bulb option to help reduce the glare problem.

Lamp heads should in most cases be angled at 45 degrees to the horizontal to also reduce glare and increase effective coverage.

These units can be powered by either a 3KVA or 5KVA generator but in both cases the maximum number of double headed units that can be attached to one generator is two.

The units are fitted with a 15 metre extension cable and when utilising 300W bulbs provide a general level of 5 lux at a radius of up to 6 metres in front of the unit and depending on site conditions a level of 50 lux is achievable at a radius of 4 metres from the unit. When 500W bulbs are used the effective radii increase marginally but the light is more intense closer to the source.

**When used correctly, tripod mounted lights are a good solution for short duration maintenance tasks on relatively small sites. These units are not suitable for mounting on trolleys due to the stability problem. A separate trolley light has been designed in conjunction with our suppliers specifically for this task.**



## **TROLLEY MOUNTABLE HALOGEN LIGHTS**

<b>POWER</b>	<b>600W</b>
<b>POWER SOURCE</b>	<b>3KVA Generator (min.)</b>
<b>MAST HEIGHT</b>	<b>1.5 – 2m</b>
<b>WEIGHT</b>	<b>12kg</b>

This unit utilises a twin 300W halogen head arrangement connected to an extendable mast.

The mast can be attached directly to the generator for support and used from any trolley to provide a lighting workstation.

The masts have also been designed for use with ballast baskets to give greater flexibility and come with 15 metre extension cables.

These units can be powered by either a 4KVA or 5KVA generator but in both cases the maximum number of double headed units that can be attached to one generator is two.

When two units are connected to the generator this gives an effective working area around the trolley producing levels of 50 lux 4 metres in both directions.

*Care should be taken when clipping these units to the generator frame not to block the generator exhaust path.*

**This lighting unit is an effective tool for a large proportion of short duration/small worksite maintenance tasks.**

The generator acts as ballast therefore the unit can be safely transported on a trolley to provide lighting for staff on route to the worksite. Once at site an effective lighting station is formed adjacent to the work immediately reducing the risk of accidents from poor lighting.

If the task required is away from the track the ballast basket option and extension cable feature can be used to effect light directly where it is needed.



## TRACKSIDE FLOURESCENT LINK LIGHTS

POWER	72W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	2 – 2.4m
WEIGHT	4kg

Light output is achieved from 2 x 36 W fluorescent tubes, each unit is mounted on an adjustable mast and supported by ballast baskets. Up to 32 units can be powered by a single 3 KVA generator.

The recommended spacing for these lights is 8 metres.

Using this spacing typical lighting levels achieved at 2 metres from the source along the line of lights is between 20 and 50 lux. At 4 metres from the source the lux level diminishes to between 10 and 15 lux. This should be taken into account when planning to utilise these lights for certain maintenance tasks.

This type of unit is particularly useful when working in tunnels as separate brackets are available to fix the lamps to the tunnel sides and roof therefore maximising space and minimising tripping hazards.

The lights are easy to assemble and link together but adequate time will be required when planning the job for setting up a long run of these units.

They are however a relatively cheap and effective way of lighting a lengthy work site and should definitely be considered for access lighting where we have large numbers of staff on site for longer duration/multi shift tasks.

**This type of lighting is primarily used for illuminating long work sites and access lighting.**



## RECHARGEABLE K9 SUPERLIGHT

POWER	3x18W (300W equiv)
POWER SOURCE	Integral Rechargeable Battery
MAST HEIGHT	up to 0.3m
WEIGHT	15kg inc. charger

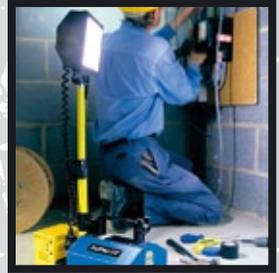
The K9 Superlite is a professional personal work light which allows the user to direct light at the optimum angle for the task being carried out.

The light source is from multiple triphosphor electronic flood lamps operating from a 12V power source.

- Can be switched between high and low power to extend duration
- Flexible work position to direct light at optimum angle
- Can be used as a high power flood beam torch
- Telescopic mast
- Duration: 5 hours high output, 14 hours low output

The light produces 135 lux at 1 metre and 25 lux at 2 metre directly in front of the source.

**This light is not for use as a primary light source other than for personal use when walking. It does however have many secondary uses providing additional illumination for detailed work.**



Picture © HSS

## RECHARGEABLE LANTERN

POWER	26W
POWER SOURCE	Integral Rechargeable Battery
MAST HEIGHT	N/A
WEIGHT	6kg inc. charger

This unit produces 360 degree brilliant white light, the equivalent of a 130W bulb having a duration of up to 20 hours.

Used as a personal 'tilley' work light suitable for use in tunnels and all open spaces. The light is also suitable for providing secondary lighting where 'shadow contrast' is a problem.

**The lantern is fairly robust and can be used at any angle. It produces an average illuminance of 20 lux at 1 metre from the source.**



Picture © HSS

# Lux values at a glance

80 —  
70 —  
60 —  
50 —  
40 —  
30 —  
20 —  
10 —  
0 —

Metres

50 LUX @ 50m

5 LUX @ 100m

## FOUR HEAD METAL HALIDE LIGHTING TOWER

POWER	N/A	MAST HEIGHT	9m
POWER SOURCE	Internal Generator	WEIGHT	1050kg

### DESCRIPTION

This road towable lighting tower is suitable to light a variety of locations from large multi shift work sites to site compounds and major access points.

50 LUX @15m

5 LUX @25m

LINKABLE

LIGHTING TOWERS

POWER	1600W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	7m
WEIGHT	226kg

### DESCRIPTION

These lighting towers can be linked together to give large light coverage ideal for renewals and extended work sites. Total coverage in excess of 1300 square metres.

50 LUX @4m

5 LUX @6m

**TRIPOD TYPE TWIN HEAD**

**HALOGEN FLOODLIGHT**

POWER	1000/600W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	1.5 – 2m
WEIGHT	7kg

**DESCRIPTION**

Used to light up relatively large areas with very few lights.  
Adjustable in height supported by three leg tripod arrangement for stability.

50 LUX @4m

5 LUX @6m

**TROLLEY MOUNTABLE**

**HALOGEN LIGHTS**

POWER	600W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	1.5 – 2m
WEIGHT	12kg

**DESCRIPTION**

Used to light up relatively large areas with very few lights.  
Adjustable in height supported by a bracket attached directly to the generator or ballast basket.

50 LUX @2m

5 LUX @6m

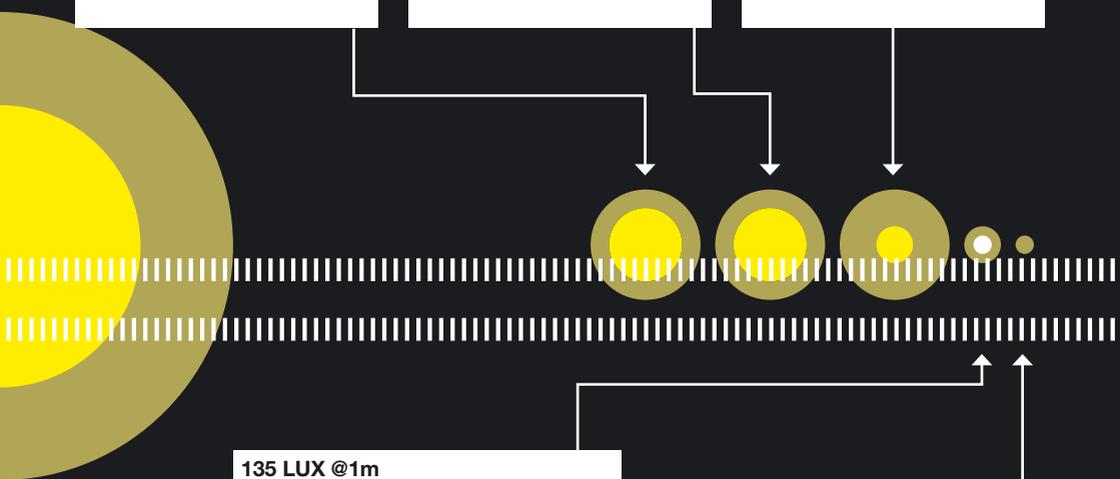
**TRACKSIDE FLOURESCENT**

**LINK LIGHTS**

POWER	72W
POWER SOURCE	3KVA Generator (min.)
MAST HEIGHT	2 – 2.4m
WEIGHT	4kg

**DESCRIPTION**

Fluorescent lights that can be linked together. Up to 32 units can be supplied from one power source and span up to nearly 200 metres.



135 LUX @1m

25 LUX @2m

**RECHARGABLE**

**K9 SUPERLIGHT**

POWER	3x18W (300W equiv)
POWER SOURCE	Integral Rechargeable Battery
MAST HEIGHT	up to 0.3m
WEIGHT	15kg Inc. Charger

**DESCRIPTION**

Portable self powered light.  
Ideal for secondary lighting where attention to detail is required.

20 LUX @1m

**RECHARGABLE**

**LANTERN**

POWER	26W
POWER SOURCE	Integral Rechargeable Battery
MAST HEIGHT	N/A
WEIGHT	6kg Inc. Charger

**DESCRIPTION**

Portable self powered light.  
Ideal for personal use as a tilley light.

# Task lighting requirements



The table below gives some guidance on the minimum level of lighting required, and how this can be achieved using the units we have available. This is by no means definitive, and the person responsible for organising any work **must** include as part of their risk assessment/method statement consideration for the requirement for **temporary lighting** to carry out the task safely and efficiently.

TYPE OF WORK	TYPES OF LIGHTING
Pedestrian access to/ from work site, access along or between sites	<ul style="list-style-type: none"><li>• Hand/head lamps</li><li>• Fluorescent link lights</li></ul>
Site access points, loading/ distribution areas, and tracking machines on/off site	<ul style="list-style-type: none"><li>• Metal halide lighting towers</li><li>• Single link tower</li><li>• Trolley mountable Twin head halogen</li></ul>
Localised work using small plant e.g. single sleeper replacement, rail head repair weld	<ul style="list-style-type: none"><li>• Trolley mounted twin head halogen</li><li>• Tripod type twin head halogen</li><li>• Twin head halogen supported by ballast basket</li></ul>
Large worksite multiple task linkable lighting towers	<ul style="list-style-type: none"><li>• Fluorescent link lights</li><li>• Metal halide lighting towers</li></ul>
S&T work location cabinets etc perception to detail required	<ul style="list-style-type: none"><li>• General background lighting</li><li>• Supported by secondary lighting e.g. K9 Superlite, various portable lamps</li></ul>