

4.27 Controls and Operating Mechanisms.

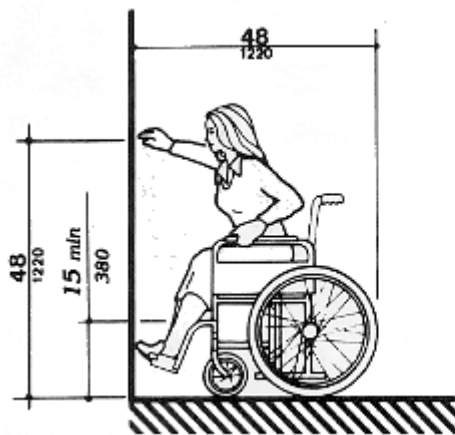
4.27.1 **General.** Controls and operating mechanisms required to be accessible by 4.1 shall comply with 4.27.

4.27.2 **Clear Floor Space.** Clear floor space complying with 4.2.4 that allows a forward or a parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.

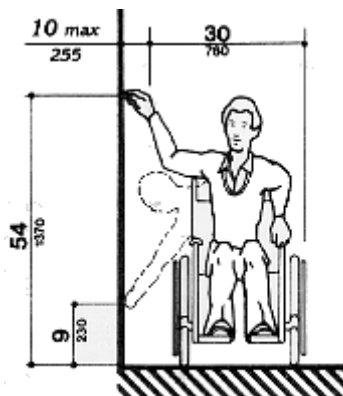
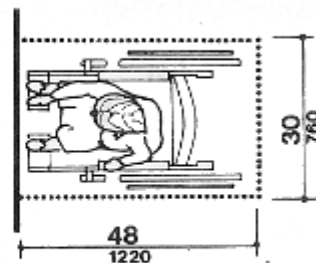
4.27.3* **Height.** The highest operable part of controls, dispensers, receptacles, and other operable equipment shall be placed within at least one of the reach ranges specified in 4.2.5 and 4.2.6. Electrical and communications system receptacles on walls shall be mounted no less than 15 in (380 mm) above the floor.

EXCEPTION: These requirements do not apply where the use of special equipment dictates otherwise or where electrical and communications systems receptacles are not normally intended for use by building occupants.

4.27.4 **Operation.** Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N).



High and Low Forward Reach



High and Low Side Reach

4.28 Alarms.

4.28.1 **General.** Alarm systems required to be accessible by 4.1 shall comply with 4.28. At a minimum, visual signal appliances shall be provided in buildings and facilities in each of the following areas: restrooms and any other general usage areas (e.g., meeting rooms), hallways, lobbies, and any other area for common use.

4.28.2* **Audible Alarms.** If provided, audible emergency alarms shall produce a sound that exceeds the prevailing equivalent sound level in the room or space by at least 15 dbA or exceeds any maximum sound level with a duration of 60 seconds by 5 dbA, whichever is louder. Sound levels for alarm signals shall not exceed 120 dbA.

4.28.3* **Visual Alarms.** Visual alarm signal appliances shall be integrated into the building or facility alarm system. If single station audible alarms are provided then single station visual alarm signals shall be provided. Visual alarm signals shall have the following minimum photometric and location features:

- (1) The lamp shall be a xenon strobe type or equivalent.
- (2) The color shall be clear or nominal white (i.e., unfiltered or clear filtered white light).
- (3) The maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. The pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.
- (4) The intensity shall be a minimum of 75 candela.
- (5) The flash rate shall be a minimum of 1 Hz and a maximum of 3 Hz.
- (6) The appliance shall be placed 80 in (2030 mm) above the highest floor level within the space or 6 in (152 mm) below the ceiling, whichever is lower.
- (7) In general, no place in any room or space required to have a visual signal appliance shall be more than 50 ft (15 m) from the signal (in the horizontal plane). In large rooms and spaces exceeding 100 ft (30 m) across, without obstructions 6 ft (2 m) above the finish floor, such as auditoriums, devices may be placed around the perimeter, spaced a maximum 100 ft (30 m) apart, in lieu of suspending appliances from the ceiling.
- (8) No place in common corridors or hallways in which visual alarm signalling appliances are required shall be more than 50 ft (15 m) from the signal.

4.28.4* **Auxiliary Alarms.** Units and sleeping accommodations shall have a visual alarm connected to the building emergency alarm system or shall have a standard 110-volt electrical receptacle into which such an alarm can be connected and a means by which a signal from the building emergency alarm system can trigger such an auxiliary

alarm. When visual alarms are in place the signal shall be visible in all areas of the unit or room. Instructions for use of the auxiliary alarm or receptacle shall be provided.

Appendix

A4.28 Alarms.

A4.28.2 Audible Alarms. Audible emergency signals must have an intensity and frequency that can attract the attention of individuals who have partial hearing loss. People over 60 years of age generally have difficulty perceiving frequencies higher than 10,000 Hz. An alarm signal which has a periodic element to its signal, such as single stroke bells (clang-pause-clang- pause), hi-low (up-down-up-down) and fast whoop (on-off-on-off) are best. Avoid continuous or reverberating tones. Select a signal which has a sound characterized by three or four clear tones without a great deal of "noise" in between.

A4.28.3 Visual Alarms. The specifications in this section do not preclude the use of zoned or coded alarm systems.

A4.28.4 Auxiliary Alarms. Locating visual emergency alarms in rooms where persons who are deaf may work or reside alone can ensure that they will always be warned when an emergency alarm is activated. To be effective, such devices must be located and oriented so that they will spread signals and reflections throughout a space or raise the overall light level sharply. However, visual alarms alone are not necessarily the best means to alert sleepers. A study conducted by Underwriters Laboratory (UL) concluded that a flashing light more than seven times brighter was required (110 candela v. 15 candela, at the same distance) to awaken sleepers as was needed to alert awake subjects in a normal daytime illuminated room.

For hotel and other rooms where people are likely to be asleep, a signal-activated vibrator placed between mattress and box spring or under a pillow was found by UL to be much more effective in alerting sleepers. Many readily available devices are sound-activated so that they could respond to an alarm clock, clock radio, wake-up telephone call or room smoke detector. Activation by a building alarm system can either be accomplished by a separate circuit activating an auditory alarm which would, in turn, trigger the vibrator or by a signal transmitted through the ordinary 110-volt outlet. Transmission of signals through the power line is relatively simple and is the basis of common, inexpensive remote light control systems sold in many department and electronic stores for home use. So-called "wireless" intercoms operate on the same principal.