

Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations (AOR) 2010



What does this guidance contain?

- Information to help you decide what you need to do to protect your workers and comply with the Regulations.
- Examples of safe sources of artificial optical radiation (AOR) that require no further action.
- Examples of hazardous sources of artificial optical radiation that could harm workers and the types of activities where they are used.

What are the Control of Artificial Optical Radiation at Work Regulations 2010?

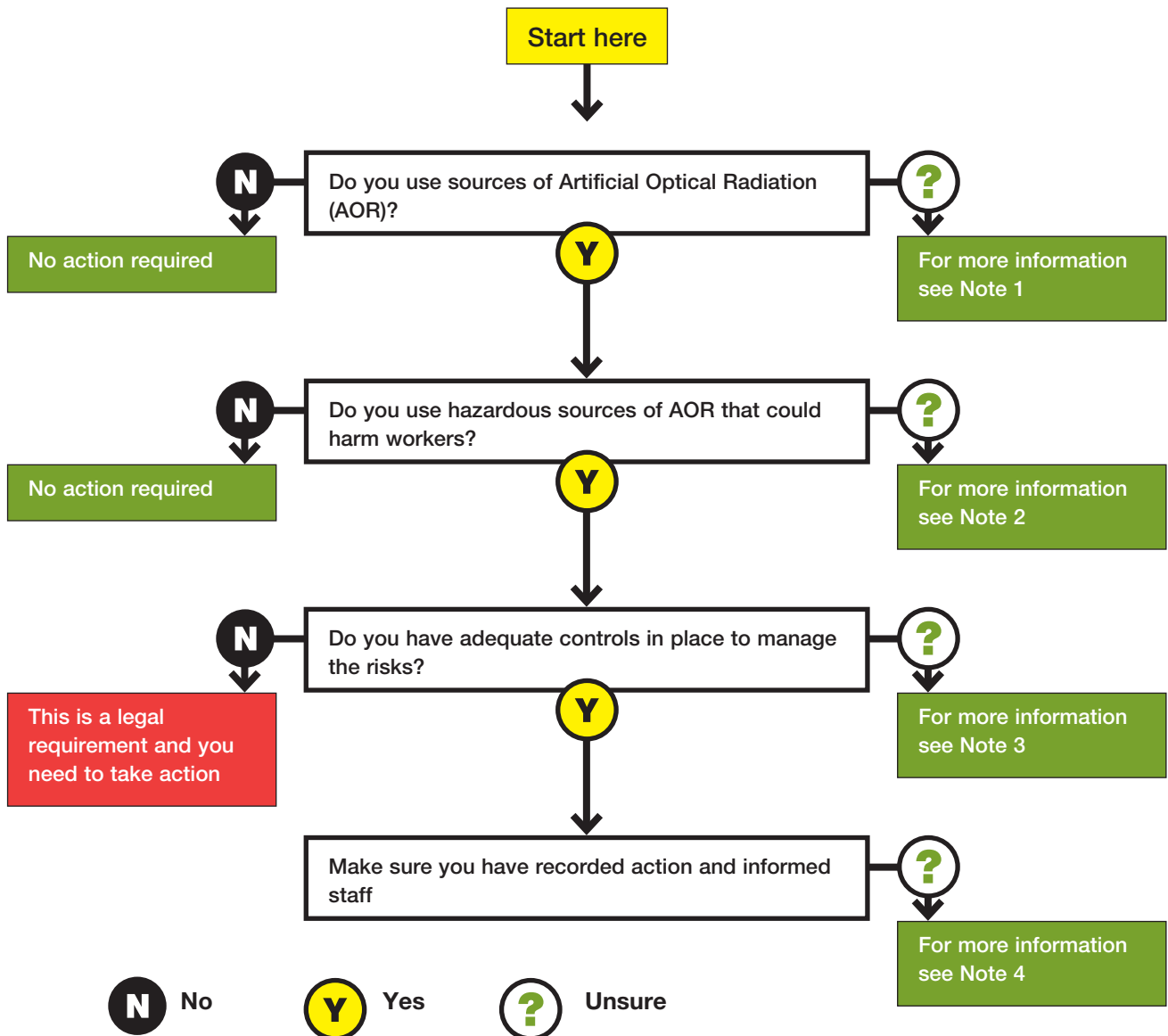
These Regulations came into force on 27 April 2010. They require you to protect the eyes and skin of your workers from exposure to hazardous sources of artificial optical radiation. AOR includes light emitted from all artificial sources in all its forms such as ultraviolet, infrared and laser beams, but excludes sunlight.

Why has HSE produced this guidance?

Some forms of artificial light can be harmful to workers unless protective measures are in place. This guidance will help you decide whether you are already protecting your workers, or whether you need to do more. Many of you will already be taking appropriate action, so it is only those whose workers remain at risk that need to do more.

How to use this guidance

Work through the series of questions below, referring to the accompanying notes if required. This should help you identify the things that you need to do to protect your workers.



Note 1

AOR includes light emitted from all artificial sources ie light in all its forms such as ultraviolet, infrared and laser beams, but excluding sunlight. It is likely that your workers will be exposed to some form of artificial light at work, whether from general lighting, equipment or from a work process.

Note 2

The majority of light sources are safe, such as those described in List 1 below. If you only have these sources, or similar, your workers are not at risk and you don't need to do anything further.

When making this decision, it is also worth considering the following points to satisfy yourself that all workers are protected:

- If you have workers whose health is at particular risk, (eg those with pre-existing medical conditions made worse by light).
- If workers use any chemicals, (eg skin creams) which could react with light to make any health effects worse.
- If you have workers who are exposed to multiple sources of light at the same time.
- If exposure to bright light could present unrelated risks, (eg temporary blindness could lead to mistakes being made in hazardous tasks).

List 1 Safe light sources

- All forms of ceiling-mounted lighting used in offices etc that have diffusers over bulbs or lamps.
- All forms of task lighting including desk lamps and tungsten-halogen lamps fitted with appropriate glass filters to remove unwanted ultraviolet light.
- Photocopiers.
- Computer or similar display equipment, including personal digital assistants (PDAs).
- Light emitting diode (LED) remote control devices.
- Photographic flashlamps – when used singly.
- Gas-fired overhead heaters.
- Vehicle indicator, brake, reversing and fog lamps.
- Any exempt or Risk Group 1 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008.
- Any Class 1 laser light product, as defined in British Standard BS EN 60825-1: 2007, for example laser printers and bar code scanners.

There are also some sources of light that, if used inappropriately, eg placed extremely close to the eyes or skin, have the potential to cause harm but which are perfectly safe under normal conditions of use. Examples include:

- Ceiling-mounted fluorescent lighting without diffusers over bulbs or lamps.
- High-pressure mercury floodlighting.
- Desktop projectors.
- Vehicle headlights.
- Non-laser medical applications such as: operating theatre and task lighting; diagnostic lighting such as foetal/neonatal transilluminators and X-ray light/viewing boxes.
- UV insect traps.
- Art and entertainment applications such as illumination by spotlights, effect lights and flashlamps (provided that any ultraviolet emissions have been filtered out).
- Multiple photographic flashlamps, for example in a studio.

- Any Risk Group 2 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008.
- Class 1M, 2 or 2M lasers, as defined in British Standard BS EN 60825-1: 2007, for example low-power laser pointers.

The above list is not exhaustive. If you have sources that are not listed but you know have not caused harm previously, and you have no reason to suspect they present a risk in the way they are used, you can assume no special control measures are needed.

Some sources of light can cause a risk of ill health, such as: burns or reddening (erythema) of the skin or surface of the eye (photokeratitis); burns to the retina of the eye; so-called blue-light damage to the eye (photoretinitis) and, damage to the lens of the eye that may bring about the early onset of cataract. Examples are listed below.

List 2 Hazardous light sources

Examples of hazardous sources of light that present a 'reasonably foreseeable' risk of harming the eyes and skin of workers and where control measures are needed include:

- Metal working – welding (both arc and oxy-fuel) and plasma cutting.
- Pharmaceutical and research – UV fluorescence and sterilisation systems.
- Hot industries – furnaces.
- Printing – UV curing of inks.
- Motor vehicle repairs – UV curing of paints and welding.
- Medical and cosmetic treatments – laser surgery, blue light and UV therapies, Intense Pulsed Light sources (IPLs).
- Industry, research and education, for example, all use of Class 3B and Class 4 lasers, as defined in British Standard BS EN 60825-1: 2007.
- Any Risk Group 3 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008, for example search lights, professional projections systems.

Less common hazardous sources are associated with specialist activities – for example lasers exposed during the manufacture or repair of equipment, which would otherwise not be accessible.

The above list is not exhaustive. If you are still unsure whether the sources you have are hazardous you could use information provided by suppliers, who have a duty under Section 6 of the Health and Safety at Work etc Act 1974 to design, manufacture and supply articles for use at work that are safe, so far as is reasonably practicable, in all reasonably foreseeable circumstances of use. If a source presents a risk of harm, they should provide information and instruction on how this risk should be managed as well as making sure the articles they supply for use at work are appropriately CE-marked.

If you are still unsure whether you have hazardous sources, you may wish to refer to a trade association who may have produced sector specific guidance and may be able to give advice. Other Standards and guidance may also be relevant. The European Commission will publish guidance later this year. A near final draft is at: <http://www.hse.gov.uk/radiation/nonionising/aor-guide.pdf>.

Note 3

If you use hazardous sources of light, you must put in place control measures to reduce the risk of harm to the eyes and skin of your workers, to as low as is reasonably practicable. This is the key requirement of these new Regulations.

Some sensible measures are suggested in List 3 below and should be considered on a case-by-case basis for your particular activity. Table 1 gives examples of work activities where hazardous sources of AOR are commonplace, the industries where they are used and the control measures considered appropriate.

In order for these controls to have the best chance of success, you need to involve your workers in developing and delivering them.

List 3 Control measures to consider when managing AOR risks

- Use an alternative, safer light source that can achieve the same result.
- Use filters, screens, remote viewing, curtains, safety interlocks, clamping of work pieces, dedicated rooms, remote controls and time delays.
- Train workers in best-practice and give them appropriate information.
- Organise the work to reduce exposure to workers and restrict access to hazardous areas.
- Issue personal protective equipment, eg clothing, goggles or face shields.
- Use relevant safety signs.

Whatever measures you use, you will also need to have a system for dealing with potential over-exposures, for example, referral to a physician or occupational health provider.

It is expected that using the right combination of measures in List 3 will make sure your workers are protected. The vast majority of businesses will be able to satisfy themselves at this stage that no further controls are needed.

If, after this process you still suspect that workers may be at risk, a more detailed risk assessment will be required which will include calculations or measurements. This should only apply in a very small minority of cases. If you have no experience of conducting these types of assessment, seek advice from a relevant trade association or a specialist consultancy and stop the work until you are satisfied that risks have been reduced to a sufficiently low level.

Note 4

If you employ five or more workers, the control measures you put in place should be recorded in a risk assessment and staff informed of them. Table 1 is an example of how this could be done. Also, a template is available at: <http://www.hse.gov.uk/pubns/indg163.pdf>.

Table 1 Work activities which use hazardous levels of Artificial Optical Radiation

What industries use hazardous sources of intense light?	What are the hazardous activities?	How might workers be harmed by the intense light?	What key measures do you need to consider?
Metal working	<ul style="list-style-type: none"> ■ Welding (arc and oxyfuel) ■ Plasma cutting 	<ul style="list-style-type: none"> ■ Damage to eyes – photokeratitis and photoconjunctivitis ('arc eye'), photochemical damage to the retina (blue light hazard) ■ Damage to skin – UV burn (erythema) 	<ul style="list-style-type: none"> ■ Provide face shields, coveralls and gloves ■ Protect others using screens/curtains/restricted access ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate
Pharmaceuticals and research	<ul style="list-style-type: none"> ■ Ultraviolet sterilisation and induced fluorescence 	<ul style="list-style-type: none"> ■ Damage to eyes – photokeratitis and photoconjunctivitis ('arc eye'), photochemical damage to the retina (blue light hazard) ■ Damage to skin – UV burn (erythema) 	<ul style="list-style-type: none"> ■ Provide protective eyewear and make sure other areas of skin are not exposed (ie provide lab coats and gloves) ■ Protect others using screens/curtains/restricted access ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate
'Hot industries'	<ul style="list-style-type: none"> ■ Proximity to furnaces, burners and hot metals/glass 	<ul style="list-style-type: none"> ■ Damage to eyes and skin – mainly early onset of cataract risk ■ Thermal discomfort 	<ul style="list-style-type: none"> ■ Engineered measures – remote controls, screening, interlocks, clamps to hold material ■ Provide face shields, goggles or other protective eyewear, coveralls and gloves ■ Enforced maximum working periods – routine change of activity ■ Protect others using screens/curtains/restricted access ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate

What industries use hazardous sources of intense light?	What are the hazardous activities?	How might workers be harmed by the intense light?	What key measures do you need to consider?
Printing and paint (motor vehicle repairs)	<ul style="list-style-type: none"> ■ Ultraviolet curing of inks and paints 	<ul style="list-style-type: none"> ■ Damage to eyes – photokeratitis and photoconjunctivitis ('arc eye'), photochemical damage to the retina (blue light hazard) ■ Damage to skin – UV burn (erythema) 	<ul style="list-style-type: none"> ■ Engineered measures – screening, automation, remote control ■ Provide face shields, goggles or other protective eyewear and ensure other areas of skin are not exposed by providing coveralls and gloves ■ Protect others using screens/curtains/restricted access ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate
Medical and cosmetic treatments	<ul style="list-style-type: none"> ■ Laser surgery (Class 3B and 4 lasers) ■ UV and blue light therapy ■ Intense Pulsed Light (IPL) 	<ul style="list-style-type: none"> ■ Damage to eyes from laser beams/IPL, including blindness ■ Laser/IPL burns to skin 	<ul style="list-style-type: none"> ■ Specialist advice may be needed for laser work ■ Provide face shields, goggles or other protective eyewear and coveralls etc ■ Provide gloves where appropriate (it is recognised that thin nitrile gloves may be needed for dexterity and that these will offer limited protection against laser burns) ■ Designated treatment rooms with restricted access ■ Curtains around equipment ■ Workers are at a distance from patients who are exposed ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate
Industry, research and education	<ul style="list-style-type: none"> ■ Class 3B and 4 lasers 	<ul style="list-style-type: none"> ■ Damage to eyes, including blindness ■ Laser beam burns to skin ■ Potential fire risk 	<ul style="list-style-type: none"> ■ Specialist advice may be needed ■ Engineered measures – enclosure, controlled areas, interlocks, remote controls, screening, clamps to hold material ■ Designated laboratories with restricted access ■ Provide face shields, goggles or other protective eyewear and coveralls/lab coat ■ Provide gloves where appropriate (it is recognised that thin nitrile gloves may be needed for dexterity and that these will offer limited protection against laser burns) ■ Include laser sources as part of fire risk assessment ■ Provide information and training ■ Display appropriate warning signs ■ Monitor and enforce use of control measures ■ If any workers are over-exposed, provide medical examination and consider whether follow-up health surveillance is appropriate

Further information

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This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

This document is available at: www.hse.gov.uk/radiation/nonionising/employers-aor.pdf.

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