
Ergonomic requirements for office work with visual display terminals (VDT's)

ISO 9241-5:1999 - Summary

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ISO 9241-5 SUMMARISATION:

Part 5 of ISO 9241 deals with the ergonomic guidelines surrounding office tasks that use Visual Display Terminals (VDTs). The guidelines take into consideration user requirements, design factors and the acquisition of workstation equipment.

The aims of the document are to ensure optimal work place design and usability at VDT workstations. This is best achieved through detailed task analysis that takes into account:

- Major tasks and their inter-relationships
- The position and use of the hands

Task analysis of a VDT workstation must consider the following principles:

- *Versatility-flexibility*. It should be possible to perform a range of tasks at the workstation.
- *Fit*. A fit needs to be attained between task requirements and user needs.
- *Postural change*. The workstation should encourage voluntary changes in posture.
- *User information/education*. Users should be informed why and how to adjust the workstation equipment.
- *Maintainability/adaptability*. Maintenance access must be easy and workstations should be designed to adapt to changing requirements.

The main body of ISO 9241-5 deals with the requirements and recommendations for the design of VDT workstations that will ensure comfortable and efficient use. The most important things to consider in determining appropriate VDT workstation layout and design are:

- Seat and work surface
- Line-of-sight angle
- Work surface and keyboard height
- Knee clearance
- Forearm inclination and positioning
- Elbow height

Workstations should be designed to be suited to several tasks, such as, screen work, keyboard input, writing etc. Furniture, equipment and work environment may be designed to be used in seated or standing positions, and where possible, alternation between the two is preferable. The philosophy of ISO 9241.5 is that work organization; task and workstation design should promote continuous voluntary posture changes to reduce static work and postural fixity.

Postures:

Where designing using anthropometric data the following reference posture is recommended.

- Thighs positioned in an approximately horizontal position, the lower legs vertical, seat at or a little below, the popliteal height of the operator.
- Upper arms hanging vertically and the forearms horizontal or angled downwards.

- No deviation or extension of the wrists
- An erect spine
- The sole of the foot should be at 90 degrees with the lower leg
- No twisting of the torso
- The line of sight between the horizontal and 60 degrees below the horizontal.

Seated workstation:

The purpose of seating is to provide stable support, which allows movement, comfort and fulfillment of tasks. Any workstation should allow for changes of seated posture.

Standing workstation:

A standing posture is recommended if it can be interchangeable with a sitting position.

Ease Of Adjustment:

Furniture adjustment controls should be intuitive, convenient and designed so that they facilitate correct usage. The controls should be located so that they are not outside of workspace reach envelopes defined in the 'postures' section.

Support Surfaces:

A VDT workstation should provide support for the equipment; screen, input devices, and associated materials, as well as for the operator's arms and hands.

All furniture and support surfaces for work equipment must allow adequate space for the operator's anthropometric characteristics and room for postural change. For both seated and standing workstations, allowances need to be made to provide adequate space for the user population at, under and around the workstation. The main considerations are clearance for thighs, knees, lower legs and feet.

Viewing distances and angles of view:

An operator should be able to angle, tilt or swivel the visual display so that:

- a relaxed working posture can be maintained regardless of the individual's eye height;
- accommodative effort is minimized;
- reflections and glare are minimized.

Height adjustment is also preferable. Any adjustability of the display should be by means of purpose specific furniture or devices at the workstation, and not dependant on the operator propping up or moving the unit with books or manuscripts. Mechanisms for adjustment should be intelligible, unambiguous and easy to use.

The angle of view should not exceed 40 degrees anywhere on the visual display. Operator's individual characteristics and task requirements will influence optimal

viewing distance and angles. It is important that display location maintains a neutral working posture at all times.

The finish of all work surfaces at a VDT workstation should minimize light reflections, avoid energy loss to contact surfaces and be finished with no sharp edges or corners.

Safety and stability.

The workstation should, when loaded with intended equipment, be stable and not tip or move if a person sits or leans on one edge or side. The levels of inherent or transmitted vibration should be as low as possible.

Work Chair

The purpose of seating at a VDT workstation is to provide stable, comfortable body support that is appropriate to the task performed. In order to be comfortable and safe over a period of time, the following should be considered:

- blood circulation to the lower limbs is unrestricted,
- maintenance and changes of posture are easy,
- there is support for the spine,
- the surface has friction (to prevent sliding) and is permeable.

The work chair must fit the intended users. Adjustability where possible is preferable, to provide a fit for the following design factors for a larger population:

- seat depth
- seat height,
- seat width,
- back support,
- arm support (if provided).

Seating should as far as is possible encourage changes of posture.

Arm support can be useful for supporting the muscular system of the neck and shoulders, and as aids for transitions between sitting and standing. Where armrests are provided should not restrict the operator's preferred working posture or accessibility to the workstation.

Additional support elements:

In tasks where VDT operators work from a source document or form of hard copy, a document holder is recommended. This allows the document to be positioned in a similar plane as the display, reducing musculoskeletal and eye movements. Document holders should be adjustable in height, angle and distance to allow for different users.

Footrests are useful in maintenance of the desired neutral body posture where an operator's feet do not rest flat on the floor, and in providing alternative postures at a workstation.

Positioning of the keyboard and other input devices on the work surface, and provision of support for the hands wrists and forearms, reduces the loading on the upper limbs and shoulders. Support for these areas can also reduce unnecessary extension and flexion of the wrist.

A VDT workstation should incorporate all these points in order to be safe, comfortable and efficient.