18.3.1 GENERAL

The rapid and expanding use of computer technology and Visual Display Screen Equipment (VDSE) in all areas of industry, commerce, education and information systems such as the Internet and e-mail, that many employees may be at risk from a number of attributed VDSE health concerns and ergonomic difficulties. As a result legislation has been enacted to ensure employees are made aware and protected from any risks to their health and safety.

18.3.2 LEGISLATION

Part VII of the Safety, Health and Welfare at Work Act (General Applications) Regulations 1993, gives effect to the safety and health requirements for employees, who habitually use display screen equipment as a significant part of their normal work. The Health & Safety Authority (HSA) has defined this category of users as one who regularly uses VDSE for one or more continuous hours per day. (The term 'employee' covers permanent, fixed term/contract and temporary employees).

Employers Duties

- Employers are required to perform an analysis and evaluate health and safety at the workstations, with particular reference to eyesight, physical difficulty and mental stress
- All new VDSE workstations must immediately meet the minimum requirements as set out in Schedules 10 and 11
- Existing VDSE workstations must meet the minimum requirements of new workstations since 1st of January 1997
- These requirements include the various components of the workstation from chairs to display screens etc. to the general environment including lighting, noise levels, heat radiation and humidity
- The other duties of employers set out in Part II of the above Regulations viz. information, consultation, and training etc. also apply to Part VII.
- Employers must ensure that employees are properly trained and educated in the use of the workstation and given information about health and safety factors.
- Employees must also be allowed to have periodic breaks away from the VDSE or change in routine.
- Employees are entitled to an appropriate eye and eyesight test (or may opt for either) before working with the VDSE and at regular intervals. VDSE users have similar entitlements, if they experience visual difficulties.

18.3.3 HAZARDS ASSOCIATED WITH VDSE USE

The most common complaints arising from work activities with using computers are:

18.3.3.1 Musculoskeletal discomfort and repetitive strain injuries, now collectively referred to as Work Related Upper Limb Disorders (W.R.U.L.D.).
18.3.3.2 Eye fatigue and discomfort.
18.3.3.3 Fatigue and stress.
18.3.3.4 Other concerns.

18.3.3.1 Work Related Upper Limb Disorders (W.R.U.L.D.)

A range of effects on the arm, hand and shoulder areas linked to work activities with VDSE. These range from temporary fatigue or soreness in the limbs, to cramps, to on-going pain in the muscles or nerves.

These effects are probably due to a number of factors rather than any single cause. Holding the body rigid for a long time, such as neck and head, can cause discomfort in the muscles, bones and tendons. Awkward positioning of the hands and wrists relative to the work being carried out is another factor. This occurs when the hand is tilted above or below the line of the forearm and when typing or incorrect usage of the mouse.

18.3.3.2 Eye fatigue and discomfort

Eyesight varies from person to person and in the case of most people deteriorates with advancing age.

Users of VDSE may experience temporary eye fatigue, with symptoms such as failure to see clearly, red or sore eyes and headaches. Although eye fatigue is annoying, medical evidence shows that using VDSE does not cause permanent damage; nor does it make any existing defects worse.
Eye fatigue and discomfort can be caused by:

- Pre-existing eye problems or deteriorating eyesight.
- Staying in the same position and concentrating for a long time.
- Poor positioning of the VDU or document holders.
- Poor legibility of the screen or source documents.
- Poor lighting (recommended 300-500 lux), glare and reflections on screen.
- Poor job organisation and inadequate rest breaks.
- Drifting, flickering images on screen.
- Low humidity causing dryness of eye liquids.
- Certain medications, contact lenses, work stress.

18.3.3.3 Fatigue and stress

The volume and VDSE work carried out by users will vary widely between different offices and activities. The work will range from accounting, record keeping & revision, stock control to word processing. Some tasks require a high degree of concentration and vigilance, while others can be routine and even give rise to boredom.

Several symptoms, including fatigue can also be caused by stress arising from broader aspects of their work. For instance, employees who use the Internet for a regular and significant part of their work, face an avalanche of information and e-mail, which contributes to stress and loss of control. The condition now recognised as ‘information fatigue syndrome’ causes anxiety, bad temper, loss of concentration, sleep disturbance and forgetfulness. If information overload continues the employee may suffer increased illness.

Stress factors associated with VDSE use also includes:

- poor organisation of work
- high speed repetitive work
- working in isolation
- under utilisation of skills or perception of being undervalued
- lack of control of the employee over the pace of the work
- poor training or fear of new technology

18.3.3.4 Other Concerns, these include:

18.3.3.4.1 Electromagnetic Radiation
18.3.3.4.2 Facial Dermatitis
18.3.3.4.3 Photo-Sensitive Epilepsy

18.3.3.4.1 Electromagnetic Radiation

The first widespread concerns expressed about the use of VDSE were centred around x-ray radiation. Subsequently, interest widened to the whole of the electromagnetic spectrum and to extremely low frequency (ELF) and very low frequency (VLF) fields in particular.

This issue encompasses not only video display terminals (computer displays), but also other electromagnetic sources such as electrical wiring, televisions and household appliances. In the wider context it must also be recognised that radiation occurs naturally in the environment. Accordingly, exposure to radiation in employment accounts for less than half of one percent of exposures from all sources.

Studies in other countries have shown that, compared to accepted international limits for continuous occupational exposure, there are no significant radiation emissions from either the screen, sides or backs of Visual Display Screen Equipment. The development of VDSE with inherent shielding against radiation emissions is ongoing. Indeed most VDSE manufacturers are currently manufacturing equipment with electromagnetic emissions that are barely detectable using current detection equipment.

Before leaving this subject, it is worth mentioning that one of the most emotive issues concerning the operation of VDSE is whether it is likely to have adverse effects on pregnancy.

Investigations which have been carried out throughout the world - involving both the measurement of radiation emissions from VDSE and the study of groups of operators to identify any ill effects - have not been able to show VDSE operations as the cause of miscarriage or birth defects.
Needless to say, some women may still remain anxious and this anxiety and the stress it creates can itself cause problems. Any woman who has particular doubts should seek medical advice. The aforementioned information should largely be sufficient to allay undue concern or anxiety.

18.3.3.4.2 Facial Dermatitis
There have been a small number of reports in the past, of cases of facial dermatitis amongst VDSE users.

The static electricity produced by the VDSE electron beam coupled with the low relative humidity of the ambient air in some VDSE work places are believed to be partially responsible for the phenomenon. In addition the thermal environment may also be altered by the heat emitted from VDSE and other electrical equipment such as photocopiers.

Skin problems may arise if relative humidity is not kept within optimum levels i.e. a level of 40 to 55% relative humidity. High static electricity levels can also lead to problems. Workers with allergies and sensitive skin should seek medical advice if the problems persist.

18.3.3.4.3 Photo-Sensitive Epilepsy
It has been alleged that work with DSE will cause photo-sensitive epilepsy. Studies to date have discounted this fear. Photo-sensitive epilepsy is a relatively rare condition even amongst those that suffer from epilepsy. The prevalence rate in the general population is in the range of 1 in 5,000 to 1 in 10,000. As the most likely age for the onset of photo-sensitive epilepsy is in the 10 to 14 age group, the majority of those who are likely to suffer an attack will have done so before the age of 20. In rare cases, a person suffering from photo-sensitive epilepsy may have a seizure or fit triggered by the flickering light of the equipment. Increasing the refresh rate of a display screen can effectively eliminate perceptible flicker and remove the risk of triggering such an attack. Medical advice should be sought if the person is concerned about working with DSE.

18.3.4 RISKS
The risks associated with the aforementioned hazards are to be assessed by the Department (using the appropriate technical input where necessary). These assessments shall be carried out using:

(i) Check lists provided (where applicable) and

18.3.5 ARRANGEMENTS AND CONTROLS REQUIRED
These hazards and risks will be minimised by the following arrangements and controls:

- All staff must be fully trained with the use and precautions to take when using VDSE
- The design of each VDSE work-station to take account of the equipment provided, the nature of the work and the size/physique of the operator(s)
- The organisation of jobs so that display screen use is interspersed with other tasks such as filing, writing, etc. Failing this, planned five minute breaks, which rest the eyes, should be introduced every hour.
- Consultation with staff in relation to hazards and proposed improvement measures
- Education of staff with respect to healthy leisure pursuits and work activities

18.3.5.1 Screen
- The positioning of visual display screen equipment relative to sources of natural and artificial lighting, so as to prevent reflectance and glare. This may be achieved by the location of VDSE at 90° to external windows and to the longitudinal line of fluorescent lighting and the use of window blinds where necessary. (Anti-glare screens may also be used as a last resort)
- The provision of visual display screens which may be tilted at angle 20° upwards and 5° downwards
- The provision of visual display screens where brightness and contrast may be adjusted
- The use of visual display screens with minimum character height of 3.8mm to 4.5mm in the 350mm to 600mm viewing range (maximum viewing range 700mm). The regular cleaning of display screens (weekly minimum)
- The positioning of display screens at least 15° below eye level, with the monitor tilted back and at a viewing range of 45 to 70 cm
18.3.5.2 Keyboard
- The provision of detachable key boards which are adjustable in height and which allow the operator to find a suitable working position. (The keyboard should be angled between 5° and 11° and the second row of keys should not be higher than 30mm from the desk surface. Key size, from right edge of an adjacent key, to right edge of the next key, should be between 18 to 20mm)
- The provision of document holders immediately adjacent to each visual display screen, to avoid the need for rapid operator head movements and frequent changes in eye focus/focal length
- The position of key boards so that operators directly face the keyboard when in the seated position (no upper torso rotations required)

18.3.5.3 Heating/Ventilation
- The provision of air temperatures of between 19°C. to 23°C.
- The provision of an air environment with a relative humidity range of 40 to 55%
- The provision of regular air changes (mechanical air conditioning) or openable windows (natural ventilation)

18.3.5.4 Noise
- The provision of background noise levels of less than 60dB(A)
- The location of noisy printers and photocopiers away from VDSE or the fitting of printers with acoustic hoods

18.3.5.5 Lighting
- The provision of lighting levels at VDSE work stations of between 300 and 500 lux. (Lighting levels may be supplemented by the use of desk lamps, provided reflectance/glare does not result)
- The use of fluorescent tubes with the characteristics of daylight, or tubes with a colour temperature of 3500-4000K
- The use of double fluorescent tubes instead of single tubes to minimise the effects of flicker
- The provision of lighting diffusers or louvres on all overhead lights
- The regular cleaning of lighting diffusers i.e. twelve monthly programme
- The establishment of a pro-active maintenance and replacement programme on VDE illuminaries within VDSE equipment areas
- The provision of blinds on windows where glare is occurring and it has not been possible to reduce glare by the re-positioning of VDU equipment. (Blinds with horizontal or vertical strips)
- The replacement of illuminaries when their output decreases below 70% of their original maximum (pro-active replacement)
- The location of overhead illuminaries/VDSE screens so that display screens are located at 90° to the longitudinal line of overhead illuminaries.

18.3.5.6 Desks
- The provision of VDSE work desks with the following dimensions:
  - Width 1200mm to 1600mm
  - Depth 500mm to 1000mm
  - Height 630mm to 790mm
  - Thickness 15mm to 30mm

Available space in addition to the area taken up by the display and keyboard (min. 600mm for writing)
- The location of illuminaries/desks so that the angle between the horizontal and the line from the eye to an illuminary overhead is more than 30°
- The provision of sufficient space under the desk for thigh, legs and feet clearance when the VDE is in use
- The provision of a minimum of 50mm to 100mm desk space in front of the keyboard to support the operators wrist when a keyboard is not in use
18.3.5.7 Chairs
• The provision of chairs that have fully adjustable seats and back-rests (height and tilt), with a 5 star base and with the following features:
  - Seat height adjustable: 380mm to 540mm (adjustable from seated position)
  - Seat width: 400mm to 450mm
  - Seat depth: 380mm to 420mm
  - Seat angle: Knees should be 5° higher than hips when seated
  - Back rest: Height adjustable and tilt adjustable (90° to 110° range.)
Back rest should have as large a surface area as possible to support the operators lower back
• The adjustment of chair height when the keyboard is in use, so that when an operator is seated, there is a 70° to 90° angle sub-tended between the outstretched forearm and the upper arm.

18.3.5.8 Computer Mouse
• Where a mouse is provided with your computer system, place it at the same height as your keyboard
• Move your entire arm when sliding the mouse around your desktop. Avoid resting your arm on the desk and simply bending your wrist as you move the mouse.

18.3.5.9 Telephones
• Telephones should be placed near at hand. Headsets should be considered for receptionists/typists

18.3.5.10 Laser Printers
Ozone gas, which can be a mild to severe irritant is emitted in detectable levels by almost all laser printers (and photocopiers) as a by-product of the electro photographic process. Fortunately, ozone is an unstable molecule that quickly breaks down to oxygen. Proper set up and maintenance of laser printers can allow this natural process to occur unimpeded.

In laser printers, the primary source of ozone is the corner wire, which produces an electrical discharge that makes the toner powder temporarily adhere to the print drum just before the paper passes over the drum. Ozone is not produced when the printer is not printing.

To ensure that the level of ozone emissions is safe, laser printer manufacturers install a special filter. The ozone emission control system should be checked and the ozone filter replaced every 50,000 pages. Dusty conditions or damage to the filter may necessitate more frequent filter replacement.

• Printers should be placed in a well-ventilated area as remote as possible from an individuals immediate work space. Exhaust fans should blow away from people who sit nearby.

18.3.6 ARRANGEMENTS AND CONTROLS
The details of the Arrangements and Controls in place and those required in the short, medium and long term, shall be set out by the Department in the forms provided in Document No.4 i.e. Departmental Safety Action Plan (D.S.A.P.). These Arrangements and Controls shall be reviewed and updated on a yearly basis.

18.3.7 RESPONSIBILITIES
The following personnel are responsible in the Department/Office/Area for ensuring the implementation and ongoing compliance with the aforementioned arrangements and controls.

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[N.B. See also Appendix VI, Idealised VDU Workstation (pictogram) and Appendix VII, VDU User – Eye Care Guide]