

Australian/New Zealand Standard™

Interior and workplace lighting

Part 2.2: Specific applications—Office and screen-based tasks



AS/NZS 1680.2.2:2008

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PREFACE

This Standard was prepared by the Standards Australia/Standards New Zealand Committee LG-001, Interior and Workplace Lighting to supersede AS 1680.2.2—1994, *Interior lighting—Office and screen-based tasks*.

This Standard forms Part 2.2 of the AS/NZS 1680 series, which covers lighting of interiors and workplaces. It is intended to be read in conjunction with the general recommendations and requirements of AS/NZS 1680.1, and the structures of the two Standards are closely aligned to facilitate this. It is also noted that, in many cases, parts of various other Standards in the AS/NZS 1680 series will also be applicable, depending on the nature of the building and the visual tasks involved.

The AS/NZS 1680 series currently consists of the following:

AS/NZS

1680	Interior and workplace lighting
1680.0	Part 0: Safe movement
1680.1	Part 1: General principles and recommendations
1680.2.1	Part 2.1: Specific applications—Circulation spaces and other general areas
1680.2.2	Part 2.2: Specific applications—Office and screen-based tasks (this Standard)
1680.2.3	Part 2.3: Specific applications—Educational and training facilities
1680.2.4	Part 2.4: Industrial tasks and processes
1680.2.5	Part 2.5: Hospital and medical tasks
1680.3	Part 3: Measurement, calculation and presentation of photometric data
1680.4	Part 4: Maintenance of electric lighting systems

NOTE: Until the revision of this series is complete, some of the above Standards might have, as a main title, 'Interior lighting'.

The significant changes that have been made in this Standard in relation to the previous publication include the following:

- (a) Updating in line with the replacement of white-on-black CRT screens with coloured screens capable of producing a light-coloured background and flat, matt-finish screens.
- (b) Additional information in relation to glare.
- (c) Alteration of the recommended maximum glare index from 16 to 19 in all applicable areas (Appendix E).

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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Australian/New Zealand Standard

Interior and workplace lighting

Part 2.2: Specific applications—Office and screen-based tasks

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out recommendations for the lighting of offices and similar tasks, including screen-based tasks. While the tasks may be commonly performed in interiors called ‘offices’, they may also be performed in other interiors; for example, reading, writing and screen-based tasks frequently occur in most types of interior workplaces.

This Standard contains material that adds to or amends the recommendations in AS/NZS 1680.1:2006 and is intended to be read in conjunction with that Standard and with any applicable specific recommendations in other Standards in the AS/NZS 1680 series.

NOTE: See Appendix E for advice on ergonomic and other factors relating to the lighting and use of screen-based equipment (SBE).

The use of this Standard without reference to AS/NZS 1680.1:2006 is a misapplication of the Standard.

1.2 APPLICATION

If any recommendation in this Standard differs from the general recommendations of AS/NZS 1680.1, the recommendation in this Standard should prevail apart from departures from the illuminance recommendations in this Standard where it should be in accordance with the clauses specifically addressing this matter in Section 3 of AS/NZS 1680.1:2006.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
3590	Screen-based workstations
3590.2	Part 2: Workstation furniture
AS/NZS	
1680	Interior and workplace lighting
1680.1	Part 1: General principles and recommendations
1680.2.1	Part 2.1: Specific applications—Circulation spaces and other general areas
1680.2.3	Part 2.3: Specific applications—Educational and training facilities
2946	Suspended ceilings, recessed luminaires and air diffusers—Interface requirements for physical compatibility

1.4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 1680.1:2006 and those below apply.

1.4.1 Screen-based equipment (SBE)

Equipment which displays information on a screen. The term includes visual display units (VDUs), microform readers and optical comparators.

1.4.2 Visual display unit (VDU)

A device comprising a screen on which information is displayed. It may also include a keyboard or other device from which the display is controlled.

1.4.3 SBE workstation

A facility at which people may operate screen-based equipment (SBE). It includes desks and the facilities which accommodate the SBE, input device, documents and other associated equipment.

SECTION 2 GENERAL REQUIREMENTS OF GOOD INTERIOR LIGHTING

The following applies in addition to Section 2 of AS/NZS 1680.1:2006. Where any conflict arises between the two documents, the recommendations in this Section are to be applied.

Difficulties previously experienced with unwanted reflections, contrast dilution and poor visibility associated with screen-based tasks have now been largely overcome by developments in screen display technology.

While most of the visibility problems associated with conventional cathode ray tube (CRT) displays have been overcome, these problems are reappearing with the emergence of flat-screen displays (e.g. liquid crystal and gas plasma). In addition, older forms of monochrome CRT displays and microform readers may continue to be used for some time into the future.

It is therefore important that, where operators are involved in the prolonged use of this equipment, full attention be given to the control of distracting and contrast-reducing reflections.

Difficulties in reading screen-based text are not always due to poor lighting. Reading glasses, especially those with bifocal or multifocal lenses, typically assume that the reading material will be held at 300-450 mm from the eyes and in such a position that the reader will look through a lower portion of the lens while reading. As screen-based equipment (SBE) is often read at longer distances than this and with a line of sight closer to the horizontal, the solution to a problem with reading SBE screens might require a different design of reading spectacles either instead of, or in addition to, alterations to the lighting provided.

SECTION 3 TASK VISIBILITY

3.1 GENERAL

The following applies in addition to Section 3 of AS/NZS 1680.1:2006. Where any conflict arises between the two documents, the recommendations in this Section are to be applied.

3.2 RECOMMENDED ILLUMINANCES

Recommended values of maintained illuminance for various office and screen-based tasks are given in Appendix E. Although Appendix E assumes an office environment, SBE can be found in many other locations.

Because the information displayed on some SBE is self-luminous, the maintained illuminance provided by the general lighting for that type of equipment can be less than recommended for paper-based office tasks if the operator has only to attend to the information displayed on the screen. However, it should be noted that a working environment with a maintained illuminance of less than 160 lx may appear gloomy unless particular attention is given to the lighting and decor of the walls, ceilings and furnishings.

If the operator has to refer frequently to input text or reference manuals, or is required to take notes, the lighting system should provide a maintained illuminance over the task area of not less than the value recommended in Appendix E for such tasks. The required illuminance can be provided by local lighting; however, the illuminance on the task resulting from the use of local lighting should not be significantly greater than the applicable value recommended in Appendix E, so as to minimize adaptation problems for the SBE user. The local lighting should be arranged in accordance with Section 10 and should be capable of being switched off by the operator when not required.

NOTE: For further information on the use of local task lighting, see Clause 10.5.

3.3 CONSIDERATIONS FOR OFFICE TASKS

3.3.1 Diversity of tasks performed

Many different tasks are performed in offices, ranging from relatively simple filing tasks to intense study of a variety of documents, the production of drawings with fine detail and screen-based tasks. The visual requirements for these tasks vary although there are common factors.

It should be noted that some tasks may be located in vertical or near vertical planes, e.g. filing, noticeboards, copy stands. The recommended maintained illuminance should be provided on these surfaces in the plane in which they are normally used.

A feature which is common to most offices is that from time to time the tasks, and generally the associated lighting requirements, vary from one area to another within the space.

3.3.2 Need for flexibility

The considerations described in Clause 3.3.1 suggest that flexibility is a prime requirement of most office lighting systems. This means that it should be possible with the minimum of time and cost to vary an office lighting system. Where possible, provision should be made for changing the characteristics of the lighting by raising or lowering the illuminance, or varying the lighting arrangement by means of switching.

3.4 WORKSTATIONS

3.4.1 General considerations

A workstation is often thought of as involving one type of task. However, a number of different tasks may be performed, for example, reading, writing, filing, drafting, screen-based tasks, copying and communications systems. The foregoing tasks can be located on horizontal and (near) vertical planes. Some may be lower than the desk height of the workstation (e.g. some filing, tower-type computers and their controls and disk drives).

The lighting that is provided should be appropriate to the characteristics and likely duration of each task. For example, reading, writing and screen-based tasks might be sustained while filing might be intermittent.

A careful task analysis should be completed before designing the lighting for offices containing workstations. However, if task information is not available the advice given in Clause 3.4.2 should be considered if it is known that workstations are to be installed in an office space.

3.4.2 Influence of workstations on lighting design

This Clause treats the workstation as a task unit. The workstation is similar to some industrial tasks (e.g. a large machine). It not only has lighting requirements but, due to its large size, can have a major impact on the performance of the selected lighting system.

Recommendations for the preferred location of SBE and associated equipment, and consequent visual fields at desk-top screen-based workstations are given in AS 3590.2. However workstation layouts generally allow for a number of different seat and desk orientations. Therefore, predominant task viewing directions and the orientation of SBE screens within the workstation cannot be predicted with certainty (see Clause 5.2).

The use of workstations that are partially surrounded by medium-height partition screens (typically 1.5 m to 1.8 m above floor) requires special attention by the lighting designer, as the partition screens around the workstations create shadows and reduce the illuminance on the desk or bench area where the task is generally located. However, such partition screens can have a beneficial effect of reducing discomfort glare and, possibly, veiling reflections.

Because workstation partitions can obstruct direct light and reduce the amount of reflected light reaching the task area, it follows that solutions which involve provision of the required maintained illuminance by means of a general lighting system alone may have a high energy demand.

Workstation areas are therefore most suited to local lighting systems in conjunction with a relatively low level of general lighting (as environmental lighting) for the circulation spaces and non-critical task areas. This environmental lighting system should be designed to achieve the objectives stated in Section 10 of AS/NZS 1680.1:2006 and, where SBE is installed, to minimize unwanted reflections in screens.

3.5 SCREEN-BASED TASKS

3.5.1 General considerations

Screen-based equipment is now used in most types of workplace, and particularly in offices. Workspaces containing SBE can generally be lit in accordance with AS/NZS 1680.1:2006 provided that attention is also given to the specific recommendations of this Standard.

NOTE: Viewing distances for screen-based tasks may be greater than for paper-based tasks (see Section 2).

3.5.2 Influence of display characteristics

Screen-based tasks can be self-luminous (as with cathode-ray tube, LED and plasma screen displays), be back-lit (as with some liquid crystal devices), be transilluminated (as with some microform readers and optical comparators), be a luminous projected image (as with data projectors and some microform readers) or rely upon reflected light (as with some liquid crystal displays and 'falling letter' displays).

Each form of display has implications for the design of the lighting system in the interior in which the equipment is used. No recommendations are given for the characteristics of these display technologies, except to note those that are determinants of task visibility (see Clause 3.5.4). It is important that the nature of the display be determined as part of the task analysis.

3.5.3 Main objectives

The main objectives in lighting for screen-based tasks are to provide—

- (a) adequate task visibility (see Clause 3.5.4); and
- (b) a comfortable visual environment so that the task can be performed with minimum fatigue (see Clause 3.5.5).

The elements necessary to achieve these objectives will depend on the duration and complexity of the task.

NOTE: Careful attention should be paid to the recommendations in Clauses 3.5.4 and 3.5.5 where the operator has to work with the SBE for sustained periods. However, compliance with the recommendations in Clause 3.5.5 is less important where the SBE is used only intermittently or for brief periods.

3.5.4 Task visibility

For SBE, the legibility of the task depends on the following factors:

- (a) Properties of the image on the screen such as contrast, sharpness, letter height and spacing, line spacing; steadiness and freedom from perceptible flicker; luminance and uniformity of luminance and, especially in the case of some flat-panel technologies, the direction of view with regard to the screen and the illuminant (on the screen).
- (b) Properties of the screen surface with respect to the suppression of specular reflections.
- (c) Prevention of a noticeable dilution of image contrast resulting from unwanted reflections (see Section 5).

It will be necessary to provide appropriate lighting for any associated tasks (see Clause 3.4.1). Some flat-panel displays are not self-luminous but require lighting to reveal the task (as a shadow on a lighted backplane), e.g. some liquid crystal displays. Visibility can be dependent upon the direction of the lighting as well as the direction of view.

3.5.5 Visual comfort

Given adequate task visibility, visual comfort mainly depends on the following:

- (a) Freedom from distracting reflections in the screen (see Section 5).
- (b) Correct relationship between the average luminance of the task surroundings and that of the task itself (see Section 6).
- (c) Control of glare from luminaires and windows within the task surroundings (refer to Section 8 of AS/NZS 1680.1:2006).

- (d) Freedom from distractions in the task surroundings. The task surroundings should be as free as possible from unnecessary distractions, particularly the movement of people or objects. The risk of this type of distraction occurring increases as the operator's normal line of sight approaches the horizontal.

NOTE: The above assumes that the display device is capable of providing good visibility, is free from flicker, etc., and will not provide an excessive luminance contrast with the surrounds (i.e. that the screen is not 'too bright').