# ANSI/HFES 100-2007

## *Human Factors Engineering of Computer Workstations*

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# FOREWORD

This standard contains hardware design specifications that are based on accepted human factors engineering research and experience for computer workstations, their associated furniture, and the end user's workplace environment. This standard was developed by the Human Factors and Ergonomics Society (HFES), using the rules and procedures of the American National Standards Institute (ANSI).

This edition is the first revision of ANSI/HFES100-1988, *American National Standard for Human Factors Engineering of Visual Display Terminal Workstations*. This edition of the standard incorporates several extensions based on technology advancements and increased human factors knowledge to the technical areas discussed in ANSI/HFES100-1988.

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# 1 PURPOSE

This technical standard specifies acceptable applications of human factors engineering principles and practices to the design and configuration of the human-hardware interfaces in computer workstations.

For the purposes of this standard, the term *computer workstation* refers to an operator-machine system consisting of a computing unit and, more important, several associated hardware components that form interfaces with the users of the system. The user interfaces addressed by this standard are input devices, output devices, and furniture. Because the application of human factors engineering principles and practices requires the consideration of specific end-user situational constraints, this standard also considers the configuration of the installed workstation components and the ambient environment immediately surrounding the computer workstation.

This standard applies to computer workstations used regularly in office workplaces by users with normal perceptual and cognitive capabilities for text-, data-, and simple graphics-processing tasks. It is specifically intended for moderate to intensive computer users. The specifications in this standard are not intended to apply to the diverse uses of computers beyond the office workplace application stated above. Although generalizations of some specifications contained in this standard to other applications may be reasonable and justifiable, it must be recognized that such generalizations exceed the scope of this standard. For example, health and safety considerations for users of computer workstations are beyond the intended purposes and stated scope of this standard.

Implementation of this standard and the assessment of conformance with this standard should be performed by trained and knowledgeable human factors engineers and ergonomists. These professionals may have technical responsibilities, in whole or in part, for the design, installation, and inspection of computer workstations and their associated components.

Many specifications contained in this technical standard are presented in a quantitative manner; that is, as numbers representing acceptable design limits. Such specifications are based on accepted empirical data and established human factors engineering principles and practices. Users of these specifications should follow acceptable human factors engineering practice when tailoring the specifications contained in this standard to particular computer workstations and user populations.

NOTE: All normative dimensions in this standard are given in SI units (meter, kilogram, seconds). Dimensions given in US customary units such as inches, pounds, etc. are presented for advisory purposes only and are non-normative.

# 2 GENERAL SCOPE

This standard covers operator-machine interface issues associated with computer workstations used regularly in offices (i.e., intentionally built indoor office workplaces) for text-, data-, and simple graphics-processing tasks. This standard applies to computer workstations for a wide range of users; in general the physical dimensions and force requirements are designed to accommodate at least 90 percent of the North American population.

## User Diversity[1]

"In general, the design specifications for the computer workstation components are intended to be equitable; that is, the design accommodates people with diverse abilities."

However, users may vary in their ability to perceive information that is statically presented or dynamically supplied by the computer workstation, in their ability to understand how to use the product, and in their ability to operate the product. Some users may need to use assistive devices with their computer workstation components. For example, a user with tremor or limited eye-hand coordination might need a special keyboard with increased spacing between the keys.

In some instances, the most practical or feasible means of achieving accommodation of diverse users may be through the use of software intended to be used with the workstation component, such as device drivers, rather than through the physical properties of the device. For example, it may be more practical to adjust key repeat rate via software controls than to build variable activation delays into a key switch circuit.

Because of the very nature of diversity, it is difficult and perhaps even contradictory to attempt to specify a unique set of design criteria that will accommodate all users. For example, a user with very limited strength may require that keys on an input device respond almost instantaneously to a light touch, yet a user with an intentional tremor may require that the keys respond only to a sustained high level of force. At present the research literature does not suffice to answer these accommodation questions, at least at a level sufficient to allow specification.

Similarly, the current state of knowledge does not allow us to determine if there is a single set of design criteria that will result in a computer workstation component suitable for all possible users. However, it is possible to provide designers with some general principles regarding features of computer workstation components that will support accommodation.

## General Guidelines

### *Perception*

Computer workstation components, either separately or in combination with supporting software, should facilitate diverse users' ability to perceive statically or dynamically displayed information such as

- Key labels
- Key locations
- Feedback from operation of the device
- Status of toggle keys, for example, number lock and capital lock

[1] The Human Factors and Ergonomics Society wishes to acknowledge the kind permission of the International Standards Organization to use this material related to user diversity.