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# Barriers

# Barriers

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- Commercial pools should be surrounded by a fence, wall, building, or other barrier that completely encloses the pool area and prevents trespassing or foot traffic through the area
- Other protective devices may also be effective in deterring trespassers:
  - Alarms
  - Surveillance equipment
  - Safety covers
  - Posting of meaningful signage
  - Security patrols

# Barriers

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- Barriers serve the purpose of protecting unattended children and non swimmers from gaining access to the water
- Multiple layers of protection are recommended to limit or delay access during lapses in supervision
- Barriers are not a substitute for active supervision
- Unattended children should never be permitted in the pool area
- Direct supervision by a responsible parent or other adult possessing swimming and basic rescue skills is the only sure way to prevent drowning and other serious accidents around a pool

# Barriers

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- Regular inspection of barriers and proper preventative maintenance is crucial to sustaining an effective deterrent
- Barrier systems can be rendered useless:
  - Blocking doors or gates open
  - Not maintaining fences, closures and latch mechanisms
  - Forgetting to lock doors
  - Not checking to see that all patrons have left a facility before locking up for the night
  - Not enforcing rules
  - Ignoring or disabling alarms

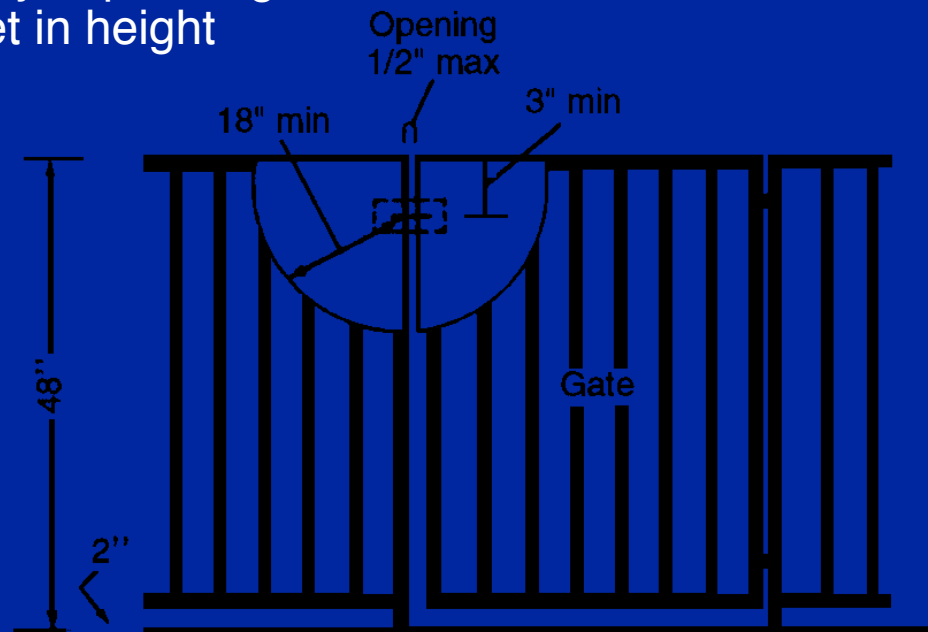
# Fences

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- If properly designed, installed and maintained, fences:
  - Will lessen unauthorized entry into the pool area
  - Prevent young children from gaining access to the pool area thereby reducing pediatric submersion accidents
- Doors opening from a house, dwelling unit or hotel or motel room directly into a courtyard pool area should not be permitted
- Perimeter fences should be installed which do not block the view of the pool
- Solid walls are not recommended
- Plants such as Pyracantha (firethorn evergreen shrubs) used on the outside of the fence as an additional barrier, should not obstruct the vision of the pool

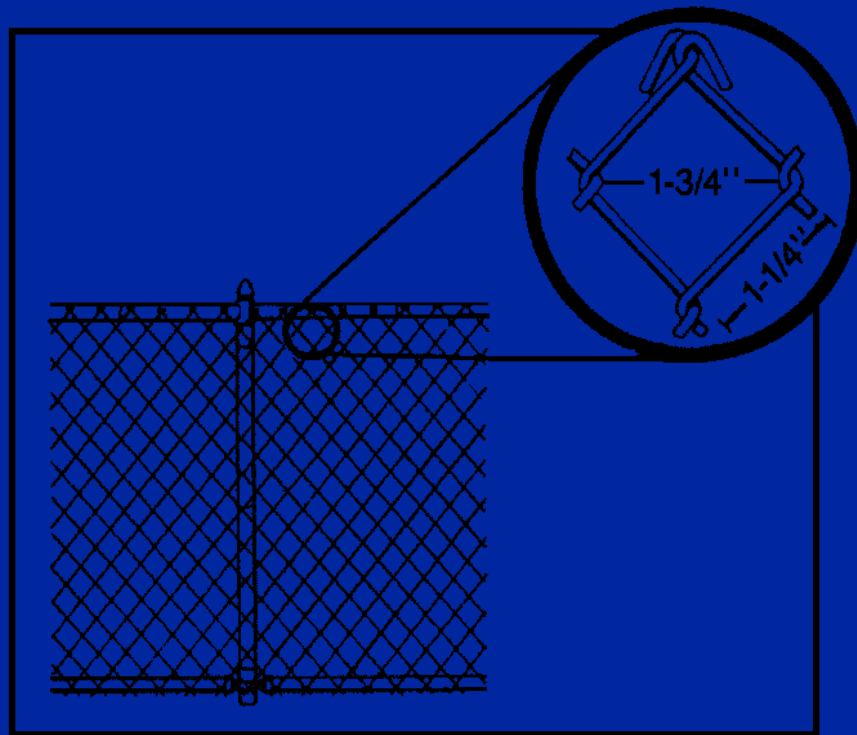
# Fences

- Height should be adequate to keep out trespassers
  - Some codes permit barriers between 4 and 5 feet in height
  - Most safety experts agree that fences should not be less than 6 feet in height



# Fences

- As recommended by the U. S. CPSC, the size of holes in chain link fence should not exceed 1 3/4 inches



# Fences

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- Chain link fences less than 6 feet in height should not be used as pool access barriers unless wire mesh, slats, barbed wire, or other means approved by local building officials is used to prevent the openings in the fence from being used as a climbing surface
- Fences should not have any footholds or handholds or horizontal members to make them easy to climb
- Should be installed in such a way to prevent other objects, building walls or permanent structures from being used to climb into the pool area
- Walls or solid barriers constructed of cement block or brick, should not contain indentations or protrusions closer than 45 inches apart



# Fences

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Nixon, Pearn and Petrie, Australian researchers studying childproof safety barriers, tested over 500 children between 2 and 8 years old on their ability to climb a 4 1/2 foot barrier fence. Results published in the Australian Pediatric Journal showed that by age 4, more than half of the subjects were successful at climbing the barrier.

Nixon, J., Pearn, J. and Petrie, G. (1979). Childproof safety barriers: An ergonomic study to reduce child trauma due to environmental hazards. Australian Pediatric Journal, 15(4), 260-262.

# Fences

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- Fences and gates should be constructed so that there is less than 2 inches of space between the bottom of the barrier and the ground or pool deck
- There should be no holes or spaces in the fence where children could slip through
- Vertical members in the barrier should not be more than 4 inches apart
- On ornamental iron fences, the distance between the tops of horizontal members should be greater than 45 inches apart
  - Spanish Modern is the most common style of ornamental iron used around pools because it is difficult to climb

# Fences

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- Evaluation of data collected by the U. S. Consumer Product Safety Commission in studies of the physical measurements of over 8,000 randomly selected children living in the U. S.
  - Approximately one half of all 13 to 18 month old children can successfully pass through a 5 inch wide opening
  - None of the children over one year old could pass through a 4 inch wide opening
  - Measurement of head size and chest depth of the children in the study showed that approximately 95% of all 10 year olds have head widths of less than 6 inches
  - The chest depth of 95% of the 7 year olds tested was less than 6 inches

# Fences

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- Study results indicate a need to space vertical members in barrier fences no more than 4 inches apart
- Fences with openings of 5 or 6 inches or more will not prevent young children from squeezing their bodies through the openings in the fence

Stephenson, E. (1993, July-August). Unsafe guardrails: The silent & inviting trap. Fabricator, pp. 36-41.

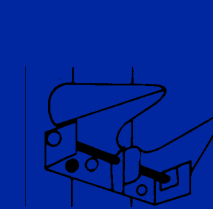
# Gates

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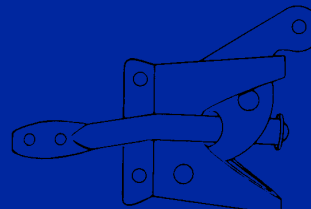
- Access gates in the barrier fence should open outward away from the pool
- Gates must be at least as high as the required height of the fence
- Gates should remain locked when the pool is not in use or supervised
- Should be equipped with locking devices
  - A key-operated lock, keypad or key card system which is integral to the gate is preferred
- Gates must not be blocked open or otherwise disabled to prevent closing
- Gates should be self-closing and self latching

# Gates

- Latching mechanism should be:
  - Mounted on the inside of the gate
  - Located at least 4 feet off the ground
  - Installed more than 6 inches below the top of the gate
- To prevent access to the latch from the exterior of the gate, the latch should be:
  - Protected by a rigid webbing, shield or plate
  - Installed to either side, below, and above the latch to the top of the gate
  - The shield should not have openings greater than 1/4 inch in diameter



BUTTERFLY  
LATCH



GRAVITY  
LATCH



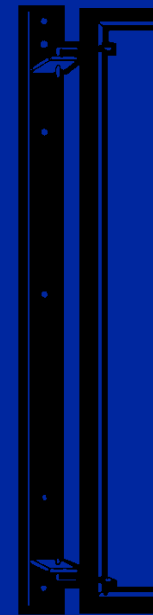
SLIDE BOLT  
LATCH

# Closers

- The closer should be adjusted to allow the gate to self-close and positively self-latch from any open position



KANT SLAM



DEL WEBB  
HANGER



SPRING  
CLOSER

# Fences & Gates

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- The pool owner or operator should periodically inspect the gate to make sure that it is operating properly
- Fences should be inspected daily to make sure they have not been vandalized or altered in any way that would permit access to the pool



# Latching Devices & Alarms

## Windows and Sliding Glass Doors

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- All windows, hinged or sliding doors on a dwelling leading directly to a pool should have latching devices installed out of the reach of small children
  - At least 40, and preferably 60 inches above the floor
- If used consistently and maintained in good working order, closers
  - Prevent doors and windows from being accidentally left open
  - Thwart unsupervised children from gaining access to a pool

# Latching Devices & Alarms

## Windows and Sliding Glass Doors

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- Hydraulic closer mounted on a sliding door
  - Automatically closes the door
  - Prevents a sliding door from being lifted out of its track
  - Closing speed can be adjusted
  - Touchpad or kill switch is installed 54 to 60 inches above the floor
  - Permits an adult to pass through the doorway without activating the alarm
  - Alarm can be deactivated for up to 15 seconds
  - If turned off, the alarm will automatically reset itself

# Latching Devices & Alarms

## Windows and Sliding Glass Doors

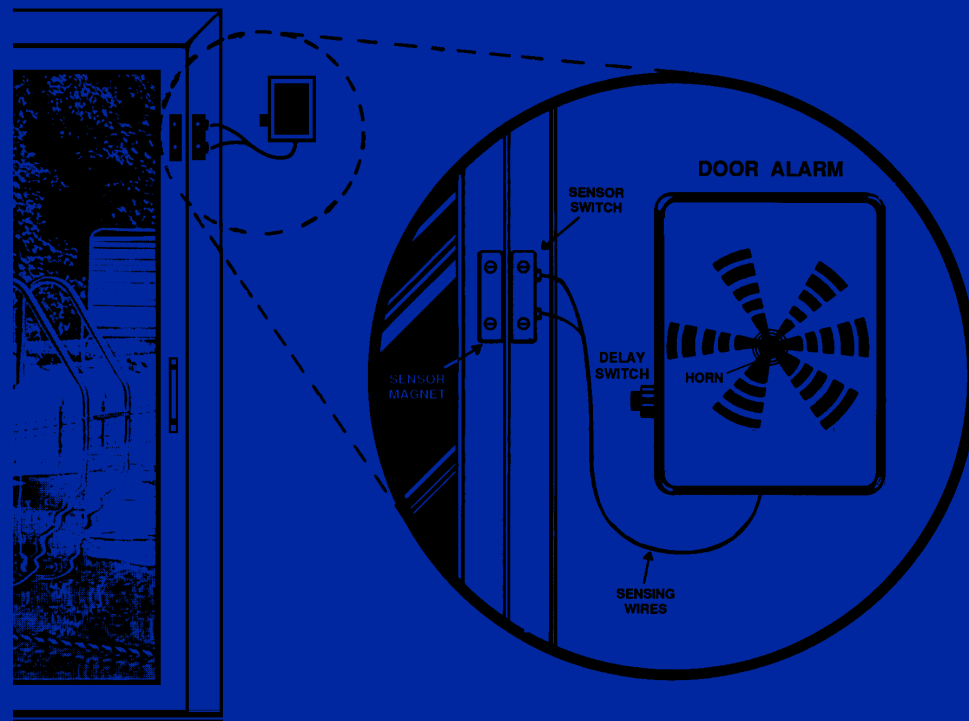
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- Audible alarm
  - Sounds for several minutes if a door adjacent to a pool is left open
  - Automatically resets itself
  - Magnetic sensing switch is attached by sensing wires to a battery operated or electric alarm
  - Some alarms use touch pads to temporarily deactivate the alarm to allow an adult to pass through the door without setting off the alarm

# Latching Devices & Alarms

## Windows and Sliding Glass Doors

U. S. CPSC in its Model Barrier Code accepts a resettable alarm on a sliding door as an alternative when no physical barrier is installed between a residence or hotel/motel room and a pool



# Latching Devices & Alarms

## Windows and Sliding Glass Doors

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- Audible alarm (continued...)
  - Others alarms use passive infrared sensors to detect body heat passing the two sensors installed in the doorway
    - One sensor is installed at a child's height, and one is installed at a typical adult height
    - An adult passing through is detected by both sensors
    - The alarm clicks to indicate that the sensors were working and detected the adult
    - When only the lower sensor detects a body, the alarm is activated
    - If triggered accidentally, an adult can wave his hand past the upper infrared beam or simply walk through the doorway in order to stop and reset the alarm

# Alarms

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- Pool alarms are used to:
  - Detect unauthorized entry into a pool area
  - Discover children or pets who have fallen into pool
  - Warn of potentially damaging low water situations
  - To warn of chemical releases into the environment
- Alarm categories include:
  - Infrared or light beams
  - Electronic devices
  - Pressure wave systems
  - Surface water wave motion sensors
  - Sonar devices

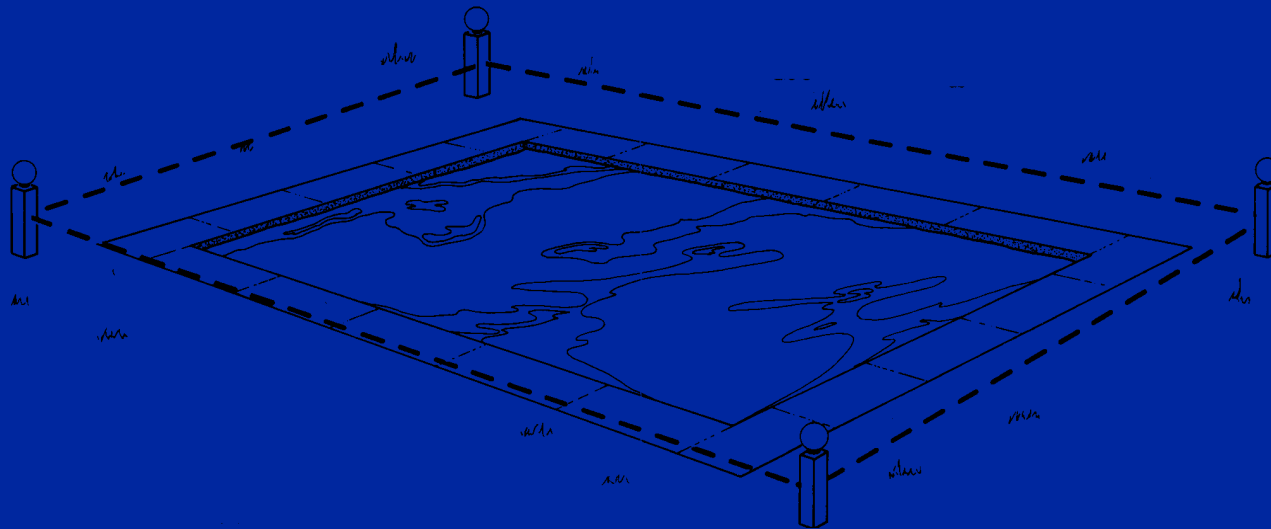
# Alarms

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- Infrared and light beams
  - Used to identify an intruder on the pool deck or while passing through a doorway or gate before the individual has a chance to get into the water
  - Sensors transmit a radio frequency to receivers plugged into standard wall outlets
  - Sensors detect infrared energy emitted by the human body when it is within the detection range
  - Or photoelectric cells emit an invisible light beam around the pool perimeter

# Deck Alarms

- Infrared and light beams (continued...)
  - When an intruder crosses the light beam, a break in the light beam is detected and an alarm is triggered





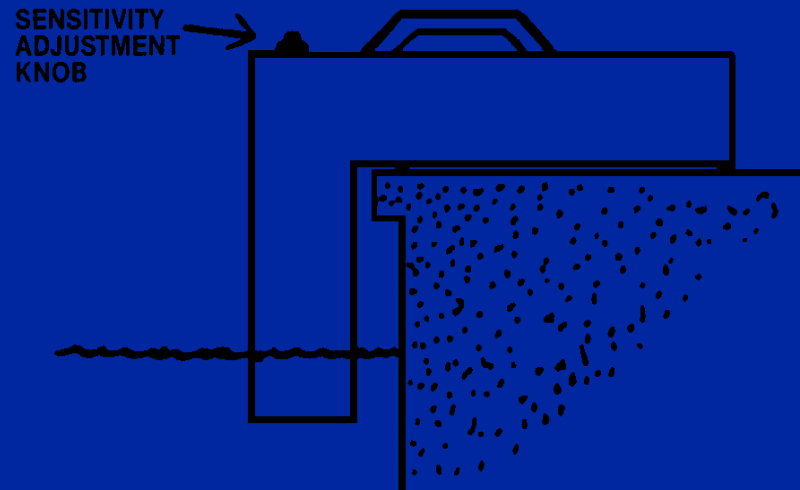
# Alarms

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- Electronic sensors
  - Installed underwater
  - Sensors are capable of detecting an electronic signal emitted by a medallion
  - Medallion is worn like a bracelet or necklace, or attached to clothing worn by children
  - Battery powered relay module can transmit alarm to remote locations up to 500 feet from the pool
  - Unfortunately, only children wearing the medallion are protected

# Alarms

- Pressure wave systems
  - Composed of hollow tubes which extend into the pool water
  - Pressure changes are detected when an object falls into the water and an alarm sounds



# Alarms

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- Surface wave motion devices
  - Float on the water surface
  - React to wave motion or changes in water surface tension
  - Turbulent water completes the electrical circuit and sets off the alarm

# Alarms

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- Sonar devices
  - Use sound waves to detect intruders in the water
  - Passive only systems often installed in residential settings, false alarms have been caused by airplanes passing directly overhead
  - Not a problem with active commercial systems-- they both send and receive signals

# Alarms

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- Sonar devices (continued...)
  - Can be installed to prevent vandalism and detect intruders who sneak into a pool at night
    - Two ultrasonic transducers are installed on each pool wall, 10 to 12 inches below the water surface
    - Each transducer can both send and receive signals
    - Sonar beams generated by the transducers create a perimeter line which if breached detects the trespasser
    - A shrill alarm is activated
    - Floodlights illuminate the area when the alarm is activated
    - Or, a silent alarm can be activated and security patrols notified
    - Can also be connected to phone pagers, video cameras, closed circuit TV monitors, or other security components
    - Resets after a specified amount of time

# Alarms

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- Sonar devices (continued...)
  - Can be used to aid lifeguards or security patrols in the performance of surveillance duties
    - Sonar emitters and receivers scan the deep areas of the pool every 2 seconds
    - When a receiver signal drops for 2 to 4 seconds, a victim is detected and an alarm sounds
    - Receiver can distinguish between someone who is just swimming underwater and someone who is submerged, drowning or in distress
    - Monitor shows where the victim is located in the pool
    - Operates 24 hours a day, but can be put into a night mode in order to detect unwanted intrusion

# Alarms

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- Most pool alarms are self-contained, battery operated units
- Alarm prices range from a low of just under \$200.00 to a high of close to \$30,000.00
- Alarms can be permanently mounted, floated on the water surface, or installed temporarily on the edge of the deck next to the pool
- Most pool alarms can be used while solar or insulating pool blankets are installed, but the alarm sensitivity may have to be adjusted
- Floating units must be removed from pools when automatic or robotic vacuum cleaners are operating

# Alarms

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- Alarms should be armed after hours or during periods of the year when the pool is not in operation
- A pool alarm should be tamper proof
  - Vandals or trespassers should not be able to remove, deactivate, turn off, or in any way disable the alarm
- Like smoke alarms, pool and deck alarms are subject to false alarms and can sometimes be a nuisance
  - Alarms are often triggered by heavy rains, strong winds, and by leaves and plant materials falling into the pool
- Alarms should be used in conjunction with other physical barriers to impede entry into unauthorized areas



# Safety Covers

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- Installed to prevent access to pool or spa water
- Have a continuous connection between the pool and deck. They are installed in a track, rail or guides, or otherwise locked or secured into the deck.
- Capable of supporting a 400 psf load
- Bear an identification label indicating the name of manufacturer and installer, and compliance with ASTM safety cover standards (ASTM Standard F1346-91)
- Provided with automatic auxiliary pumps or designed in a way which prevents the accumulation of standing water on top of the cover

## Fencing Requirements

# California Bathing Codes

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- The Design, Construction, Operation and Maintenance of Public Swimming Pools
- State Building Code (Part 2, Title 24, CAC), Section 3118B (formerly 2-9024) - Enclosure of Pool Area
- 3118B.1 Enclosure.
- The pool shall be enclosed by one or a combination of one of the following: a fence, portion of a building, wall or other approved durable enclosure. Doors, openable windows, or gates of living quarters or associated private premises shall not be permitted as part of the pool enclosure. The enclosure, doors and gates shall meet all of the following specifications:

## Fencing Requirements

# California Bathing Codes

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- 1. The enclosure shall have a minimum effective perpendicular height of 5 feet as measured from the outside as depicted in Figures 31B-4 and 31B-5.
- 2. Openings, holes or gaps in the enclosure, doors and/or gates shall not allow the passage of a 4 inch diameter sphere The bottom of the enclosure shall be within 2 inches of the finished grade.

## Fencing Requirements

# California Bathing Codes

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- 3. The enclosure shall be designed and constructed so that it cannot be readily climbed by small children. Horizontal and diagonal member designs, which might serve as a ladder for small children, are prohibited. Horizontal members shall be spaced at least 48 inches apart. Planters or other structures shall not be permitted to encroach upon the clear span area as depicted in Figure 31B-5. Chain link may be used provided that the openings are not greater than 1 3/4 inches measured horizontally.

## Fencing Requirements

# California Bathing Codes

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- 31181B.2 Gates.
- Gates and doors opening into the pool enclosure shall also meet the following specifications:
  - 1. Gates and doors shall be equipped with self-closing and self-latching devices. The self-latching device shall be designed to keep the gate or door securely closed. Gates and doors shall open outward away from the pool except where otherwise prohibited by law. Hand activated door or gate opening hardware shall be located at least 3 1/2 (1,067 mm) feet above the deck or walk-way.
  - 2. Except as otherwise provided herein, gates and doors shall be capable of being locked during times when the pool is closed. Exit doors which comply with Chapter 10 shall be considered as meeting these requirements.

## Fencing Requirements

# California Bathing Codes

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- Exception: Doors leading from areas of hotels and motels, as defined in Business and Professions Code Section 25503.16(b), which are open to the general public, e.g., restaurants, lobbies, bars, meeting rooms, and retail shops need not be self-latching.
- 3. The pool enclosure shall have at least one means of egress without a key for emergency purposes. Unless all gates or doors are so equipped, those gates and/or doors which will allow egress without a key shall be clearly and conspicuously labeled in letters at least 4 inches (102 mm) "EMERGENCY EXIT".

## Fencing Requirements

# California Bathing Codes

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- 4. The enclosure shall be designed and constructed so that all persons will be required to pass through common pool enclosure gates or doors in order to gain access to the pool area. All gates and doors exiting the pool area shall open into a public area or walkway accessible by all patrons of the pool.

## Fencing Requirements

# ICBO

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- International Conference of Building Officials
- California Building Standards Commission has adopted as mandatory provision for all California Building Codes
- Current regulation requires that every new pool or spa must have one of the following:
  - 3-sided fencing with self-closing, self-latching doors on all doors from the house to the pool/spa area
  - 3-sided fence with an 85 decibel alarm on all doors from the house to the pool/spa area
  - 4-sided fence around the pool and spa



## Fencing Requirements

# ICBO

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- Meeting in Las Vegas in September 1995, to recommend that ICBO approve barrier code with amendments recommended by the pool industry:
  - Exemption to spa fencing requirement if ASTM F-1346 listed safety covers are used
  - Amendment to allow door alarms with a delay of up to 7 seconds (instead of the alarm sounding immediately when the door is opened)
- Sec. 1243 (a) 5. allows other means of protection if found equivalent by the building official
- Final version was written into the 1996 Uniform Building Code as Appendix 4: Pool Barrier Code

## Fencing Requirements

# Arizona Bathing Codes

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- Title 9: Health Services, Chapter 8: Environmental Sanitation, Article 8: Public and Semipublic Bathing Places
- R 9-8-841 H.  
The walkway and pool shall be enclosed by a durable fence at least 6-feet high...
- R 9-8-822: Fencing  
All public swimming pools shall be enclosed by a fence for bather control while the pool is in operation and to prohibit any person from using the pool except when a lifeguard or attendant is on duty...

## Fencing Requirements

# Nevada Bathing Codes

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- Nevada Administrative Code, Chapter 444: Public Bathing Places (11-12-88)
- §444.136 Barriers; exclusion of unauthorized persons
  - Provisions must be made to exclude unauthorized persons from any pool or pool area. A pool must be surrounded by a fence, wall, building, or other barrier that completely encloses the pool area and otherwise complies with the requirements of this section. No part of a pool enclosure may be used for common foot traffic.
  - The barrier must be impenetrable for small children and must not offer any external handholds or footholds.

## Fencing Requirements

# Nevada Bathing Codes

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- In the case of a swimming pool operated solely for and in conjunction with a hotel, motel, or other place of lodging, or a trailer park, apartment, condominium or other facility containing multiple dwellings, the barrier must not be less than 5 feet (1.5 meters) in height. Courtyard-type concepts in which gates or doors open directly into a pool enclosure from a dwelling unit or hotel or motel room are not permitted. In any other case, the barrier must not be less than 6 feet (1.8 meters) in height.
- Any vertical members in the barrier must not be more than 4 inches (10.16 centimeters) apart.
- Any opening at the bottom of the barrier must not be more than 4 inches (10.16 centimeters) apart.

## Fencing Requirements

# Nevada Bathing Codes

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- Any gate or door that opens into the pool area:
  - Must be equipped with permanent locking devices and self-closing and positive self-latching mechanisms. Self-closing and self-latching mechanisms must be located not less than 3 1/2 feet above the ground.
  - Must self close and self-latch from any position.
  - Must not be blocked open or otherwise disabled to prevent closing and latching.
  - Must, in the case of an indoor pool, be made of metal and installed in a metal frame.
  - The operator shall periodically inspect each such gate or door to ensure that it is operating properly.

## Fencing Requirements

# Nevada Bathing Codes

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- Facilities, such as large resort hotels, which have continuous, 24-hour-a-day security of the pool area may be exempt from the requirements of this section.
- Where existing construction prohibits compliance with the requirements of this section, the owner shall file with the health authority an operation procedure which will serve to ensure the exclusion of unattended small children from the pool.