

# Standards for Computer Workstations at Duke

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# Duke Ergonomics Division

## Standards for Computer Workstations at Duke

### I. INTRODUCTION

These technical standards and guidelines are based on ANSI/HFES 100-2007 standard, Human Factors Engineering of Computer Workstations, and apply to computer workstations used regularly in office environments at Duke University and Duke University Health System.

In general, computer workstations at Duke University and Duke University Health System should be **adjustable** to fit the widest range of users, 5<sup>th</sup> percentile female to 95<sup>th</sup> percentile male. Options are available for employees outside of that range, or those with specific medical needs, and they should be accommodated accordingly.

Computer workstations should meet the ANSI/HFES 100-2007 standard (*American National Standard for Human Factors Engineering of Computer Workstations*) and the OSHA Document, 3092 *Working Safely with Video Display Terminals*. Per OSHA, this is particularly critical if employees use computers for prolonged periods of time (> 4 hours per day).

Following are standards and guidelines for computer workstations as recommended by the Duke Ergonomics Division.

## II. GENERAL TASK SEATING

### ***A. For Duke employees who sit for more than four hours per day or who have chronic back pain, task chairs shall have:***

1. An independent backrest height adjustment with space for buttocks between the backrest and seatpan.
  - a. The mid-lumbar portion of the backrest should range in height from 7.5 inches to 11 inches from the seatpan.
  - b. Backrests should be at least 9 inches high by 12 inches wide and should include a pronounced lumbar support that protrudes forward from the seat back.
  - c. The backrest of the chair should provide support to the lower and upper regions of the back.
  - d. Mesh backs should be avoided for those with chronic back pain.
2. Seat cushions should be made of high density foam and cloth fabric for breathability.
  - a. Polyurethane may be required in “clean” areas.
  - b. Mesh seats should be avoided due to contact stress from the frame.
3. Pneumatic seat height adjustment, ranging from 16 to 20.5 inches from the floor. (Footrings or footrests should be attached to chairs with taller cylinders such as lab stools or tall footrests should be provided.)
4. Adjustable seatpan depth.
5. Minimal contouring of the seatpan.
6. Minimum of 5 star base.
7. Casters should be appropriate for the flooring type. (Rubber casters for linoleum and tile, nylon casters for carpet.)
8. Backrest tilt, minimum range of 90 to 105 degrees.
9. Removable and adjustable armrests (height and width) or no armrests.

### ***B. For Duke employees who sit for four hours or less per day, task chairs should have as many of the above features as possible.***

\*\* NOTE: Options should be made available for employees who are tall, petite, or those who may exceed the chair’s recommended weight limit. Some individuals may require different chair features to accommodate specific medical conditions. It is preferable to provide several chair options to employees rather than assume one size fits all. A variety of chairs can be upholstered with matching fabric to provide a uniform look.

### III. COMPUTER WORKSTATIONS

**A. For Duke employees who use computers more than four hours per day, computer workstations shall have:**

1. Adjustable-height keyboard trays or adjustable-height work surfaces
  - a. The height of keyboards and input devices should be adjustable within a range of 22 to 29 inches for seated workstations and 37 to 50 inches for standing workstations.
  - b. A full range of 22 to 50 is preferred for sit to stand workstations.
2. All keyboard surfaces must be able to accommodate a mouse or other input device directly beside the keyboard.
  - a. The input device should be usable on either the right or left side of the keyboard.
  - b. Obstructions under keyboards should be minimal.
  - c. Thin profile (1/4" to 3/8") single platform keyboard trays are recommended.
  - d. Separate mouse surfaces are not recommended.
  - e. Adjustments should be possible without the use of knobs or levers.
3. Input devices should not be "handed" and should be usable with either the right or left hand. Devices that require repetitive use of the thumb should be avoided.
4. Monitors should be as adjustable as possible (height, depth, and angle). Options are to provide monitors with a built-in height adjustability feature or use a monitor arm.
5. Laptops should be placed in a docking station and should include a separate full-size monitor, full-size keyboard, and input device.
6. Document holders may be indicated if employees frequently refer to documents.

**B. For Duke employees who use computers for four hours or less per day, computer workstations should have as many of the above features as possible.**

**C. General Recommendations for All Computer Workstations**

1. It is best to provide employees with workstations that are designed for computers rather than for some other function.
2. Workstations with built-in or recessed areas for keyboards should be avoided as they are not adjustable and generally do not provide enough work area for using input devices such as a mouse.
3. If built-in work surfaces are used they should follow the height recommendations listed in Table 1 below.
4. The work surface depth must be a minimum of 24 inches deep to ensure adequate viewing distance to monitors and room for mounting keyboard trays.
5. Monitor height should be adjustable through the use of adjustable monitors, monitor arms, risers, or platforms if needed.
6. Workstations with monitors recessed under glass, below the work surface are appropriate in some cases such as training areas or other short-term use areas but are not recommended for every user.

7. As an option to keyboard trays, work surfaces can be set to the user’s seated elbow height as long as sufficient work surface depth (24 inches minimum) is available.
8. Sit to stand workstations are an option to keyboard trays, provided the height range is appropriate for the employee’s seated and standing elbow height (generally 22-50 inch height range).
9. For employees who are required to simultaneously write and use a computer, a corner configuration is not appropriate. An L-shaped configuration is recommended with the keyboard tray on a straight surface directly in front and a writing return adjacent to the dominant hand. (Right return for right-handed workers and left return for left-handed workers.) Note: keyboard trays must be positioned close to the return to avoid excessive reaching to the writing surface.

**Table 1 – Recommended Heights for Built In, Non-Adjustable Workstations**

Seated Computer Workstation	26-27 inches
Standing Computer Workstation	39-41 inches
Seated Writing Workstation (adjustable keyboard tray should be added for computer tasks)	28–30 inches
Standing Writing Workstation (adjustable keyboard tray should be added for computer tasks)	42-43 inches
Seated Fixed Monitor Mounting Height (from the floor to the top of screen)	43-44 inches
Standing Fixed Monitor Mounting Height (from the floor to the top of screen)	57-58 inches
Lifting and Materials Handling Safe Range	27-42 inches

***D. Mobile and Wall-Mounted Computer Workstations***

- a. Mobile and wall-mounted workstations must have separate adjustments for monitor height and keyboard/input device height.
- b. Placement of the input device must be such that it can be used with the left or right hand.
- c. If routine use of touch screens is required, a separate input device must be provided.
- d. Keyboard/input device height should have the range as indicated in Table 2 below.

**Table 2 – Recommended Height Ranges for Mobile or Wall Mounted Workstations (measured from the floor, based on US Adult Anthropometry Table, )**

	Top of Screen Ht Range	Keyboard/Input Ht Range
Sit to Stand Mobile or Wall Mount	44-72 inches	22-50 inches
Seated Mobile or Wall Mount	44-57 inches	22-30 inches
Standing Mobile or Wall Mount	56-72 inches	37 -50 inches

**E. For Duke employees in wheelchairs who use computers, computer workstations shall have:**

1. Adjustable height legs on tables and/or work surface at least 28” to 34” from the floor.
2. Monitor placed on adjustable arm.
3. Clearance of 28” from the floor to bottom of lowest protrusion (allows for electric wheelchair.)
4. Minimum of 19" horizontal knee clearance under the desk or table.
5. Utility and equipment controls located within easy reach
6. Clear aisle width minimum 36”.
7. Wireless mouse and wireless keyboard recommended.

**F. For Duke employees who use computers, the following guidelines are recommended for lighting of computer workstations.**

1. Computer tasks typically require less light than other tasks. Table 3 below describes intensity guidelines that should be used when selecting lighting for work areas.

**IES ILLUMINANCE CATEGORIES AND VALUES**

Activity	Footcandles
Extended periods of computer (VDT) use	5-10
Read standard documents, photocopies or newspapers	20-50
View photo in moderate detail, reference phone book	50-100
Perform visual task of low contrast or small size over prolonged periods of time	200-500
Source: Illuminating Engineers Society recommended lighting levels for common office tasks	

2. Task lighting should be adjustable in direction and brightness.
3. Task lights should be able to be positioned so bulbs are not in direct field of view and are well shielded.
4. Dark, opaque shades should be used for desk lamps rather than sheer, light colored shades.
5. Computer workstations should utilize low ambient lighting levels with task lamps to supplement lighting for source documents and writing surfaces. Floor lamps are acceptable for supplemental lighting and often provide softer light than overhead ceiling fixtures.
6. Anti-glare and privacy screens should be made of coated glass rather than mesh or plastic.

***G. For all Duke employees who use computers, computer hardware installations shall:***

1. Utilize adjustable height monitors or monitor arms when possible.
2. Remove tabs (that lock adjustable monitors for shipping) so that users can easily adjust them.
3. Place monitors directly on work surface or monitor arm, not on CPU or docking station.
4. Place monitors square with the work surface and aligned with the keyboard and mouse, not diagonal to the user.
5. Avoid placing computers in the corner of a workstation as that is not typically the best arrangement.
6. Place dual monitors side by side, as close as possible, with the center between the two aligned with midline of the keyboard .
7. Place monitors such that they do not face or are not placed in front of a window.
8. Place monitors directly in front of employee with a single, adjustable-height keyboard/mouse platform.
9. Place input devices as close to the keyboard as possible and at the same height.
10. Utilize “non-handed” input devices so they can be used by the right or left hand equally.
11. Utilize a KVM switch in the case of dual systems so that a single keyboard and input device can be used.
12. Utilize docking stations for all laptops including a separate full size monitor and full size keyboard and input device.

## **IV. Sitting vs. Standing**

Sitting is best for tasks that are repetitive and require precision, hand stability, or are visually demanding. Additionally, tasks that are longer in duration and require stationary postures are better seated due to leg fatigue that may otherwise be caused by prolonged standing.

Standing is best for tasks that require exerting high forces, working with large or heavy work items, using multiple work areas at the same time, when maximum reach distance is required, when materials handling is required, or if there is insufficient leg room for sitting. Standing also tends to be a better choice for individuals who suffer from chronic back pain.

Sit/stand stools are recommended when:

- the individual must stand stationary for long periods of time;
- there is not adequate knee room to permit chair use;
- force requirements would not be feasible from a seated posture;
- the individual needs to frequently reach for items.

Sit/stand workstations are recommended when:

- an individual reports back pain from prolonged sitting;
- an individual works exclusively at a computer >6 hours per day;
- a new chair or a keyboard tray is requested. A sit/stand workstation may be a more cost effective solution in both cases.

Devices that raise and lower the monitor and keyboard/mouse (as one unit, separate from the work surface) are relatively inexpensive and work well for most individuals. If an entire work surface must be raised and lowered due to work requirements, motorized bases or motorized work tables are recommended.

Prolonged static postures, whether sitting or standing, should be avoided and postures should be frequently changed.