

Safety & Health Guides

for Working with DSE



職業安全健康局
OCCUPATIONAL SAFETY & HEALTH COUNCIL





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Introduction

With the rapid growth of information technology, the wide application of display screen equipment (DSE) to improve quality of work and efficiency are commonly recognized in all industries. However, there are trade-offs in developing upper limbs and back pain as well as other symptoms of visual discomfort and muscle fatigue if prolonged use of display screen equipment is resulted. The situation not only affects workers' health, but the work efficiency would also be fallen off. All these problems are related to the potential occupational safety and health hazards in DSE workplace, which include the design of display screen and sitting chair, lighting and ventilation at work environment and the posture adopted by the operators at workers.

The Occupational Safety and Health (Display Screen Equipment) Regulation came into operation on 4 July 2003. Under the Regulation, the person responsible for the workplace is obliged to perform risk assessment of DSE workstation and to take steps to reduce any risk identified in the risk assessment to the lowest extent as is reasonably practicable. Employers should ensure that their employees are provided with necessary safety and health training in the use of DSE workstations. Employees should on the other hand conform to the system of work and work practice and comply with the risk reduction measures.

In accordance with the effect of the Regulation, this booklet is designed to assist employers or those responsible for workplaces in effectively performing risk assessment, controlling the hazards and protecting the occupational safety and health of DSE users.



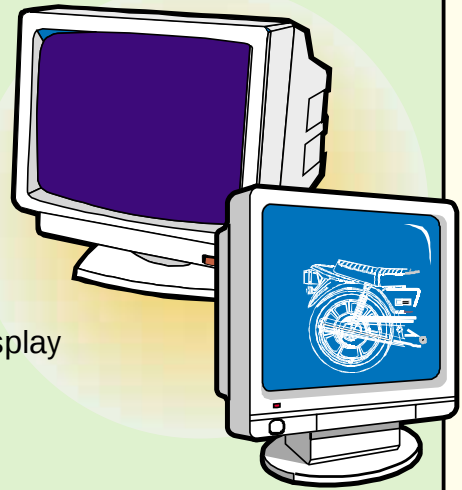


Definition of Display Screen Equipment (DSE)

Under the Occupational Safety and Health (Display Screen Equipment) Regulation, the definition of Display Screen Equipment is described as follows:

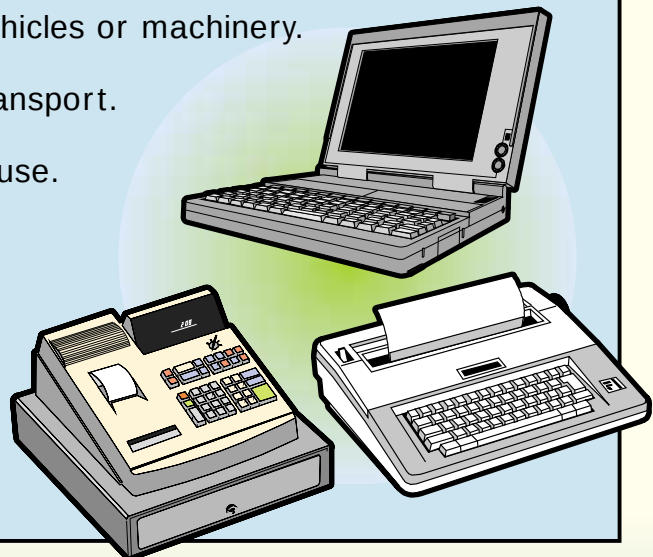
Inclusive

- any display screen which shows alphabets, numbers, characters or graphics.
- conventional display screens, such as cathode ray tube displays or flat panels.
- other display technologies, such as ordinary display technologies and microfilm viewers.



Exclusive

- DSE which is used mainly to show pictures, television or films.
- driver's cabs or control cabs for vehicles or machinery.
- DSE on board a means of public transport.
- portable systems not in prolonged use.
- calculators, cash registers or any equipment having a small data or measurement display required for direct use of the equipment.
- window typewriters.





Facilities of DSE Workstation

The workstation for operation of display screen equipment consists of the following facilities. Only with suitable types of facilities, DSE operation can be comfortably achieved and therefore protect the occupational safety and health of employees.

- the DSE
- the related furniture (e.g. chair, desk, work surface)
- the items peripheral to DSE (e.g. printer, document holder)
- the immediate working environment around the DSE (e.g. lighting, temperature, humidity, noise and ventilation)



Risk Assessment

Under Section 4 of the Occupational Safety and Health (Display Screen Equipment) Regulation, risk assessment of DSE workstation in the workplace is required before it is first used. The risk assessment consists of a process of :

- identifying the potential hazards of the DSE workstation;
- evaluating the risks to the safety and health of users of the DSE workstation;
- assessing the DSE workstation in respect of display screen, input devices, work desk, chair, accessories like document holder and footrest, and the work environment;
- deciding whether existing precautions are adequate;
- recording the findings and retaining the records for a period of at least 2 years after that particular DSE workstation ceases to be used by any user.



Potential Hazards Associated with the Use of DSE

Symptoms of upper limbs discomfort and pain, visual fatigue, muscle fatigue and mental stress are frequently associated with long hours of work with display screen equipment. The symptoms of somatic discomforts can adversely affect the workers' performance and also lower their work productivity.

Upper limb discomfort and pain

The body parts affected by prolonged DSE operation include hands, forearms, shoulders and neck. The short-term effect is the discomfort and pain induced by long hours of DSE operation. However, it can be aggravated by sustained posture as well. The long-term effect of prolonged DSE operation in static posture can be detrimental. The outcome can lead to development of cumulative musculoskeletal disorders.



Visual fatigue

Visual fatigue can be caused after a long period of viewing the display screen. Poor lighting and blurred image display are also the leading factors to cause visual fatigue. If high demand of viewing DSE work is required, complaint of visual fatigue is more prominent.

Muscle fatigue and mental stress

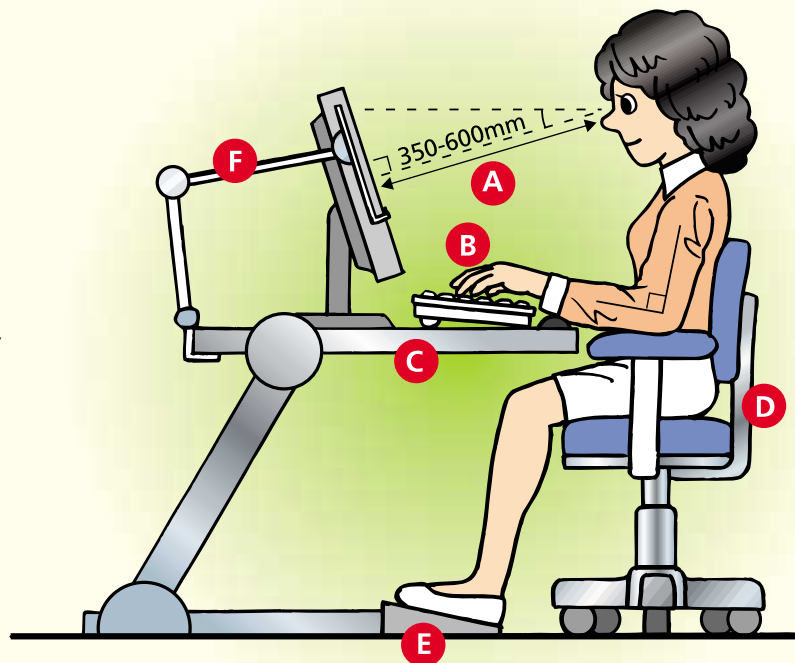
DSE operation usually involves repetitive and monotonous movement. The movement characterized by low exertion but frequent pumping of muscular work actually promotes the accumulation of metabolites and further initiates muscle fatigue. If demand of DSE operation is exceedingly high, it also increases the level of mental stress despite of the physical stress already imposed on the working muscles.





Noteworthy Characteristics in Workplace

DSE workstation is best designed in accordance with the ergonomic requirement in order to protect the safety and health of the operator. The main features of a DSE workstation design and the suggested precautionary measures are listed as follows:



A Display Screen

- the screen should give a clear, sharp and steady image.
- the characters should be of adequate size, with adequate spacing between the characters and the lines.
- the brightness and contrast of the image should be easily adjusted.
- the screen should be easily swiveled and tilted to suit the needs of the operator.
- the screen should be kept at a comfortable viewing distance at **350 - 600** mm and the first line on screen is suitable at about or just below eye level.





B Keyboard

- the keyboard should be as thin as possible, tiltable and detachable from display screen to accommodate frequent postural change of the operator.
- the keyboard should be neutral in color and non-reflective.
- the letters and symbols on the key tops should be clear and easily recognized.
- there should be sufficient space in front of the keyboard to provide support for the hands.
- the table edge should preferably be rounded.
- Use of wrist support is recommendable to alleviate muscle strain of hands if prolonged keyboard operation is required.
- forearm at about right angle to arm.



C Work Surface



- the work surface should be large enough for the screen, keyboard, mouse and other peripheral equipment.
- the height of work surface for the screen and keyboard should be adjusted to suit the needs of the user.
- Sufficient leg clearance should be kept under the work surface.



D Chair

- the chair should be adjustable in height to suit the body size of the user (**400 - 500** mm from the floor).
- the backrest should be easily adjustable in both height and tilt to provide adequate support to the lower back;
- armrests should not interfere with keyboard operation.
- the chair should have a stable base (a five-pronged base) and be provided with smooth castors for easy movement.
- the seat pan should be of appropriate hardness and the front edge should be scrolled.

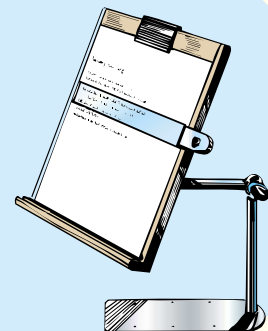


E Foot Rest

- a stable footrest should be made available to the user if the chair is too high for the feet to rest firmly on the floor.

F Document Holder

- If reading of documents and entering data are both necessary, provide operators with suitable document holder so as to avoid awkward neck posture and movement.





Working Environment

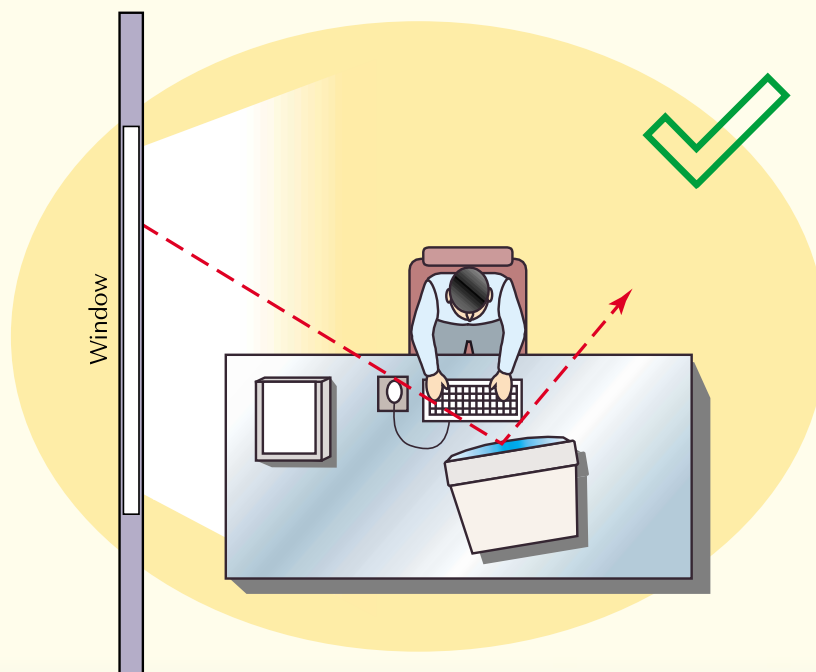
Sufficient luminance

- Suitable lighting and auxiliary lighting facilities should be provided according to the nature of DSE work and the visual demand on the operator. Suitable illumination for general office work ranges from **300** to **500** lux.



Avoidance of reflections and glare

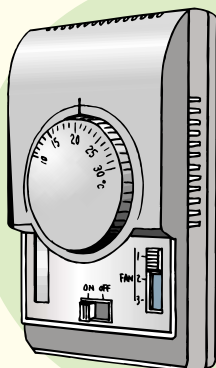
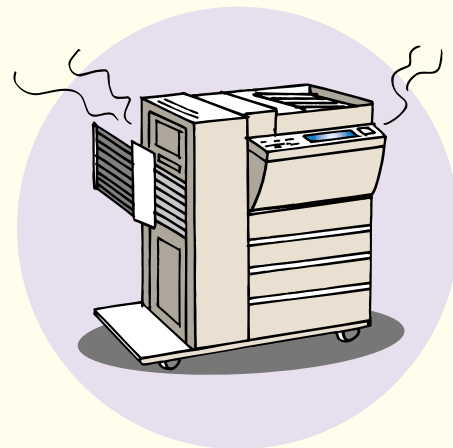
- Avoid placing the screen directly under the light sources or close to windows to eliminate glare and reflections.
- The screen should be perpendicular to the light sources and windows. Fit all windows with blinds to prevent excessive sunlight and to control lighting level.





Noise control

- Noise produced by the equipment such as printers and photocopiers in the workplace should be controlled to avoid nuisance to operators. Noisy equipment should be located away from the DSE workstation or placed suitable barrier to reduce the noise level.
- For general computer work, a noise level below 60dB(A) is optimal.

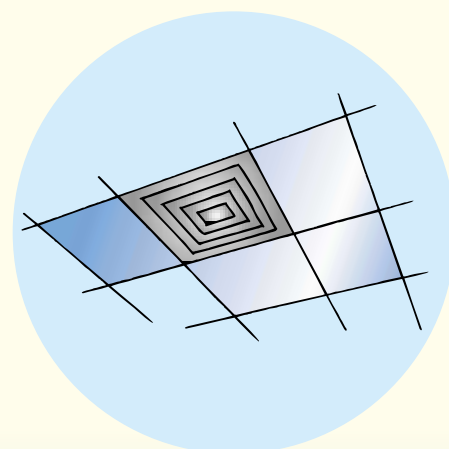


Suitable temperature and humidity

- The temperature and humidity at workplace should be kept at a suitable level to avoid discomfort to the operator: optimum temperature for office work is best kept at **23 - 26°C** (in summer) or **20 - 24°C** (in winter) with relative humidity between **40 - 70%**.

Sufficient supply of fresh air

- Suitable ventilation should be provided to the workplace to ensure sufficient fresh air supply.





Provision of Safety and Health Training

Employers should provide safety and health training on working with DSE. The content of training can be focused on the following items :

Viewing angle

- The operator should not only keep a comfortable viewing distance of **350 to 600** mm from the screen, but also should bear a comfortable viewing angle. The suitable viewing angle should be adjusted to accommodate the users so as to avoid awkward neck bending.



Keyboard operation

- The keyboard should be adjusted to a suitable inclination for proper keyboard operation. Excessive inclination can cause extreme wrist bending. Wrist position is best kept straight or at most slight inclined.



Position of mouse

- The mouse should be positioned at an easily reachable distance to the operator. It should be close to the area of operation so as to avoid overstretching of forearm but to keep the wrist in neutral position.

Sitting posture

- A correct sitting posture should have the back straight but allow no twisting at all. The back rest should be capable of providing support to the back of the operator in sitting position.
- Prolonged sitting is a static load to the body. Periodic postural change should be encouraged to facilitate blood circulation.



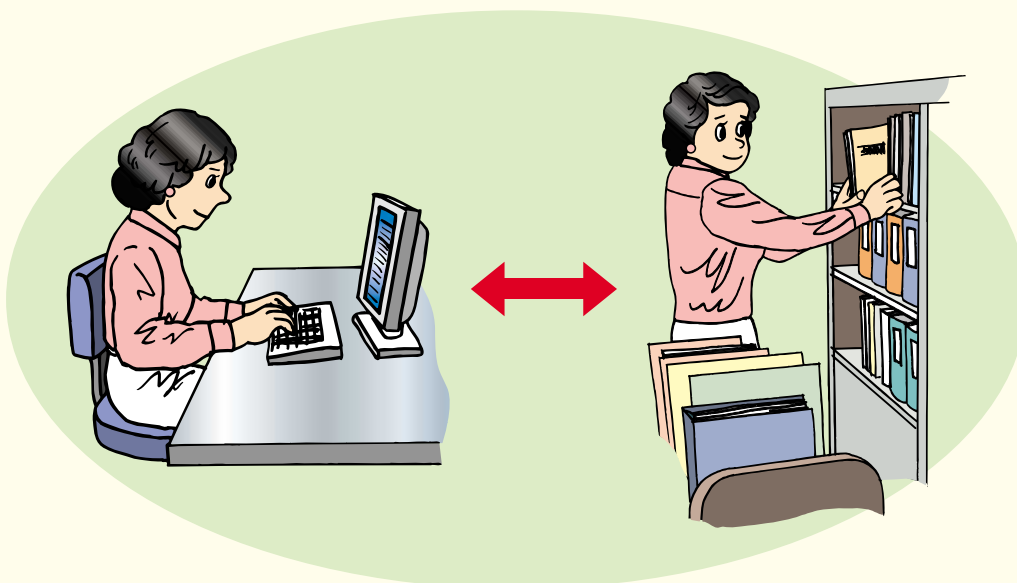


Rest break and stretching exercise

- Short breaks should be arranged to relieve muscle strain arose from prolonged keyboard operation.

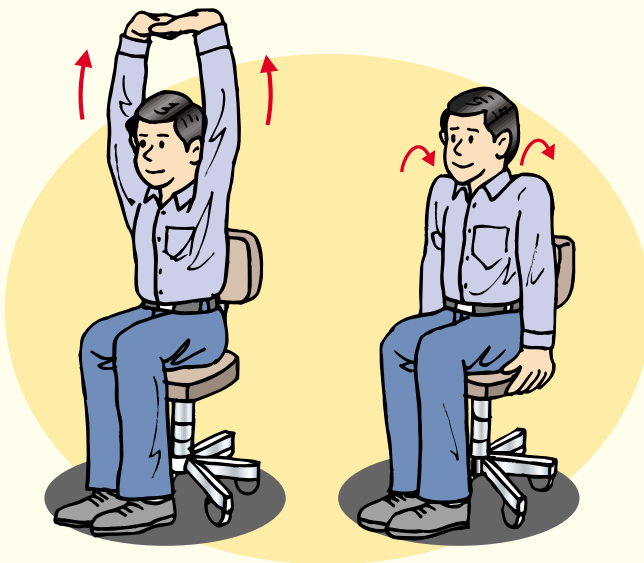
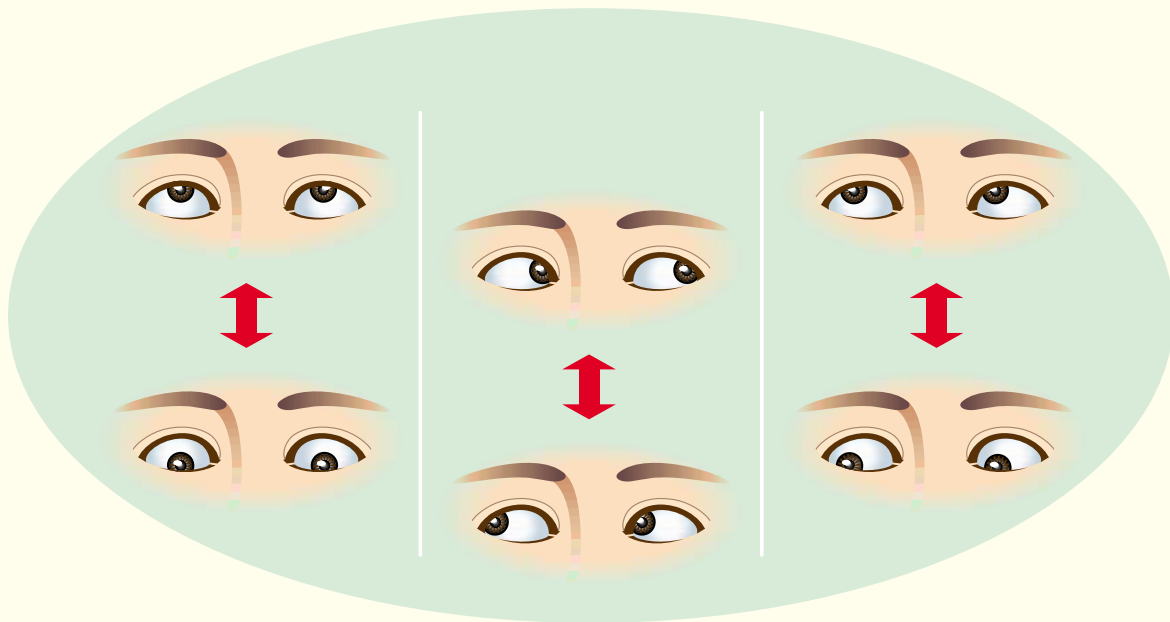


- Apart from DSE work, job allocation should also be planned in such a manner to incorporate different varieties (e.g. mix of DSE work with photocopying and other paper work). This arrangement not only helps to minimize static or repetitive movement, but also takes chances for different muscle groups to rest.





- If prolonged viewing of DSE is needed, viewing of distant objects is recommended to alleviate eyestrain. Exercises for visual comfort are highly recommended.



- Prolonged DSE work can induce muscle fatigue in upper limbs and low back. Stretching exercises for DSE operators are recommended during the rest breaks since the exercises are effective in reducing mental stress as well as muscle strain.



Inspection Checklist for DSE Workstation

Display Screen		Yes	No
*	1. Is the screen positioned in front of the user?	☐	☐
*	2. Is the first line displayed on screen at about or slightly below the eye level of the user?	☐	☐
*	3. Does the screen display a clear, sharp and steady image?	☐	☐
*	4. Are the displayed characters readable?	☐	☐
*	5. Are brightness and contrast easily adjustable?	☐	☐
*	6. Does the screen swivel and tilt?	☐	☐
*	7. Is the screen free from reflection and glare?	☐	☐
	8. Is the screen kept a distance away from the user (e.g. 350-600mm)?	☐	☐
Keyboard		Yes	No
*	9. Is the keyboard detached from the display screen?	☐	☐
*	10. Is the keyboard tiltable?	☐	☐
*	11. Are the characters on the keys of the keyboard/numeric pad readable?	☐	☐
*	12. Is the keyboard/numeric pad glare free?	☐	☐
*	13. Is there enough space to rest hands in front of the keyboard?	☐	☐
*	14. Is the keyboard positioned at about the elbow level?	☐	☐
	15. Do you rest on any wrist support pad for keyboard operation?	☐	☐
	16. While keying, do you keep your wrists in neutral position (not bending upward or downward)?	☐	☐
Mouse		Yes	No
*	17. Do you keep your wrists in neutral position (no deviation from two sides) while maneuvering the mouse?	☐	☐
*	18. Is the mouse positioned at about the elbow level?	☐	☐
	19. Is the mouse click in light touch feature?	☐	☐
Work Desk		Yes	No
*	20. Is the desk surface large enough for the screen, keyboard, mouse and documents?	☐	☐
*	21. Is there adequate legroom (depth, width and height) below the desk?	☐	☐



Chair		Yes	No
*	22. Is the base of the chair stable?	☐	☐
	23. Does your chair come with a stable 5-pronged base?	☐	☐
*	24. Are castors provided at the base to allow easy movement of the chair?	☐	☐
*	25. Is the seat height adjustable to suit the size of the user?	☐	☐
	26. Does the chair come with backrest?	☐	☐
*	27. Is the backrest adjustable in height and tilt to provide adequate back support?	☐	☐
	28. Does your chair come with armrest?	☐	☐
*	29. Do the armrests allow the user to get close enough to key comfortably?	☐	☐
*	30. Is the seat pan padded and free from sharp edges?	☐	☐
Document Holder		Yes	No
*	31. Is the document holder, if provided, properly positioned to avoid awkward neck posture and movement?	☐	☐
	32. Is the document holder stable enough to hold document?	☐	☐
Footrest		Yes	No
*	33. Is the footrest, if required, stable?	☐	☐
*	34. Is the footrest provided with a non-slip surface?	☐	☐
Illumination		Yes	No
*	35. Is the lighting level suitable for the work?	☐	☐
	36. Are there blinds or curtains available to block excessive sunlight through windows?	☐	☐
	37. Is anti-glare filter used to reduce glare on the screen?	☐	☐
Temperature / Humidity		Yes	No
*	38. Is temperature and humidity at workplace comfortable?	☐	☐
	39. Is the temperature at workplace kept at 23 - 26°C (in summer) or 20 - 24°C (in winter) with relative humidity between 40 - 70% ?	☐	☐
Noise		Yes	No
*	40. Is the noise produced by the workplace acceptable (e.g., photocopiers, binding machines, printers)?	☐	☐

Please feel free to use this checklist to assess your own DSE workstation. If you answer "NO" to any item, it may indicate further action is needed for workstation modification. To better cope with the health and safety of using DSE, you are more than welcome to refer to this booklet as a general guideline.

Note: * indicates those items under the statutory requirement of the Regulation and the rest of the checklist items are the best practice in operating display screen equipment.



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