

Chapter Comm 9 MANUFACTURE OF FIREWORKS

Subchapter I — Administration and Enforcement

- Comm 9.01 Purpose.
- Comm 9.02 Scope.
- Comm 9.04 Licensing of manufacturers.
- Comm 9.05 Inspections.
- Comm 9.06 Recordkeeping and reporting.
- Comm 9.07 Fees.
- Comm 9.08 Enforcement.
- Comm 9.09 Petition for variance.
- Comm 9.10 Appeals.
- Comm 9.11 Penalties.

Subchapter II — Definitions

- Comm 9.15 Definitions.

Subchapter III — Manufacturing Operations

- Comm 9.20 Application.
- Comm 9.21 Plant site security.
- Comm 9.22 Separation distances.
- Comm 9.23 Building construction.
- Comm 9.24 Means of egress.

- Comm 9.25 Heating, lighting and electrical equipment.
- Comm 9.26 Number of occupants and quantities of compositions permitted.
- Comm 9.27 Fire and explosion prevention.
- Comm 9.28 Fire protection and emergency procedures.
- Comm 9.29 Testing of fireworks.

Subchapter IV — Storage of Special Fireworks and Black Powder

- Comm 9.30 General requirements.
- Comm 9.31 General magazine construction requirements.
- Comm 9.32 Construction of Type 1 magazines.
- Comm 9.33 Construction of Type 2 magazines.
- Comm 9.34 Construction of Type 3 magazines.
- Comm 9.35 Construction of Type 4 magazines.
- Comm 9.36 Magazine operations.
- Comm 9.37 Miscellaneous safety precautions.

Subchapter V — Storage of Common Fireworks

- Comm 9.40 General requirements.
- Comm 9.41 Construction of storage buildings.
- Comm 9.42 Storage building operations.
- Comm 9.43 Miscellaneous safety precautions.

Note: Chapter ILHR 9 was renumbered to be Comm 9 and corrections made in this chapter were made under s. 13.93 (2m) (b) 1., 6., 7. and 14. Stats., Register, October, 1996, No. 490.

Subchapter I — Administration and Enforcement

Comm 9.01 Purpose. Pursuant to s. 167.10 (6m), Stats., the purpose of this chapter is to establish safety standards and licensing procedures for the manufacture of fireworks.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.02 Scope. (1) APPLICATION. The provisions of this chapter shall apply to the manufacture of fireworks, to the storage of fireworks in connection with the manufacture, and to the licensing and inspection of fireworks manufacturers.

(2) EXCLUSIONS. The provisions of this chapter shall not apply to the transportation, sale or use of fireworks.

Note: See s. 167.10, Stats., for requirements pertaining to the sale, use, storage and handling of fireworks.

Note: The transportation of fireworks is regulated by the U.S. department of transportation.

Note: See ch. Comm 7 for complete requirements pertaining to the manufacture, storage, transportation, handling and use of explosive materials.

Note: See ch. Comm 5, s. Comm 5.21 pertaining to the licensing of fireworks manufacturers.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.04 Licensing of manufacturers. (1) No person may manufacture fireworks unless that person holds a license issued by the department in accordance with ch. Comm 5.

(2) A fireworks manufacturer license shall be posted at each plant where fireworks are to be manufactured.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85; r. and recr. Register, October, 1996, No. 490, eff. 11-1-96.

Comm 9.05 Inspections. (1) GENERAL. The authorized inspectors of the department, upon presenting appropriate credentials to the owner, operator or person in charge, may enter and inspect at reasonable times the premises on which each person licensed under this chapter manufactures fireworks.

(2) INITIAL INSPECTIONS. Upon receipt of an application for a fireworks manufacturing license, the department or the department's designated deputy shall inspect the premises for which the application is being made.

(3) PERIODIC INSPECTIONS. The department or the department's designated deputy shall inspect a fireworks manufacturing plant at least once a year.

(4) FEDERAL INSPECTION ACCEPTANCE. Where an inspection of a fireworks manufacturing plant has been conducted by the federal bureau of alcohol, tobacco and firearms, the department may accept a federal inspection report in lieu of the department inspection.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.06 Recordkeeping and reporting. (1) RECORDS. (a) A holder of a fireworks manufacturing license shall keep a record of all transactions or operations involving explosive materials and fireworks for 5 years. The record shall be made available to the department upon request.

(b) Invoices, sales slips, delivery tickets, receipts or similar papers representing individual transactions shall satisfy the requirements for records provided they include the signature of any receiver of the explosive materials or fireworks.

(c) Records made and kept for compliance with the federal bureau of alcohol, tobacco and firearms regulations need not be duplicated to satisfy the requirements of this section.

(2) REPORTING CHANGE OF ADDRESS. The department shall be notified promptly in writing by any fireworks manufacturing license holder of a change in business address.

(3) REPORTING THEFT OR LOSS. The theft or loss of explosive materials shall be reported to the federal bureau of alcohol, tobacco and firearms, and to the local law enforcement agency.

Note: The federal bureau of alcohol, tobacco and firearms requires reporting the theft or loss of any explosive materials within 24 hours by telephoning 1-800-424-9555.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.07 Fees. Fees for the licensing and inspection of fireworks manufacturing plants shall be submitted as specified in ch. Comm 2.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85; correction made under s. 13.93 (2m) (b) 7., Stats., Register, March, 1995, No. 471.

Comm 9.08 Enforcement. The provisions of this chapter shall be enforced by the department, or by municipal officials or other local officials who are required by law to enforce the administrative rules of the department.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.09 Petition for variance. (1) PROCEDURE. The department shall consider and may grant a variance to an administrative rule upon receipt of a fee, a completed petition for variance form from the owner and, where applicable, a completed position

statement from the chief of the local fire department, provided an equivalency is established in the petition for variance which meets the intent of the rule being petitioned. The department may impose specific conditions in granting a variance to promote the protection of the health, safety and welfare of the employees or the public. Violation of those conditions under which the variance is granted shall constitute a violation of these rules.

Note: Copies of the petition for variance (form SB-8) and the position statement (form SB-8A) are available at no charge from the Division of Safety and Buildings, P.O. Box 7969, Madison, Wisconsin 53707.

Note: Section 101.02 (6), Stats., and ch. Comm 3 outline the procedure for submitting petitions to the department and the department procedures for hearing petitions.

(2) PETITION PROCESSING TIME. Except for priority petitions, the department shall review and make a determination on a petition for variance within 30 business days of receipt of all calculations, documents and fees required to complete the review. The department shall process priority petitions within 10 business days of receipt of the required items.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.10 Appeals. (1) APPEAL OF LOCAL ORDER. Any person affected by a local order which may be in conflict with a rule of the department may petition the department for a hearing on the grounds that the local order is unreasonable and in conflict with the rule of the department.

Note: Section 101.01 (8), Stats., defines "local order" as any ordinance, order, rule or determination of any common council, board of alderpersons, board of trustees or the village board, of any village or city, or the board of health of any municipality, or an order or direction of any official of such municipality, upon any matter over which the department has jurisdiction.

(2) PETITION OF ADMINISTRATIVE RULE. Pursuant to s. 227.12, Stats., any municipality, corporation or any 5 or more persons having an interest in an administrative rule may petition the department requesting the adoption, amendment or repeal of the rule.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.11 Penalties. Pursuant to s. 167.10 (9) (g), Stats., a person who violates any rule in this chapter may be fined not more than \$10,000 or imprisoned not more than 10 years or both.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Subchapter II — Definitions

Comm 9.15 Definitions. The following definitions shall apply in this chapter:

(1) "Approved" means acceptable to the department.

(2) "Artificial barrier" means an artificial mound or revetted wall of earth of a minimum thickness of 3 feet.

(3) "Barricade" means a natural or artificial barrier that will effectively screen a magazine, building, railway, or highway from the effects of an explosion in a magazine or building containing explosives, of such height that a straight line from the top of any sidewall of a magazine or building containing explosives to the eave line of any magazine or building, or to a point 12 feet above the center of a railway or highway, will pass through the natural or artificial barrier.

(4) "Bullet-sensitive explosive material" means any explosive material that can be detonated by a 150-grain M2 ball ammunition having a nominal muzzle velocity of 2,700 feet per second when fired from a 0.30 caliber rifle at a distance of 100 feet measured perpendicular. The test material is at a temperature of 70° to 75° F and is placed against a 1/4-inch-thick steel plate.

(5) "Common fireworks" means any small firework device designed primarily to produce visible effects by combustion. Common fireworks include the following:

Note: Common fireworks are classified as Class C explosives by the U.S. Department of Transportation Regulations, 49 CFR, Part 173.100. The items listed in par. (e) are not classified as common fireworks by the U.S. Department of Transportation.

(a) Ground and hand-held sparkling devices. 1. "Cone fountain" means a cardboard or heavy paper cone containing up to 50

grams of pyrotechnic composition. The effect is the same as that of a cylindrical fountain.

2. "Cylindrical fountain" means a cylindrical tube not more than 3/4-inch inside diameter, containing up to 75 grams of pyrotechnic composition. Upon ignition, a shower of colored sparks, and sometimes a whistling effect, is produced. This device may be provided with a spike for insertion into the ground, spike fountain, a wood or plastic base for placing on the ground, base fountain, or a wood or cardboard handle, if intended to be hand-held, handle fountain.

3. "Dipped stick or sparkler" means a stick or wire coated with pyrotechnic composition that produces a shower of sparks upon ignition. Total pyrotechnic composition may not exceed 100 grams per item. Those devices containing any perchlorate or chlorate salts may not exceed 5 grams of pyrotechnic composition per item. Wire sparklers which contain no magnesium and which contain less than 100 grams of composition per item are not included in this category.

4. "Flitter sparkler" means a narrow paper tube filled with pyrotechnic composition that produces color and sparks upon ignition. This device does not have a fuse for ignition. The paper at one end of the tube is ignited to make the device function.

5. "Ground spinner" means a small device similar to a wheel in design and effect and placed on the ground and ignited. A shower of sparks and color is produced by the rapidly spinning device.

6. "Illuminating torch" means a cylindrical tube containing up to 100 grams of pyrotechnic composition. Upon ignition, colored fire is produced. May be spike, base, or hand-held.

7. "Wheel" means a pyrotechnic device attached to a post or tree by means of a nail or string. Each wheel may contain up to 6 "driver" units: tubes not exceeding 1/2-inch inside diameter and containing up to 60 grams of pyrotechnic composition. Upon ignition, the wheel revolves, producing a shower of color and sparks and sometimes a whistling effect.

(b) Aerial devices. 1. "Helicopter or aerial spinner" means a tube not more than 1/2-inch inside diameter and containing up to 20 grams of pyrotechnic composition. A propeller or blade is attached which, upon ignition, lifts the rapidly spinning device into the air. A visible or audible effect is produced at the height of flight.

2. "Mine shell" means a heavy cardboard or paper tube up to 2 1/2-inch inside diameter attached to a wood or plastic base and containing up to 40 grams of pyrotechnic composition. Upon ignition, "stars", firecrackers, or other devices are propelled into the air. The tube remains on the ground.

3. "Missile-type rocket" means a device similar to a sky rocket in size, composition and effect that uses fins rather than a stick for guidance and stability, except that model rockets and model rocket motors designed, sold and used for the purpose of propelling recoverable aero models are not considered to be fireworks.

4. "Roman candles" means a heavy paper or cardboard tube not exceeding 3/8-inch inside diameter and containing up to 20 grams of pyrotechnic composition. Upon ignition, up to 10 "stars", pellets of pressed pyrotechnic composition that burn with bright color, are individually expelled at several-second intervals.

5. "Sky rocket" means a tube not exceeding 1/2-inch inside diameter that may contain up to 20 grams of pyrotechnic composition. Sky rockets contain a wooden stick for guidance and stability and rise into the air upon ignition. A burst of color or noise or both is produced at the height of flight.

(c) Audible ground devices. 1. "Chaser" means a small paper or cardboard tube that travels along the ground upon ignition. A whistling effect, or other noise, is often produced. The explosive composition used to create the noise may not exceed 50 milligrams.

2. "Firecracker or salute" means a small paper-wrapped or cardboard tube containing not more than 50 milligrams of pyrotechnic composition. Upon ignition, noise and a flash of light is produced.

(d) *Combination items.* Fireworks devices containing combinations of 2 or more of the effects described in pars. (a), (b) and (c) shall also be considered common fireworks.

(e) *Novelties and trick noisemakers.* 1. "Smoke device" means a tube or sphere containing pyrotechnic composition that, upon ignition, produces white or colored smoke as the primary effect.

2. "Snake or glow worm" means a pressed pellet of pyrotechnic composition that produces a large, snakelike ash upon burning. The ash expands in length as the pellet burns. These devices may not contain mercuric thiocyanate.

3. "Trick noisemaker" means an item that produces a small report intended to surprise the user. These devices include the following:

a. "Auto burglar alarm" means a tube which contains pyrotechnic composition that produces a loud whistle or smoke, or both when ignited. A small quantity of explosive, not exceeding 50 milligrams, may also be used to produce a small report. A squib is used to ignite the device.

b. "Booby trap" means a small tube with string protruding from both ends, similar to a party popper in design. The ends of the string are pulled to ignite the friction-sensitive composition, producing a small report.

c. "Cigarette load" means a small wooden peg that has been coated with a small quantity of explosive composition. Upon ignition of a cigarette containing one of the pegs, a small report is produced.

d. "Party popper" means a small plastic or paper item containing not more than 16 milligrams of explosive composition that is friction sensitive. A string protruding from the device is pulled to ignite it, expelling paper streams and producing a small report.

e. "Snapper" means a small, paper-wrapped item containing a minute quantity of explosive composition coated on small bits of sand. When dropped, the device explodes, producing a small report.

f. "Trick match" means a kitchen or book match that has been coated with a small quantity of explosive or pyrotechnic composition. Upon ignition of the match, a small report or a shower of sparks is produced.

4. "Wire sparkler" means a wire coated with pyrotechnic composition that produces a shower of sparks upon ignition. These items may not contain magnesium and must not exceed 100 grams of composition per item. Devices containing any chlorate or perchlorate salts may not exceed 5 grams of composition per item.

(6) "Department" means the department of commerce.

(7) "Explosive" means any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses except external burning pyrotechnic hobby fuses, squibs, detonating cord, igniter cord, and igniters.

(8) "Fireworks" means any composition or device for the purpose of producing a visible or an audible effect by combustion, deflagration or detonation. Fireworks are further classified as "common" and "special".

Note: Section 167.10 (6m) (e), Stats., states that the safety standards for the manufacture of fireworks must also include the devices listed under s. 167.10 (1) (e), (f), (i) to (n), Stats. For the purposes of applying the provisions of this chapter, these devices will be considered fireworks.

(9) "Fireworks plant" means all land and buildings thereon, used for or in connection with the manufacture or processing of fireworks, including storage buildings used with or in connection with plant operation.

(10) "Highway" means any public street or public road.

(11) "Inhabited building" means a building regularly occupied in whole or in part as a habitation for human beings, or any church, school, store, railroad station, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the fireworks plant.

(12) "Magazine" means any building or structure, other than a manufacturing building, meeting the requirements specified in subch. IV.

(13) "Manufacture" means the preparation of fireworks mixes and the loading and assembly of all fireworks ingredients, except the preparation of pyrotechnic devices by qualified personnel for immediate on-site use when such operation is otherwise lawful.

(14) "Mixing building" means any building used primarily for mixing and blending of pyrotechnic compositions, excluding wet sparkler mixes.

(15) "Motor vehicle" means any self-propelled vehicle, truck, tractor, semi-trailer, or truck-trailer combination used for the transportation of freight over public highways.

(16) "Natural barrier" means natural features of the ground, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine or building containing explosives when the trees are bare of leaves.

(17) "Nonprocess building" means any office building, warehouse, or other building in a fireworks plant where no fireworks or explosive compositions are processed or stored.

(18) "Person" means any individual, firm, copartnership, corporation, company, association, joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.

(19) "Process building" means any mixing building; any building in which pyrotechnic or explosive composition is pressed or otherwise prepared for finishing and assembly; any finishing or assembly building; or any building in which fireworks are prepared for shipment. If a pyrotechnic or explosive composition, while in process, is stored in a process building, the building is still considered a process building.

(20) "Public conveyance" means any railroad car, street car, ferry, cab, bus, airplane or other vehicle which carries passengers for hire.

(21) "Pyrotechnic composition" means a chemical mixture which, upon burning and without explosion, produces visible, brilliant displays, bright lights, or sounds.

(22) "Railway" means any steam, electric, diesel-electric or other railroad or railway which carries passengers for hire on the particular line or branch in the vicinity of a pyrotechnics manufacturing or storage facility.

(23) "Screen barricade" means any barrier that will contain the embers and debris from a fire or deflagration in a process building, extending from floor level to a height such that a straight line from the top of any side wall of the donor building to the eave line of any exposed building intercepts the screen at a point not less than 5 feet from the top of the screen and having the top 5 feet of the screen inclined towards the donor building at an angle of between 30 and 45°.

Note: The purpose of a screen barricade is to prevent the propagation of fire from a process building to other buildings or areas. Screen barricades are typically constructed of metal roofing or one-quarter-inch to one-half-inch mesh screen.

(24) "Special fireworks" means large fireworks designed primarily to produce visible or audible effects by combustion, deflagration, or detonation. This term includes, but is not limited to, firecrackers containing more than 2 grains or 130 milligrams of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces which exceed the limits for classification as common fireworks.

Note: Special fireworks are classified as Class B explosives by the U.S. Department of Transportation Regulations, 49 CFR, Part 173.88.

(25) “Squib” means a device containing a small quantity of ignition compound in contact with a bridge wire.

(26) “Storage building” means any building, structure, or facility in which common fireworks in any state of processing or in which finished common fireworks are stored, but in which no processing or manufacturing is actually performed.

(27) “Warehouse” means any building or structure used exclusively for the storage of materials which are neither combustible materials nor explosive compositions used to manufacture fireworks.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Subchapter III — Manufacturing Operations

Comm 9.20 Application. All fireworks plants shall comply with the requirements of this chapter, except that those plants that meet all of the following conditions need not comply with ss. Comm 9.21 and 9.24:

(1) CUSTOMIZED FIREWORKS. Only customized fireworks, not for general sale, are manufactured;

(2) LIMITED QUANTITY. Not more than 5 pounds of explosive composition, of which no more than one-half pound may be initiating explosive, is present in any one building at any one time; and

(3) DAILY REMOVAL. All explosive and pyrotechnic compositions are removed to an appropriate storage magazine at the end

of each work day.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.21 Plant site security. Only authorized employees or representatives of the department, the federal government or local agencies having jurisdiction over the plant shall be allowed in the plant without special permission of the person in charge of the plant.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.22 Separation distances. (1) INHABITED BUILDINGS, HIGHWAYS AND RAILWAYS. Process buildings, magazines, and storage buildings shall be separated from inhabited buildings, public highways, and passenger railways in accordance with Table 9.22-1.

(2) SEPARATION AT PLANT. Process buildings shall be separated from other process buildings and from nonprocess buildings by the distances specified in Table 9.22-2. Magazines and storage buildings shall be separated from both process and nonprocess buildings by the distances specified in Table 9.22-2.

(3) MAGAZINES. Magazines containing high explosives or salutes classified as special fireworks shall be separated from each other and from inhabited buildings, public highways, and passenger railways in accordance with Table 9.22-3.

(4) SPECIAL FIREWORKS. Magazines containing special fireworks, other than special salutes, and black powder or other low explosives shall be separated from each other and from inhabited buildings, public highways, and passenger railways according to the distances specified in Table 9.22-4.

Table 9.22-1

Minimum Separation Distances of Processing Buildings, Magazines, and Storage Buildings from Inhabited Buildings, Passenger Railways, and Public Highways¹

Net Weight of Fireworks ² (Pounds)	Distance from Passenger Railways and Public Highways ^{3,4,5,6}		Distance from Inhabited Buildings ^{3,4,5,6}	
	Common Fireworks (Feet)	Special Fireworks ⁵ (Feet)	Common Fireworks (Feet)	Special Fireworks ⁵ (Feet)
100	25	200	50	200
200	30	200	60	200
400	35	200	70	200
600	40	200	80	208
800	45	200	90	252
1,000	50	200	100	292
2,000	58	230	115	459
3,000	62	296	124	592
4,000	65	352	130	704
5,000	68	400	135	800
6,000	70	441	139	882
8,000	73	509	140	1,018
10,000	75	565	150	1,129
15,000	80	668	159	1,335
20,000	83	745	165	1,490
30,000	87	863	174	1,725
40,000	90	953	180	1,906
50,000	93	1,030	185	2,060
60,000	95	1,095	189	2,190
80,000	98	1,205	195	2,410
100,000	100	1,300	200	2,600
150,000	105	1,488	209	2,975
200,000	108	1,638	215	3,275
250,000	110	1,765	220	3,530

¹ This table does not apply to separation distances at fireworks manufacturing buildings, magazines for storage of special fireworks, and storage buildings for common fireworks.

² Net weight is the weight of all pyrotechnic and explosive composition and fuse only.

³ See subch. II for definitions of "passenger railways", "public highways" and "inhabited buildings".

⁴ Special fireworks processing buildings and special fireworks magazines, including buildings located on the property of a fireworks plant, shall be separated from passenger railways, public highways, and inhabited buildings by a minimum distance of 200 feet except that the separation from hospitals, schools, and bulk storages of flammable liquids or flammable gases shall be by a minimum distance of 500 feet.

⁵ The separation distances shall apply to all special fireworks except salutes. The separation distances in Table 9.22-3 shall apply for salutes. When salutes and special fireworks are stored in the same magazine, the net weight of salute is applied to Table 9.22-3 and the net weight of special fireworks, including the net weight of salutes, is applied to this table. Whichever distance is the greater shall determine the separation distances of the magazine.

⁶ All distances in this table are to be applied with or without barricades or screen barricades.

Table 9.22-2
Minimum Separation Distances at Fireworks Manufacturing Plants

Net Weight of Fireworks ¹ (Pounds)	Distance of Magazines and Storage Buildings From Process Buildings and Nonprocess Buildings ^{2,5}		Distance Between Process Buildings and Between Process and Nonprocess Buildings ²	
	Common Fireworks ³ (Feet)	Special Fireworks ⁴ (Feet)	Common Fireworks ³ (Feet)	Special Fireworks ⁴ (Feet)
100	30	30	37	57
200	30	35	37	69
400	30	44	37	85
600	30	51	37	97
800	30	56	37	105
1,000	30	60	37	112
2,000	30	76	37	172
3,000	35	87	48	222
4,000	38	95	60	264
5,000	42	103	67	300
6,000	45	109	72	331
8,000	50	120	78	382
10,000	54	129	82	423

¹ Net weight is the weight of all pyrotechnic and explosive compositions and fuse only.

² For the purposes of applying the separation distances in this table, a process building includes a mixing building, any building in which pyrotechnic or explosive compositions are pressed or otherwise prepared for finishing and assembling, and any finishing and assembling building. A nonprocess building means office buildings, warehouses, and other fireworks plant buildings where no fireworks or explosive compositions are processed or stored.

³ Distances apply with or without barricades or screen barricades.

⁴ Distances apply only with barricades or screen barricades.

⁵ Distances include those between magazines, between storage buildings, between magazines and storage buildings, between magazines or storage buildings from process buildings and nonprocess buildings.

Table 9.22-3

Minimum Separation Distances of Magazines for Storage of High Explosives or Special Salutes from Inhabited Buildings, Highways, Railways, and Other Magazines¹

Quantity of Explosives ^{2,3}		DISTANCES IN FEET							
		Inhabited Buildings		Public Highways With Traffic Volume of Less Than 3,000 Vehicles/Day		Passenger Railways, and Public Highways With Traffic Volume of More Than 3,000 Vehicles/Day		Separation of Magazines ⁴	
		Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
2	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164

Table 9.22-3 (continued)

Quantity of Explosives ^{2,3}		DISTANCES IN FEET							
		Inhabited Buildings		Public Highways With Traffic Volume of Less Than 3,000 Vehicles/Day		Passenger Railways, and Public Highways With Traffic Volume of More Than 3,000 Vehicles/Day		Separation of Magazines ⁴	
		Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570

Table 9.22-3 (continued)

Quantity of Explosives ^{2,3}		DISTANCES IN FEET							
		Inhabited Buildings		Public Highways With Traffic Volume of Less Than 3,000 Vehicles/Day		Passenger Railways, and Public Highways With Traffic Volume of More Than 3,000 Vehicles/Day		Separation of Magazines ⁴	
		Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

¹ This table applies only to the manufacture and permanent storage of commercial explosives. It is not applicable to transportation of explosives or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

² All types of blasting caps in strengths through No. 8 cap should be rated at 1¹/₂ pounds of explosives per 1,000 caps. For strengths higher than No. 8 cap, the manufacturer should be consulted.

³ For quantity and distance purposes, detonating cord of 50 to 60 grains per foot should be calculated as equivalent to 9 pounds of high explosives per 1,000 feet. Heavier or lighter core loads should be rated proportionately.

⁴ When 2 or more storage magazines are located on the same property, each magazine shall comply with the minimum distances specified from inhabited buildings, railways, and highways, and in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines", except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives. If any 2 or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such 2 or more magazines, as a group, shall be considered as one magazine and the total quantity of explosives stored in such group shall be treated as if stored in a single magazine located on the site of any magazine of the group, and shall comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

Table 9.22-4

Minimum Separation Distances for the Storage of Special Fireworks and Black Powder

Quantity of Fireworks in Pounds		Distances in Feet		
Over	Not Over	From Inhabited Buildings	From Public Railways and Highways	From Aboveground Magazines
0	1,000	75	75	50
1,000	5,000	115	115	75
5,000	10,000	150	150	100
10,000	20,000	190	190	125
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	280	280	190
80,000	90,000	295	295	195
90,000	100,000	300	300	200
100,000	200,000	375	375	250
200,000	300,000	450	450	300

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.23 Building construction. (1) EXPLOSION RELIEF. At least one wall or the roof of each process building shall be provided with explosion relief, either by suitable weakwall construction or by explosion vents.

Note: In general, the wall having the largest area should be chosen to provide explosion relief. The entire area of the wall should be utilized. The term "weakwall" is used to describe the relative strength of the explosion relieving wall as compared to the rest of the building.

(2) SINGLE STORY. Process buildings shall be single story and shall have no basements or subfloor areas.

(3) INTERIOR FINISH. (a) Interior wall and ceiling surfaces shall be smooth, free of cracks and crevices. Interior finish shall be of noncombustible or limited combustible materials.

(b) Wall joints and openings for wiring, plumbing and other utilities shall be sealed to prevent entry of dusts.

(4) HORIZONTAL SURFACES. Horizontal ledges and surfaces upon which dust may settle and accumulate shall be minimized.

(5) FLOORS. Floors and work surfaces shall not have cracks or crevices in which explosives or pyrotechnic compositions may lodge. Floors and work surfaces in mixing and pressing buildings shall be of conductive materials.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.24 Means of egress. (1) ALL BUILDINGS. Means of egress in all buildings shall comply with applicable requirements of chs. Comm 61 to 65.

(2) PROCESS BUILDINGS. Means of egress in process buildings shall also comply with the following requirements:

(a) From every point in every undivided floor area of more than 100 square feet there shall be at least 2 exits placed as far apart as practicable and so located that if any exit is blocked, some other exit will be available.

(b) Where process buildings are divided into rooms, there shall be at least 2 means of escape from each room of more than 100 square feet, except that toilet rooms need have only one exit, provided they are located away from or shielded from process areas.

(c) Exits shall be so located that every point within the room or undivided floor area is within 25 feet of an exit. The routes to the exits shall not be obstructed.

(d) Exit doors shall open outward and shall be capable of being pressure-actuated from the inside.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85; correction in (1) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543; **CR 01-139: am. (1) Register June 2002 No. 558, eff. 7-1-02.**

Comm 9.25 Heating, lighting and electrical equipment. (1) PROHIBITED DEVICES. Stoves, exposed flames, and electric heaters shall be prohibited in any building where fireworks, fireworks components, or flammable liquids are or may be present.

(2) HEATING. (a) Heating shall be provided by steam, hot water, or indirect hot air radiators, or any other means approved by the department.

(b) Unit heaters located in buildings which contain or may contain explosive or pyrotechnic composition shall be equipped with motors and electrical devices suitable for use in Class II, Group E, Division 1 locations as specified in ch. Comm 16.

(3) LIGHTING AND ELECTRICAL EQUIPMENT. (a) All wiring in process buildings shall be in rigid metal conduit or shall be Type MI cable. Wiring, switches, and electrical fixtures shall be suitable for use in Class II, Group E, Division 1 locations as specified in ch. Comm 16.

(b) Temporary or loose electrical wiring shall not be used.

(c) 1. Except as provided in subd. 2., portable lighting equipment shall not be used.

2. Approved portable lighting equipment may be used during repair operations, provided the area has been cleared of all pyrotechnic or explosive material and all dust or residue has been removed by washing.

(d) All presses and other mechanical devices shall be electrically bonded and grounded.

(e) 1. Except as provided in subd. 2., a master electrical disconnect shall be provided at the point where the electrical service enters the plant. This master disconnect shall be arranged to disconnect all electrical power to the plant.

2. Emergency circuits, such as the electrical supply to fire pumps or emergency lighting, shall have their own master disconnects.

(f) All artificial lighting shall be electrically powered.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.26 Number of occupants and quantities of compositions permitted. (1) OCCUPANCY LIMITS. The number of occupants in each process building and in each magazine shall not exceed the number necessary for the proper conduct of production operations.

Note: This requirement is for purposes of minimizing personnel exposure and is distinct from any requirement on maximum building occupancy that may be in the local building code.

(2) POSTING. The maximum number of occupants permitted under the local building code in each process building and in each magazine shall be posted in a conspicuous location in each process building or magazine.

(3) QUANTITIES OF COMPOSITIONS PERMITTED. (a) No more than 500 pounds of pyrotechnic or explosive composition shall be permitted at one time in any mixing building or in any building in which the composition is pressed or otherwise prepared for finishing and assembly.

(b) No more than 500 pounds of pyrotechnic or explosive composition shall be permitted at one time in a finishing and an assembly building.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.27 Fire and explosion prevention.

(1) CLEANLINESS. (a) All buildings shall be kept clean, orderly, and free of accumulations of dust or rubbish.

(b) Spills of explosive or pyrotechnic composition shall be immediately cleaned up and removed from the building. The spilled material shall be destroyed by immersion in water or by burning in a manner acceptable to the local fire department.

(c) Rags, combustible scrap, and paper shall be kept separate from waste explosive or pyrotechnic materials. Both shall be kept in approved, marked containers until removed from the building. All disposal containers shall be removed from buildings on a daily basis and removed from the plant at intervals sufficient to prevent the unsafe accumulation of waste materials. Waste explosive or pyrotechnic materials shall be destroyed by means specified in par. (b).

(2) SMOKING REGULATIONS. (a) Smoking materials shall not be carried into or within 50 feet of process buildings. Personnel shall deposit all smoking materials at a suitable location in a non-process building immediately upon entering the plant.

(b) Smoking shall only be permitted in office buildings or in buildings used exclusively as lunchrooms or rest rooms and in which the presence of explosive or pyrotechnic materials is prohibited.

(c) Authorized smoking locations shall be so marked, shall contain suitable receptacles for disposal of smoking materials, and shall be provided with at least one approved portable fire extinguisher suitable for use on Class A fires.

(d) Personnel whose clothing may be contaminated with explosive or pyrotechnic composition to a degree that may endanger personnel safety shall not be allowed in smoking locations.

(3) ALCOHOL AND DRUGS. No employee or other person shall be permitted to enter the plant while in possession of or under the influence of alcohol, drugs, or narcotics.

(4) CLOTHING. (a) Personnel working at or supervising mixing, pressing, and loading operations shall be provided with and shall wear cotton clothing and conductive footwear. Other protective clothing, eye protection, and respiratory protection shall be worn as needed.

(b) Washing, shower, and change facilities shall be provided for personnel.

(c) Work clothing shall be washed frequently to prevent accumulation of explosive or pyrotechnic composition and shall not be worn outside the plant.

(5) SAFETY OFFICER. (a) Each plant shall have an employee designated as safety officer who shall be responsible for general safety, fire prevention and protection, and employee safety training.

(b) The safety officer shall give formal instruction regarding proper methods and procedures, safety requirements, and procedures for handling explosives and pyrotechnic compositions and devices to all employees upon commencing employment and at least annually thereafter.

(6) HAND TOOLS. In areas where sparks may ignite materials, only nonsparking hand tools shall be used.

(7) STORAGE OF OXIDIZERS. Oxidizers shall not be stored in the same building with combustible powdered materials such as charcoal, gums, metals, sulfur, or antimony sulfide.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.28 Fire protection and emergency procedures.

(1) FIRE EXTINGUISHERS. (a) Except as provided in par. (b), portable fire extinguishers shall be provided in all buildings according to the requirements in chs. Comm 61 to 65.

(b) Extinguishers shall not be located in buildings in which explosive or pyrotechnic mixtures are exposed.

(2) EMERGENCY PROCEDURES. Each plant shall have formal emergency procedures. Such procedures shall include employee instruction and training and shall be applicable to all anticipated emergencies. An emergency warning signal shall be established.

(3) INSTRUCTIONS FOR EMERGENCIES. (a) Emergency procedures shall include instruction on the use of portable fire extinguishers and instruction on the fires for which they may be safely used.

(b) Employees shall be instructed to abandon fire fighting efforts if the fire involves or may spread to explosive or pyrotechnic compositions or devices. In such cases, employees shall be instructed to evacuate the building immediately and to alert other plant personnel.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85; correction in (1) (a) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543; CR 01-139: am. (1) (a) Register June 2002 No. 558, eff. 7-1-02.

Comm 9.29 Testing of fireworks. Testing of fireworks and fireworks components shall be performed only in an area set aside specifically for that purpose. Fireworks shall not be tested at a site where any portion of the fireworks or combustion from the fireworks could reasonably be expected to come within 100 feet of the plant buildings as a result of the expected operation of the fireworks or as a result of any reasonably foreseeable malfunction.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Subchapter IV — Storage of Special Fireworks and Black Powder

Comm 9.30 General requirements. (1) MAGAZINE STORAGE. (a) Special fireworks and black powder shall be stored in magazines that meet the requirements of this subchapter. They shall be so stored at all times unless they are in the process of manufacture, packaging, or being transported.

(b) Special fireworks that are bullet-sensitive shall be stored only in a Type 1, 2, or 3 magazine.

(c) Black powder and special fireworks that are not bullet-sensitive shall be stored only in a Type 1, 2, 3, or 4 magazine.

(2) SEPARATION DISTANCES. (a) Magazines containing special fireworks, other than special salutes, and black powder or other low explosives shall be separated from each other and from inhabited buildings, passenger railways, and public highways by the distances specified in Table 9.22-4.

(b) Magazines containing special fireworks shall be separated from plant buildings by barricades or screen barricades and by the distances specified in Table 9.22-2.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.31 General magazine construction requirements. (1) **CONSTRUCTION COMPLIANCE.** Magazines shall be constructed in conformance with the provisions of this subchapter, or shall be of substantially equivalent construction.

Note: Complete plans for all types of magazines are available from the U.S. Bureau of Mines, explosive manufacturers, and the Institute of Makers of Explosives.

(2) **LAND GRADE.** The ground around magazines shall be graded so that water drains away from the magazine.

(3) **HEATING SYSTEMS.** (a) Magazines requiring heat shall be heated by either hot water radiant heating within the magazine building or by indirect warm air heating.

(b) Indirect warm air shall be heated by either hot water or low-pressure, 15 psig or less, steam coils located outside the magazine building.

(c) Magazine heating systems shall meet the following requirements:

1. Radiant heating coils within the building shall be installed so that explosive materials or their containers cannot contact the coils and so that air is free to circulate between the coils and the explosives. The surface temperature of the coils shall not exceed 165°F.

2. Heating ducts shall be installed so that the hot air discharge from the ducts is not directed against explosive materials or their containers.

3. The heating system shall be controlled so that the ambient temperature of the magazine does not exceed 130°F.

4. Any electric fan or pump used in the heating system shall be located outside the magazine, separate from the magazine walls, and shall be grounded.

5. Any electric motor and any controls for electric heating devices used to heat water or produce steam shall have overload devices and disconnects which comply with ch. Comm 16. All electrical switchgear shall be located at least 25 feet from the magazine.

6. Any fuel-fired heating source for the hot water or steam shall be separated from the magazine by a distance of not less than 25 feet. The area between the heating unit and the magazine shall be cleared of all combustible materials.

7. Explosive materials stored in magazines shall be arranged so that uniform circulation of air is assured.

(4) **LIGHTING.** (a) Except as provided in par. (b), when lighting is necessary within the magazine, electric safety flashlights or electric safety lanterns shall be used.

(b) Electric lighting may be used within a magazine only if the installation meets the following requirements:

1. Junction boxes containing fuses or circuit breakers and electrical disconnects shall be located at least 25 feet from the magazine.

2. Disconnects, fuses, and circuit breakers shall be protected by a voltage surge arrester capable of handling 2500 amperes for 0.1 seconds.

3. All wiring from switches, both inside and outside the magazine, shall be installed in rigid conduit. Wiring leading into the magazine shall be installed underground.

4. Conduit and light fixtures inside the magazine shall be protected from physical damage by suitable guards or by location.

5. Light fixtures shall be suitably enclosed to prevent sparks or hot metal from falling on the floor or onto material stored in the magazine.

6. Junction boxes located within the magazine shall have no openings and shall be equipped with close-fitting covers.

7. Magazines containing materials that may release flammable vapors shall have wiring and fixtures which meet the requirements of Article 501 of the National Electrical Code as adopted by reference in ch. Comm 16.

8. Lights inside magazines shall not be left on when the magazine is unattended.

(5) **EXPOSED METAL.** There shall be no exposed ferrous metal on the interior of the magazine where it may contact material stored within.

(6) **VENTILATION.** (a) When ventilation is required in the magazine, sufficient ventilation shall be provided to protect the stored materials for the specific area in which the plant is located.

(b) Stored materials shall be placed so that they do not interfere with ventilation and so as to prevent contact with masonry walls, any steel, or any other ferrous metal by means of a nonsparking lattice or equivalent lining.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.32 Construction of Type 1 magazines. A

Type 1 magazine shall be a permanent structure, such as but not limited to, a building, an igloo or "Army-type structure", a tunnel, or a dugout. It shall be bullet-resistant, fire-resistant, weather-resistant, theft-resistant and ventilated. A Type 1 magazine shall meet the following requirements:

(1) **BUILDINGS.** All Type 1 building magazines shall be constructed of masonry, wood, metal or a combination of these materials, and have openings except for entrances and ventilation. The ground around building magazines shall slope away for drainage or other adequate drainage shall be provided. The construction of Type 1 building magazines shall comply with the requirements of pars. (a) to (k).

(a) *Masonry wall construction.* Masonry wall construction shall consist of brick, concrete, tile, cement block, or cinder block and be not less than 6 inches in thickness. Hollow masonry units used in construction shall have all hollow spaces filled with well-tamped, coarse, dry sand or weak concrete consisting of at least a mixture of one part cement and 8 parts of sand with enough water to dampen the mixture while tamping in place. Interior walls shall be constructed of, or covered with, a nonsparking material.

(b) *Fabricated metal wall construction.* Metal wall construction shall consist of sectional sheets of steel or aluminum not less than number 14-gauge, securely fastened to a metal framework. Metal wall construction shall be either lined inside with brick, solid cement blocks or hardwood not less than 4 inches thick, or shall have at least a 6 inch sand fill between interior and exterior walls. Interior walls shall be constructed of, or covered with, a nonsparking material.

(c) *Wood frame wall construction.* The exterior of outer wood walls shall be covered with iron or aluminum not less than number 26-gauge. An inner wall of, or covered with, nonsparking material shall be constructed so as to provide a space of not less than 6 inches between the outer and inner walls. The space shall be filled with coarse, dry sand or weak concrete.

(d) *Floors.* Floors shall be constructed of, or covered with, a nonsparking material and shall be strong enough to bear the weight of the maximum quantity to be stored. Use of pallets covered with a nonsparking material is considered equivalent to a floor constructed of or covered with a nonsparking material.

(e) *Foundations.* Foundations shall be constructed of brick, concrete, cement block, stone, or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the buildings shall be enclosed with not less than number 26-gauge metal.

(f) *Roof.* Except for buildings with fabricated metal roofs, the outer roof shall be covered with no less than number 26-gauge iron or aluminum, fastened to at least 7/8-inch sheathing.

(g) *Bullet-resistant ceilings or roofs.* Where it is possible for a bullet to be fired directly through the roof and into the magazine

at such an angle that the bullet would strike the stored materials within, the magazine shall be protected by one of the following methods:

1. A sand tray lined with a layer of building paper, plastic, or other nonporous material, and filled with not less than 4 inches of coarse, dry sand and located at the tops of inner walls covering the entire ceiling area, except that portion necessary for ventilation.

2. A fabricated metal roof constructed of 3/16-inch plate steel lined with 4 inches of hardwood. For each additional 1/16 inch of plate steel, the hardwood lining may be decreased one inch.

(h) *Doors.* All doors shall be constructed of not less than 1/4-inch plate steel and lined with at least 2 inches of hardwood. Hinges and hasps shall be attached to the doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed in such a manner that they cannot be removed when the doors are closed and locked.

(i) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and padlock; a mortise lock that requires 2 keys to open; or a three-point lock. Padlocks shall have at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks shall be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(j) *Ventilation.* Ventilation shall be provided to prevent dampness and heating of stored materials. Ventilation openings shall be screened to prevent the entrance of sparks. Ventilation openings in side walls and foundations shall be offset or shielded for bullet-resistant purposes. Magazines having foundation and roof ventilators with the air circulating between the side walls and the floors and between the side walls and the ceiling shall have a wooden lattice lining or equivalent to prevent the packages of stored materials from being stacked against the side walls and blocking the air circulation.

(k) *Exposed metal.* No sparking material may be exposed to contact with the stored materials. All ferrous metal nails in the floor and side walls, which might be exposed to contact with stored materials, shall be blind nailed, countersunk, or covered with a nonsparking lattice work or other nonsparking material.

(2) **IGLOOS, "ARMY-TYPE STRUCTURES", TUNNELS AND DUGOUTS.** All Type 1 igloo, "Army-type structure", tunnel and dugout magazines shall be constructed of reinforced concrete, masonry, metal, or a combination of these materials. They shall have an earthmound covering of not less than 24 inches on the top, sides and rear unless the magazine meets the requirements of sub. (1) (g). Interior walls and floors shall be constructed of, or covered with, a nonsparking material. Magazines of this type shall also be constructed in conformity with the requirements of sub. (1) (d) and (h) to (k).

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.33 Construction of Type 2 magazines. A Type 2 magazine shall be a box, trailer, semitrailer, or other mobile facility. A Type 2 magazine shall meet the following requirements:

(1) **OUTDOOR MAGAZINES.** (a) *General.* Outdoor Type 2 magazines shall be bullet-resistant, fire-resistant, weather-resistant, theft-resistant and ventilated. They shall be supported to prevent direct contact with the ground and, if less than one cubic yard in size, shall be securely fastened to a fixed object. The ground around outdoor magazines shall slope away for drainage or other adequate drainage shall be provided. When unattended, vehicular magazines shall have wheels removed or otherwise effectively immobilized by kingpin locking devices or other methods approved by the department. The construction of outdoor Type 2 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Exterior construction.* The exterior and doors shall be constructed of not less than 1/4-inch steel and lined with at least 2 inches of hardwood. Magazines with top openings shall have lids with water-resistant seals or which overlap the sides by at least one inch when in a closed position.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three-point lock. Padlocks shall have at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks shall be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(2) **INDOOR MAGAZINES.** (a) *General.* Indoor Type 2 magazines shall be fire-resistant and theft-resistant. They need not be bullet-resistant and weather-resistant if the buildings in which they are stored provide protection from the weather and from bullet penetration. No indoor magazine may be located in a residence or dwelling. The indoor storage of high explosives shall not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. The construction of indoor Type 2 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Exterior construction.* Indoor Type 2 magazines shall be constructed of wood or metal according to one of the following specifications:

1. Wood indoor magazines shall have sides, bottoms and doors constructed of at least 2 inches of hardwood and shall be well braced at the corners. They shall be covered with sheet metal of not less than number 26-gauge. Nails exposed to the interior of magazines shall be countersunk.

2. Metal indoor magazines shall have sides, bottoms and doors constructed of not less than number 12-gauge metal and shall be lined inside with a nonsparking material. Edges of metal covers shall overlap sides at least one inch.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three-point lock. Padlocks shall have at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks shall be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Indoor magazines located in secure rooms that are locked as provided in this paragraph may have each door locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter, if the door hinges and lock hasp are securely fastened to the magazine. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(3) **DETONATOR BOXES.** Boxes for detonators in quantities of 100 or less shall have sides, bottoms and doors constructed of not less than number 12-gauge metal and lined with a nonsparking material. Hinges and hasps shall be attached so they cannot be removed from the outside. One steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case-

hardened shackle of at least 3/8-inch diameter shall be sufficient for locking purposes. Magazines for the storage of detonators in quantities of more than 100 shall meet the requirements for Types 1, 2, 3 or 4 magazines.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.34 Construction of Type 3 magazines. A Type 3 magazine shall be a "day-box" or other portable magazine. It shall be fire-resistant, weather-resistant and theft-resistant. A Type 3 magazine shall be constructed of not less than number 12-gauge steel, lined with at least either 1/2-inch plywood or 1/2-inch Masonite-type hardboard. Doors shall overlap sides by at least one inch. Hinges and hasps shall be attached by welding, riveting, or bolting with nuts on the inside. One steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter is sufficient for locking purposes. Stored materials shall not be left unattended in Type 3 magazines and shall be removed to Type 1 or 2 magazines for unattended storage.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.35 Construction of Type 4 magazines. A Type 4 magazine shall be a building, igloo or "Army-type structure", tunnel, dugout, box, trailer, or a semitrailer or other mobile facility. A Type 4 magazine shall meet the following requirements:

(1) **OUTDOOR MAGAZINES.** (a) *General.* Outdoor Type 4 magazines shall be fire-resistant, weather-resistant, and theft-resistant. The ground around outdoor magazines shall slope away for drainage or other adequate drainage shall be provided. When unattended, vehicular magazines shall have wheels removed or otherwise be effectively immobilized by kingpin locking devices or other methods approved by the department. The construction of outdoor Type 4 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* Outdoor Type 4 magazines shall be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. Foundations shall be constructed of brick, concrete, cement block, stone, or metal or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the building shall be enclosed with fire-resistant material. The walls and floors shall be constructed of, or covered with, a nonsparking material or lattice work. The doors shall be metal or solid wood covered with metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and a padlock; a mortise lock that requires 2 keys to open; or a three-point lock. Padlocks shall have at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks shall be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

(2) **INDOOR MAGAZINES.** (a) *General.* Indoor Type 4 magazines shall be fire-resistant and theft-resistant. They need not be weather-resistant if the buildings in which they are stored provide protection from the weather. No indoor magazine may be located in a residence or dwelling. The indoor storage of low explosives shall not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. The construction of indoor Type 4 magazines shall comply with the requirements of pars. (b) to (d).

(b) *Construction.* Indoor Type 4 magazines shall be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. The walls and floors shall be constructed of, or covered with, a nonsparking material. The doors shall be metal or solid wood covered with metal.

(c) *Hinges and hasps.* Hinges and hasps shall be attached to doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed so that they cannot be removed when the doors are closed and locked.

(d) *Locks.* Each door shall be equipped with 2 mortise locks; 2 padlocks fastened in separate hasps and staples; a combination of a mortise lock and padlock; a mortise lock that requires 2 keys to open; or a three-point lock. Padlocks shall have at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks shall be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps and staples. Indoor magazines located in secure rooms that are locked as provided in this paragraph may have each door locked with one steel padlock, which need not be protected by a steel hood, having at least 5 tumblers and a case-hardened shackle of at least 3/8-inch diameter, if the door hinges and lock hasp are securely fastened to the magazine. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.36 Magazine operations. (1) **PERSON IN CHARGE.** Magazines shall be under the responsibility of a competent person at all times. This person shall be at least 21 years of age and shall be responsible for the enforcement of all safety precautions.

(2) **INSPECTION.** All magazines containing explosives shall be opened and inspected at intervals not exceeding 7 days to determine whether there has been unauthorized or attempted entry or whether there has been unauthorized removal of the magazines or their contents.

(3) **LOCKING.** Magazine doors shall be kept locked except during placement or removal of explosive materials or during inspection.

(4) **POSTING OF RULES.** Safety rules covering the operations of magazines shall be posted on the interior side of the magazine door.

(5) **ORDER OF USE.** When explosive materials are removed from the magazine for use, the oldest stock shall be used first.

(6) **GROUPING OF GRADES AND BRANDS.** Corresponding grades and brands of explosive materials shall be stored together so that brand and grade markings are readily visible. All stock shall be stored so as to be easily counted and checked.

(7) **STABILITY OF PILES.** Containers of explosive materials shall be piled in a stable manner, laid flat and with top side up.

(8) **OPEN CONTAINERS.** Open containers of explosive materials shall be securely closed before being returned to a magazine. No container without a closed lid may be stored in a magazine.

(9) **OPENING OF CONTAINERS.** (a) Except as provided in par. (b), containers of explosive materials shall not be opened, unpacked, or repacked inside or within 50 feet of a magazine or in close proximity to other explosives.

(b) Fiberboard containers may be opened inside or within 50 feet of a magazine. They shall not, however, be unpacked.

(10) **NONSPARKING TOOLS.** Tools used for opening containers of explosive materials shall be nonsparking, except that metal slitters may be used for opening fiberboard containers.

(11) **STORAGE OF OTHER MATERIALS.** Magazines shall be used exclusively for the storage of explosive and pyrotechnic materials. Metal tools other than nonferrous conveyors shall not be

stored in magazines. Ferrous metal conveyor stands protected by a coat of paint may be stored within magazines.

(12) **HOUSEKEEPING.** Magazine floors shall be regularly swept and kept clean, dry, free of grit, paper, empty packing materials, and rubbish. Brooms and other cleaning utensils shall not have spark-producing metal parts. Sweepings from magazine floors shall be disposed of according to instructions of the explosives manufacturer.

(13) **DETERIORATED MATERIAL.** When any explosive or pyrotechnic material has deteriorated to the extent that it has become unstable or dangerous, the person responsible shall immediately contact the manufacturer for assistance.

(14) **INTERIOR REPAIRS.** Before making repairs to the interior of a magazine, all explosive or pyrotechnic material shall be removed and the interior shall be cleaned.

(15) **EXTERIOR REPAIRS.** Before making repairs to the exterior of a magazine where there is a possibility of causing sparks or fire, all explosive and pyrotechnic material shall be removed.

(16) **REMOVED MATERIALS.** Explosive or pyrotechnic material removed from a magazine undergoing repair shall either be placed in another magazine or be placed a safe distance from the magazine, where they shall be properly guarded and protected. Upon completion of the repairs, the materials shall be promptly returned to the magazine.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.37 Miscellaneous safety precautions.

(1) **FIRE PREVENTION.** Smoking, matches, open flames, spark-producing devices and firearms, except firearms carried by authorized guards, shall not be permitted inside of or within 50 feet of a magazine.

(2) **AREA AROUND MAGAZINES.** The area around a magazine shall be kept clear of brush, dried vegetation, leaves, and similar combustibles for a distance of at least 25 feet.

(3) **STORAGE OF COMBUSTIBLES.** Combustible materials shall not be stored within 50 feet of a magazine.

(4) **SIGNS.** Property on which are located Type 1 magazines and outdoor magazines of Types 2 and 4 shall be posted with signs reading "EXPLOSIVES - KEEP OFF". The signs shall be located so as to minimize the possibility that a bullet shot at the sign will hit the magazine.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Subchapter V — Storage of Common Fireworks

Comm 9.40 General requirements. (1) **BUILDING STORAGE.** Common fireworks shall be stored in buildings that meet the requirements of this subchapter. They shall be so stored at all times unless they are in the process of manufacture, packaging, or being transported.

(2) **STORAGE BUILDING CONSTRUCTION.** Storage buildings shall be constructed so as to comply with this subchapter or in a manner substantially equivalent to the requirements of this subchapter.

(3) **SEPARATION FROM INHABITED BUILDINGS, RAILWAYS AND HIGHWAYS.** Storage buildings containing common fireworks shall be separated from inhabited buildings, passenger railways, and public highways by the distances specified in Table 9.22-1.

(4) **SEPARATION FROM OTHER BUILDINGS AND MAGAZINES.** Storage buildings containing common fireworks shall be separated from other storage buildings, magazines, and fireworks manufacturing buildings by the distances specified in Table 9.22-2.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.41 Construction of storage buildings.

(1) **GENERAL REQUIREMENTS.** Storage buildings for common fireworks may be a building, igloo, box, trailer, semi-trailer or other mobile facility. They shall be constructed to resist fire from an external source and to be weather-resistant and theft-resistant.

(2) **VENTING.** Storage buildings shall be provided with explosion venting.

(3) **LOCKS.** All openings shall be equipped with a means for locking.

(4) **EXITS.** All doors shall open outward and all exits shall be clearly marked. Aisles and exit doors shall be kept free of any obstructions.

(5) **ELECTRICAL FIXTURES.** (a) All electrical fixtures shall be dust-ignition proof. All electrical wiring shall comply with Articles 500 and 502 of the National Electrical Code as adopted by reference in ch. Comm 16.

(b) Wall receptacles shall not be permitted. All light fixtures shall have guards.

(c) An electrical disconnect shall be located outside each storage building and shall be arranged to de-energize all electrical power to the building.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.42 Storage building operations. (1) **PERSON IN CHARGE.** Storage buildings shall be under the direct supervision of a competent person at all times. This person shall be at least 21 years of age and shall be responsible for the enforcement of all safety precautions.

(2) **LOCKING.** Doors shall be kept locked when the building is not in operation.

(3) **SAFETY RULES.** Safety rules covering the operation of the storage building shall be posted.

(4) **STORAGE OF CONTAINERS.** (a) Except as provided in par. (b), common fireworks shall be stored in their original packages, and in unopened cases and cartons. All containers shall be stacked neatly and in a stable manner.

(b) Unpackaged fireworks returned to the storage building by retailers may be stored temporarily in bins until repackaged.

(5) **NONSPARKING TOOLS.** Tools used for opening containers shall be constructed of nonsparking material, except that metal slitters may be used for opening fiberboard containers.

(6) **HOUSEKEEPING.** Storage buildings shall be kept clean, dry, free of grit, paper, empty used packages and rubbish. Brooms and other cleaning utensils shall not have any spark-producing metal parts. Sweepings from magazine floors shall be disposed of properly.

(7) **INTERIOR REPAIRS.** Before making repairs to the interior of a storage building, all fireworks shall be removed and the interior shall be cleaned.

(8) **EXTERIOR REPAIRS.** Before making repairs to the exterior of a storage building where there is a possibility of causing sparks or fire, all fireworks shall be removed.

(9) **REMOVAL OF MATERIALS FOR REPAIRS.** Fireworks removed from a storage building undergoing repair shall either be placed in another storage building or be placed a safe distance from the storage building, where they shall be properly guarded and protected. Upon completion of the repairs, the fireworks shall be promptly returned to the storage building.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.

Comm 9.43 Miscellaneous safety precautions.

(1) **FIRE PREVENTION.** Smoking, matches, open flames, spark-producing devices and firearms, except firearms carried by authorized guards, shall not be permitted inside of or within 25 feet of a storage building.

(2) **AREA AROUND STORAGE BUILDINGS.** The area around storage buildings shall be kept clear of brush, dried vegetation, leaves and similar combustibles for a distance of at least 25 feet.

(3) **NO SMOKING SIGNS.** Smoking shall not be permitted in storage buildings or within 25 feet of the storage building. Signs with the words "FIREWORKS - NO SMOKING" in letters not less than 4 inches high shall be conspicuously posted.

History: Cr. Register, June, 1985, No. 354, eff. 7-1-85.