

Lighting in Offices



This guide is intended to help employers and employees assess the health risks associated with lighting in their workplace. Such assessments can be no more than an examination of what, in the course of work, could possibly cause harm to people. By following this guide, you may identify hazards, the degree of risk and the possible solutions.

LIGHTING

Lighting is an essential provision for any workplace. It is preferable to provide uniform illumination over the entire workplace by combining both natural and artificial lighting. Localised lighting may be required in certain cases to cut costs and improve illumination. Good lighting helps us to see and to recognise hazards. It can reduce visual strain and discomfort. Poor lighting may affect workers' performance and health as poor visibility increases the chances of errors being made. It also means that people work slower. Besides, natural working posture may not be possible under poor lighting, thus resulting in musculo-skeletal strain.

(a) General & Uniform



(b) Localised



(c) Local

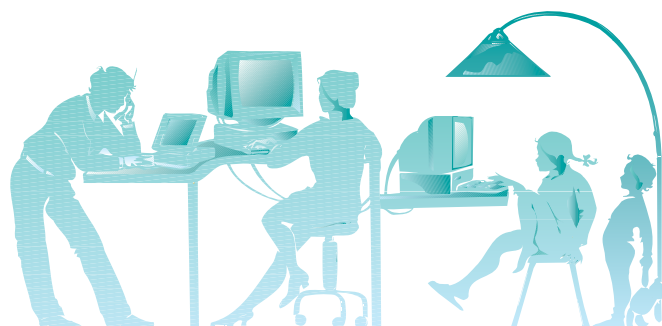


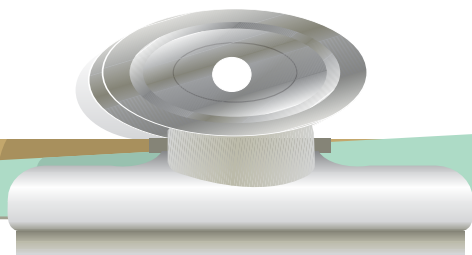
Fig. 1. Different Light Provisions

RISK ASSESSMENT

The following checklist is designed to help you assess the health risks at your workplace. Answer all the questions and if your answer(s) is the same as that indicating “potential hazards”, there are deficiencies in the safety system or there are situations that can cause health hazards/accidents. You are advised to go through the guidance materials presented in the following sections and apply suitable solutions to eliminate or reduce the health hazards. Should you get matched answers in question 2, 3, 4, 5, 6, 7, 8 or 10, you will probably experience visual strain or fatigue and may require immediate remedial actions.

The checklist may not cover all the situations in your workplace. You are free to add more or modify the questions to suit your specific needs.





Answers indicating potential hazards

- | | | |
|-----|--|-----|
| 1. | Is there only natural or general lighting provided in your workplace? | Yes |
| 2. | Are there sufficient light fittings and are they well distributed? | No |
| 3. | Are there any glare problems?
If yes, what is the glare effect like?
(Disability glare or Discomfort glare) | Yes |
| 4. | Does the lighting make a harsh contrast between your work and its surroundings?
(e.g. the desktop and the far corners) | Yes |
| 5. | Are the contrast and brightness of the task satisfactory, when it is compared with the immediate background? (e.g. the document relative to the desktop) | No |
| 6. | Are there any shadows cast across your work station? | Yes |
| 7. | Is the lighting too dim? | Yes |
| 8. | Is there too much light? | Yes |
| 9. | Is the lighting colour suitable for your activity? | No |
| 10. | Do any of the lights flicker? | Yes |
| 11. | Is there any heat radiation or hot spot effects from the lighting? | Yes |
| 12. | Do you experience visual strain or frequent headaches? | Yes |
| 13. | Do you work long hours in front of a computer screen? | Yes |
| 14. | Do you have access to the lighting controls? | No |
| 15. | Is there a schedule or a plan for maintenance of the lighting in your workplace? | No |

PROBLEMS & SOLUTIONS

Here are further comments and possible solutions to the problems that you may have found when you follow the assessment procedure.

1. In modern buildings, artificial lighting is essential for work. There should be facilities for general lighting, localised lighting or local lighting to suit different purposes. General lighting is designed for movement and casual work, such as filing. Localised lighting provides more intense illumination at the workstations. Local lighting units illuminate only specific work areas, like a desk.

Natural lighting is often unreliable and it varies with weather conditions, season and window spacing.

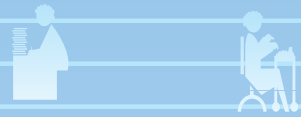


- Combine natural lighting with artificial lights to improve your workplace lighting.

2. General lighting installations are designed to provide uniform illumination over the whole workplace. Both quality and quantity of light are important.



- Light sources should be well located, illuminating the workplace as well as entrances and corridors.
- A workplace should have a comfortable and uniform illumination.



3. If lights are too bright, glare will result and may affect visibility.

Disability glare usually happens when broad-band light illuminates your workstation, like light from a window.



- Reposition your workstation to prevent such light sources falling within your field of vision. For example, align your workstation at right angle to windows and similar light sources.



Fig. 2a Disability glare from a light fitting



Fig.2b Disability glare from windows

Discomfort glare does not cause direct visual interference, but it can be annoying or uncomfortable. It can be caused by direct or reflected light. This can be avoided by



- reposition the light source(s) and, or your workstation appropriately,
- avoid the use of well-polished surfaces and
- reduce the contrast between your work area and its surrounding.



Fig. 3 Veiling reflections: the reflection of the lights is masking information on the screen.

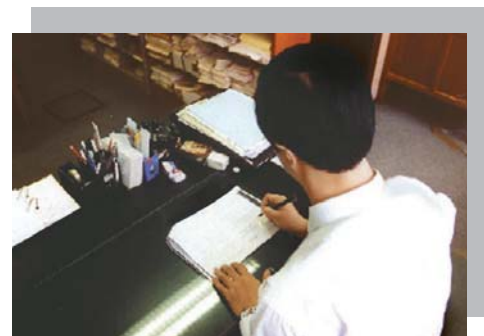


Fig. 4 Distraction reflection close to the line of sight.

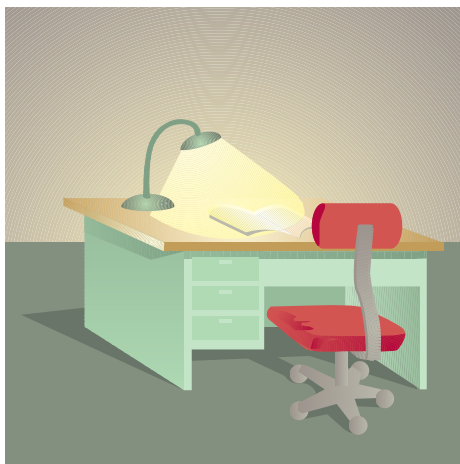
4. Optimum lighting conditions also depend on an optimum contrast between illumination of your workstation and its surroundings.



- The lighting contrast between your workplace and the surroundings should be no more than a ratio of 10:1. (For example: the desktop and the far corners of the room)
- A bright light source near the line of sight is distracting, but this can be reduced by ensuring your workstation is within the brightest part of the workplace.

5. The light contrast between your task at the workstation and its immediate background should not exceed a ratio of 10:3. (For example: the document and the desktop)

The working environment



Individual lamp in dark environment gives maximum concentration but prolonged work under such illumination will lead to visual fatigue.

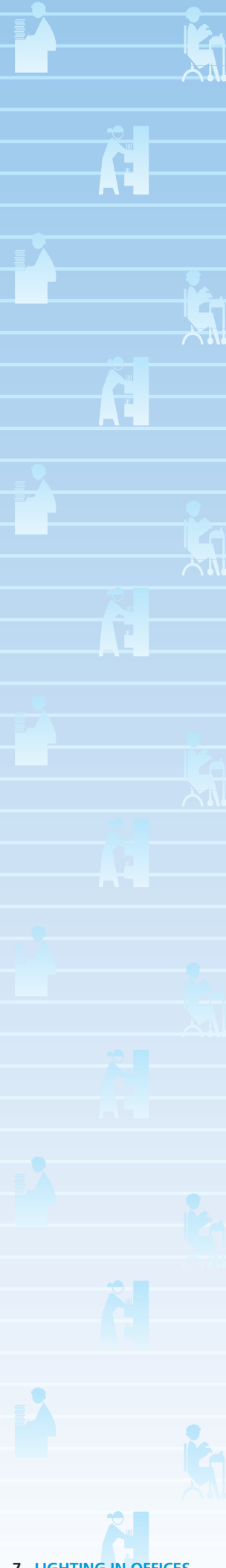



The changes between task illuminance and illuminance of immediate surroundings should be gradual to avoid harsh contrasts.

Fig. 5 Illumination and contrast



- The brightness contrast may be reduced by altering the intensity and direction of the nearby light sources.



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6. Backlighting will cast shadows of your head and, or body across your workstation. To avoid casting shadows, attention should be paid on the direction of the lighting.



- Change the direction of your nearby light sources may avoid the shadowing effect. It is preferable to have lighting from the left for right-handed person, and vice versa.

7. There are many causes for insufficient lighting: too little light, shadows or dirty light sources. Insufficient lighting may cause you to squint and is likely to cause eye strain. The optimum light intensity for workplaces depends on the task at hand. Some examples of optimum illuminance for special activities in an office are given in the appendix. For details, consult the health and safety personnel.



- The minimum level of illumination recommended for work in general offices is 200 lux.
- Local lighting can improve illumination of your workstation.

8. Fine works usually need more light but too much light can cause eye-strain.

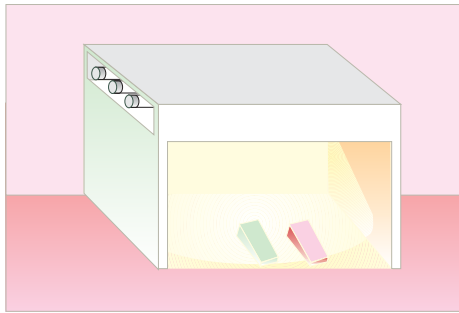


- Extra lighting can be avoided by removing lights from your field of vision or by reducing the light intensity.
- The optimum lighting for normal desk work is between 300 and 500 lux. It should not be less than 200 lux under any condition.
- Local lights that are easy to clean and to maintain can be used for precision work.

9. If you are working with colours, like paint or ink, the type of lamp you use will be important. Generally lamps with high luminous efficiency render colours poorly but fluorescent lamps give both good colour rendering and good vision.

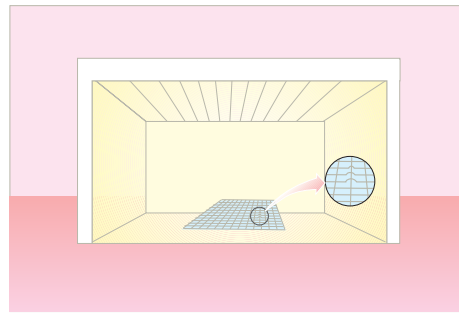


- Use daylight bulbs or fluorescent tubes for colour recognition tasks.



Inspection of colour

'Light box' with fluorescent tubes meeting the requirement of BS 950 allows colour matching of products.



Inspection of surface flatness

Irregularities in reflected image highlight defect on product surfaces.

Fig. 6 Lighting for inspection purposes

10. Light flicker is annoying and can cause visual fatigue and even accidents. The most likely causes of flicker in offices are old fluorescent tubes. It can also result from mechanical origins like rotating fan blades on the ceiling.



- Set up a lamp replacement schedule so that lamps are replaced before worn-out.
- Remove the cause of flicker.

11. All electric lamps emit both light and heat. Tungsten filament lamps or halogen lamps with reflectors may focus the heat radiation causing possible discomfort or burns. Arc eyes can result if an incandescent source gives off ultraviolet radiation too.



- Use 'air-handling' reflectors that disperse the heat, or
- Use uplighters to re-direct the light and heat radiation to the ceiling.
- Alternatively, use higher efficient lamps which demand a lower wattage, to reduce heat radiation.





Classification

Luminaire

**Upper-hemisphere
flux**

**Lower-hemisphere
flux**

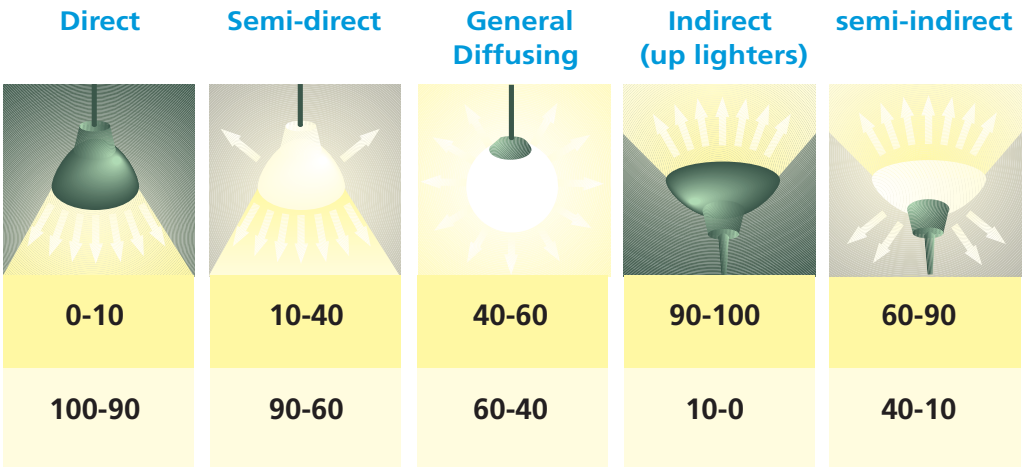


Fig.7 Light Distribution Classification

12. The signs and symptoms of visual strain are diverse and complicated, and come in three forms: ocular, visual and systemic. Ocular problems should be dealt with by an optician. Visual difficulties usually result from poor lighting contrast. The most common systemic symptoms are headache and eye-strain, which are usually not specific and are therefore overlooked.



- The causes should be identified and rectified.
- Short and frequent breaks may reduce the complaint.
- Regular eye checks are recommended for people needing glasses.

13. Working on a display screen equipment (DSE) is visually demanding. If the lighting condition of the workstation is poor, visual strain may result after long working hours. It may also make the workers to adopt unsuitable postures that lead to other forms of health concerns such as neck pain.



- General lighting or task lighting should be suitably provided in accordance with the nature of work and the visual demand.
- For detailed guidelines on working with display screen equipment, please refer to other relevant publications by our Department.

14. Flexible or adjustable lighting systems give you better control over your light sources. In addition, a knowledge of the best lighting conditions can bring the best of such equipment.



- Provide local switch for control of the lighting system.

15. The lighting system should be checked and maintained regularly (such as cleaning of and replacing bulbs). Ordinary filament bulbs and fluorescent tubes may last approximately 700 hours and 7,000 hours respectively.



- Implement a regular cleaning and maintenance programme for windows and the lighting system.
- Cleaning dirty lamps can improve the efficiency of the lights by more than 20%.

Appendix

Examples of optimum average illumination in offices

Task position or area	Optimum average illumination in lux	Notes
General offices	500	
Computer work stations	500	Local lighting may be required for reading a document
Drawing work stations	750	Local lighting is appropriate
Other areas, e.g. file storage and reception, telephone operators	300	

For details, please refer to our 'Guidelines for Good Occupational Hygiene Practice in a Workplace'.

FURTHER INFORMATION

For further information about the subject or assistance, please contact

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1. Introduction and Housekeeping
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THIS GUIDE IS

The Labour Department's contribution towards safety and health - a shared responsibility - and the Department's endeavour to serve the community.