Sec. 29-357-12b. Displays of fireworks

(a) **Fire and police protection required at fireworks displays**.

(1) The local fire marshal or his certified designee shall be present at all fireworks displays.

(2) Duration of police and fire personnel assignment to fireworks displays.

(A) Fire Department personnel shall remain on duty from the time that the fireworks are delivered to the display site until termination of the display and removal of all fireworks and debris from the site.

(B) Reasonable and adequate supervision of areas within the immediate vicinity of any display may be determined by the chief of police, local fire marshal, state police in areas under the jurisdiction of the Department of Public Safety, Division of State Police, or the first selectman of any municipality not having a police or fire department.

(3) Police and fire protection shall be paid for by the applicant.

(b) **Days, hours and weather conditions when fireworks displays shall be prohibited.**

(1) No fireworks display shall be conducted on any day between midnight and 8:00 a.m., except on July 3, July 4, December 31 and January 1.

(2) Fireworks displays shall not be held during any electrical storm or at any time when the wind consistently reaches a velocity of more than 20 miles per hour during the period when the display is to be fired. Within the allowable limits of the permit, a display may be delayed for a few minutes if a brief storm can pass in a reasonable time. The operator shall have available for use at all times a portable anemometer or similar device for measuring wind velocity.

(c) **Distances from general public and structures**.

(1) Members of the general public shall be restrained by a physical barrier at least 300 feet from the point at which the aerial fireworks are discharged. Only operators, their assistants and necessary emergency personnel shall be allowed inside such lines. The minimum separation distance shall be maintained from the time that fireworks are loaded into mortars until a post-display search of the site is conducted.

(2) A fireworks display of aerial shells shall be permitted only when the actual point at which fireworks are to be fired is in compliance with the following table of distances:

NOTE: THE MINIMUM SEPARATION DISTANCE FROM SPECTATORS AND INHABITED BUILDINGS SHALL NOT BE LESS THAN 300 FEET.

Mortar size in inches	**Minimum distance from spectators and inhabited buildings**	**Other buildings, public highways, railroads**	**Inhabited school, hospital, church, theater, penal institution or similar institution or bulk storage facilities of explosives, flammable or toxic materials**
0” to 4”	300 feet	200 feet	500 feet
5”	350 feet	200 feet	500 feet

6”	420 feet	250 feet	600 feet
7”	490 feet	300 feet	700 feet
8”	560 feet	300 feet	800 feet
9”	630 feet	400 feet	900 feet
10”	700 feet	400 feet	1000 feet
11”	770 feet	400 feet	1100 feet
12”	840 feet	400 feet	1200 feet
Over 12”	70 feet per mortar bore inch		100 feet per mortar bore inch

(3) Ground displays of common fireworks with moving parts, the functioning height of which shall not be more than 100 feet, shall be located at least 200 feet from the general public or any inhabited building.

(4) Static set pieces containing no moving parts shall be located at least 75 feet from the general public or any inhabited building.

(5) No vehicles, water craft, amusement rides, portable structures or equipment shall be located within the safety fallout zone, except as follows:

(A) Necessary emergency equipment or equipment required for the display set up, such as a backhoe or similar equipment; or

(B) With special permission from the local fire marshal or the State Fire Marshal, if present, amusement rides placed within the safety fallout zone, provided that the rides are at least 300 feet from the discharge site, all rides located inside the safety fallout zone are shut down for the day at least one hour before the scheduled firing time, and all persons maintain required separation distances.

(6) Fireworks discharge sites shall be located 50 feet or more from any overhead obstruction, except that such discharge sites may be located within 25 feet of trees.

(7) Whenever possible, all ground display pieces and set pieces shall be positioned out of the firing range of aerial displays.

(8) No dry grass or combustibles shall be located beneath ground display pieces. If dry, the area shall be thoroughly wet down before the display.

(9) Poles for ground display pieces shall be securely placed and firmly braced to prevent accidental displacement from any cause.

(d) **Temporary and prohibited storage of fireworks**.

(1) No person, firm or corporation shall store fireworks or special effects in any municipality until permission for such storage has been granted by the local fire marshal.

(2) The local fire marshal shall ensure that all fireworks and special effects at display sites or awaiting public display shall be stored in a place and manner secure from fire, accidental discharge or theft.

(3) Whenever fireworks or special effects are stored at places of public display, they shall be securely locked and labeled “FIREWORKS NO SMOKING.”

(4) Fireworks shall not be stored in the following locations:

(A) Buildings used in whole or part as schools, theaters, churches, hospitals, workshops,

residences, factories or buildings that are otherwise inhabited;

(B) Buildings where paints, oils or varnishes are manufactured or stored;

(C) Buildings where any hazardous materials, matches, turpentine, resin, or gasoline are stored or kept; or

(D) Buildings in which stoves or exposed flames are used.

(e) **Safety equipment required during the display of fireworks**.

(1) All operators and assistants shall wear appropriate safety equipment including, but not limited to, eye protection, ear protection and protective headgear.

(2) Any person manually discharging aerial shells or reloading shells into mortars during the display shall wear eye protection, a hard hat, long-sleeved shirt or jacket, long pants, shoes or boots, gloves and ear protection.

(f) **Ready boxes**.

(1) Before any firing begins, the entire complement of shells for any public display shall be brought to the firing site and stored in ready boxes at a point not less than 25 feet distance upwind from the nearest mortar.

(2) Ready boxes shall be constructed of wood, metal, heavy cardboard or plastic and arranged to open away from the mortars.

(3) A flameproof water repellent cover shall protect all ready boxes from the time that they are placed into position to the time that they are empty, except when shells are being taken from or returned to such boxes.

(g) **Angle of projectile**.

All fireworks that fire a projectile shall be set in such a manner that the projectile is launched as nearly vertical as possible, provided that where such fireworks are to be fired beside a lake or other large body of water, they may be directed in such a manner that falling residue will fall into the water.

(h) **Electrical firing mechanisms.**

(1) Power sources for firing fireworks shall be limited to batteries or individual isolated mechanisms specifically approved by a recognized national testing laboratory.

(2) Only a low voltage power source shall be permitted from the firing mechanism to the fireworks, unless the source consists of a system listed by a nationally recognized testing laboratory.

(3) Short circuit shunts shall be maintained on all electrically fired fireworks during preparatory operations, including loading, setting and adjusting. Fireworks that fail to ignite during a show shall be shunted prior to their removal.

(4) All firing switches, including battery and power-circuit types, shall be designed or altered to insure against accidental firing by providing as follows:

(A) An automatic short circuiting shunt across the firing leads until the switch is intentionally thrown to the firing position; and

(B) An automatic positive disconnection when the switch is released by the operator. Firing boxes shall be designed to prevent firing unless the switch is manually operated.

(5) Connection of any electrical firing circuit to any power supply is prohibited until all fireworks in the sequence are connected to firing leads and cleared for firing, except for circuit testers, provided that the circuit testers shall not be capable of delivering sufficient energy to cause the fireworks circuit being tested to fire. Permissible testers include

galvanometers, low current multimeters, or built-in circuit testers in the firing system supplying no more than 25 miliamps.

(i) **Shells**.

(1) Electrical firing, chained fuse firing, or other approved types of remote firing shall be required for all shells larger than 8 inches in diameter. The operator shall be located at least 100 feet from such shells when firing.

(2) Shells shall be ignited by electrical initiation or by lighting the tip of the fuse with a fusee, torch, port fire or similar device. Electrical firing must comply with the requirements of subsection (h) of this section. As soon as the fuse is ignited, the operator shall retreat from the mortar area.

(3) The safety cap protecting the fuse shall not be removed by the operator responsible for lighting the fuse until immediately before the shell is to be fired, except where electrical or other remote-type ignition is used.

(4) The operator shall carefully observe the first shell fired to determine that its trajectory will carry it into the intended firing range and that the shell functions over, and any debris falls into, the potential landing area. Mortars shall be re-angled or reset if necessary at any time during the display.

(5) Shells shall be measured and classed only in terms of the inside diameter of the mortar from which they are designed to be shot. Shells shall be constructed so that the difference between the inside diameter of the mortar and the outside diameter of the shell is not less than 1/8 inch and not more than 1/4 inch for 2- and 3-inch shells, or not more than 1/2 inch for shells larger than 3 inches.

(6) All shells shall be inspected prior to the display by the operator. Shells shall be inspected for proper fit into the mortars. Any shell not fitting properly shall not be fired. No shell shall be forced into a firing mortar.

(7) Any shell having tears, leaks or showing signs of having been wet shall be returned to the supplier or destroyed according to manufacturer's instructions, except that minor tears on fuses may be repaired with tape.

(8) After the fireworks have been delivered to the display site, all shells shall be separated according to diameter and stored in covered containers of metal, wood, plastic, or corrugated cardboard. Such containers shall meet the requirements of 49 CFR Part 173, U.S. Department of Transportation regulations covering the transportation of explosives and other dangerous articles by motor, rail or water.

(9) Quick match leaders for shells shall be long enough to allow not less than 6 inches of fuse to protrude from the mortar after the shell is inserted.

(10) Staple guns shall not be permitted for securing quick match that is connected to aerial shells or mines, shells, comets, rockets and similar devices.

(11) The length of the exposed black match shall not be less than 3 inches. Minimum delay time from ignition to the tip of the exposed black match and ignition of the lift charge shall not be less than 4 seconds in order to allow the operator to retreat to safety.

(12) In the event that a shell fails to ignite in the mortar, the mortar shall be left alone for at least 30 minutes. Mortars containing misfires shall be clearly identified during the display. Lighted flashlights or boxes placed over the mortar may be used for identification.

(j) **Mortars: construction**.

(1) Metal mortars shall be made of steel tubing, the tensile strength of which shall be at least 40,000 pounds per square inch, or from metal of equivalent strength. Cast iron or other fragmenting types of metals shall be prohibited. The mortar shall have a smooth bore and base plate equal in thickness to the tube, welded continuously around its perimeter. Aluminum mortars may be provided with bottom plugs meeting the specifications of subdivision (5) of this subsection or they may have a bottom plate which incorporates the bottom plugs and which is approved by the State Fire Marshal. No salutes or multi-break shells shall be fired out of an aluminum mortar.

(2) Mortars limited solely to firing single break shells may be made of spiral or convolute paper tubes or may be made of HDPE. Paper tubes for 3-inch shells shall have a wall thickness of not less than 3/8 inch. Paper tubes for 4-, 5- and 6-inch shells shall have a wall thickness of not less than 1/2 inch. The cross grain tensile strength of the paper shall be at least 2,300 pounds per square inch.

(3) Mortars constructed of HDPE shall be used for firing single-break shells only. HDPE mortars may be reloaded once during the display, provided that at least 75 percent of the mortar is buried in the ground.

(4) HDPE mortars shall meet the following requirements:

(A) Tube material shall be manufactured in accordance with ASTM specifications F714-97 and ASTM DD3350-98, which may be obtained from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959;

(B) ASTM wall thickness ratings or Standard Dimensional Ratios (SDR) must be clearly marked on each tube; and

(C) HDPE mortar tubes shall comply with the following SDR rating requirements:

3-inch mortars	SDR	15.5	.226 inch
4-inch mortars	SDR	21.0	.214 inch
5-inch mortars	SDR	21.0	.265 inch
6-inch mortars	SDR	21.0	.315 inch
8-inch mortars	SDR	26.0	.332 inch
10-inch mortars	SDR	32.5	.331 inch
12-inch mortars	SDR	32.5	.392 inch

(5) All tubes shall have a base plug in good condition, the thickness of which shall not be less than one-half the inside diameter of the tube. The base plug shall be securely attached to the mortar tube by the use of nails or screws. The base plug shall be of solid one-piece construction or commercially manufactured laminate with the grain parallel to the long axis of the mortar.

(6) The minimum inside length of completed mortar assemblies shall not be less than four times their inside diameter for mortars up to 7 inches inside diameter and not less than five times their inside diameter for mortars having an inside diameter greater than 7 inches.

(7) Any damaged mortar shall not be used for firing. This prohibition shall apply to split or bulged tubes, bases, seams, or loose rivets, bolts or wooden base plugs.

(k) **Mortars: setting**.

(1) All mortars, except finale batteries, shall be set upon a heavy plank or timber footing buried in solidly tamped clean earth, except mortars specially set as provided in subsection (l) of this section and mortars up to 6 inches in diameter, which are placed in aboveground racks as provided in subsection (n) of this section. The plank or timber requirement may be omitted for electrically fired shows or mortars which will not be reloaded during the display.

(2) Not less than 75 percent of the mortar tube length shall be placed below the normal surface of the ground.

(3) When personnel are to be in the immediate vicinity of the mortars during an outdoor fireworks display, sand bags or other suitable protection shall be placed around the mortars up to the approximate level of the mouth of the mortar in each direction where personnel could be located.

(*l*) **Mortars: special settings**.

At locations where it would be impractical to bury mortars in suitable clean earth or where there is agreement among the local fire marshal, the senior fire officer at the scene, the operator, and the State Fire Marshal, if present at the site, that the interests of public safety are met, mortars may be set for firing in approved sand-filled containers. Heavy steel drums, plastic drums or troughs constructed in accordance with the following requirements, shall be used for setting mortars:

(1) The diameter of the drum or width of the trough shall not be less than three times the diameter of the largest mortar tube;

(2) The diameter of the drum or width of the trough shall permit spaces between all mortars and the sides of the drum or trough equal to the diameter of the largest mortar. Whenever sequentially firing more than three shells, the minimum separation of mortars shall be at least four times the diameter of such shells;

(3) The depth of the drum or trough shall permit burial in clean sand of not less than 75 percent of the length of each mortar;

(4) The space between the bottom of the mortar and the container shall be filled with heavy wood blocking at least 2 inches thick. The wood blocking requirement may be omitted where the mortars are placed over solid ground and are not being reloaded during the display;

(5) The length of the trough shall permit spaces between all mortars and the end of the trough equal to the diameter of the largest mortar;

(6) The sides, ends and bottom shall be constructed of at least 3/4- inch plywood or of 2-inch boards in good condition and nailed securely with 20d common nails. Trough panels shall be secured by 1/2-inch threaded rods, through bolts or "U"-shaped brackets located in the center and at each end;

(7) The maximum length of a trough shall be 8 feet for plywood construction, or 16 feet for 2-inch board construction. Individual troughs may be positioned in continuous rows provided that they are properly secured and stable; and

(8) After the containers are set, the mortars shall be secured at an angle determined as safe for firing;

(m) **Mortars: loading**.

(1) Mortars shall be cleared of burning material after firing.

(2) When loaded into mortars, shells shall be held by the thick portion of their fuses and

carefully lowered into the mortar. At no time shall the operator place any part of his body over the throat of the mortar.

(n) **Mortars: finale racks and aboveground racks**.

(1) Finale racks and aboveground racks shall be limited to mortars with an inside diameter of not more than 6 inches, which shall be set squarely upon lumber at least 2 inches thick, the width of which shall be equal to the outside diameter of the largest mortar. The ends of the rack shall be constructed of similar material. The unit shall be boxed along both sides at the top and bottom by boards of 1-inch-by-6-inch dimension or its equivalent. The assembly shall be fastened together using screws or nails of a length that shall provide a minimum of 1 1/2-inch penetration into the holding member.

(2) Aboveground set-ups may consist of as many racks as required for the display. Each rack shall be independently set, braced and secured. Cubed bracing may be employed, provided that each rack is independently secured.

(3) Whenever possible, aboveground racks shall be set up perpendicular to the location of the general public.

(o) **Marine displays: special provisions**.

(1) Marine displays, which are set up and loaded in Connecticut but are to be discharged at locations outside of the state, shall be subject to the provisions of this subsection.

(2) Barges.

(A) All barges and vessels used as platforms for the discharge of fireworks shall be of sturdy, seaworthy construction and shall be provided with adequate anchor, towing and mooring lines.

(B) No barge previously used for the transportation of hazardous cargo shall be used as a discharge site for fireworks unless such hazardous cargo and its residue have been properly removed.

(C) Barges without sides shall be of sufficient height from the water to keep personnel and the fireworks safe from boarding seas.

(D) Barges with decks constructed of combustible materials shall have all exposed decking covered with at least 1 inch of clean sand.

(E) Barges shall be towed to the firing location by a tug.

(F) From the time that it leaves the dock until it returns to the loading site, the barge, during shell loading of the display, shall display warning signs on both sides reading "FIREWORKS STAY CLEAR." Signs shall be at least 3 feet wide and 2 feet high, with red lettering on a white background, and characters at least 6 inches high and 2 inches apart.

(3) Barges: set-up and location on barges.

(A) Security, separation distances and fire safety requirements shall apply only during the time that fireworks are on the display site.

(B) Except during setup, fireworks shall be stored in a locked transport vehicle or set up on the barge and shall not be left unattended. The operator shall be present during handling and loading operations and security personnel shall be present at the dock area, except where the barge is located within a larger guarded area to which the public is denied access.

(C) No personnel other than those directly responsible for loading and discharging the display shall be allowed on the display barge, except necessary emergency and private safety watch personnel in performance of their duties.

(D) No one under the age of 18 shall be allowed on the barge or in the loading area during loading operations.

(E) No smoking shall be permitted on any vessel containing fireworks or within 50 feet of fireworks loading operations or storage facilities.

(F) Each barge shall be provided with at least two Class A fire extinguishers during shell loading of the display.

(G) Warning signs prohibiting public access and smoking shall be clearly posted on shore areas near barges and storage areas.

(H) Trucks and other motor vehicles shall not be permitted to remain parked in the waterfront loading area, except when awaiting opportunity to load or discharge cargo, supplies or passengers; when loading, discharging or storing tools, equipment or materials related to the display; or when used to set up the display.

(I) The minimum separation distances provided in subsection (c) of Section 29-357-12b shall be maintained from the time fireworks loading operations begin until the completion of the display, except for shorefront buildings associated with dock operations which have been cleared and remain vacant for the duration of the fireworks loading operations.

(4) The operator shall obtain all necessary permits and approvals from the United States Coast Guard.

(5) The operator shall ensure that the required safety fallout zone is kept clear of unauthorized personnel or craft during the time that the barge is at its firing location and before and during the display.

(Adopted effective November 24, 1999)