Natural Resources Canada | Ressources naturelles Canada

G06-08

Storage of Explosives

Explosives Regulatory Division
Lands and Minerals Sector
Natural Resources Canada

DRAFT FOR CONSULTATION
May 5, 2025

Consultation on ERD's new 'Storage of Explosives' Document

May 5, 2025

The Explosives Regulatory Division (ERD) of Natural Resources Canada is soliciting feedback from stakeholders and other interested parties on its new *Storage of Explosives* document.

The new *Storage of Explosives* document will incorporate and replace the use of these documents by ERD:

- Bureau de normalisation du Québec (BNQ) *Standard CAN/BNQ 2910-500 Explosives — Magazines for Industrial Explosives*. ERD was notified in January 2025 that the BNQ had withdrawn the standard and would no longer revise or amend the document;
- ERD's G06-01 - *Storage Guidelines for Non-Industrial Explosives*; and
- ERD's G06-05 - *Storage Guidelines for Compatibility of Explosives: Types E, I, P, C, F, R and S.*

Changes to information in the BNQ's Storage Standard

- Added information on old magazines not built to the 2015 Magazine standard (such as sunset dates and conditions for licensing).
- Added information on Type-6 magazines.
- Combined information on electricals, ventilations, marking, interior and exterior finish for all magazine types.
- Utilized more performance-based language (for example, information on ventilation).
- Clarified information on bullet resistance (deleted examples of specific brands).
- Deleted unnecessary references to other jurisdictions, standards and codes.
- Added information for Type-12 magazines.
- Deleted information on cylinders, locks, and keys for Type-1, -4, and -9 magazines (this information is communicated directly to ERD's approved fabricators).
- Updated information on magazine markings.
- Updated information on electricals.
- Updated information on magazine monitoring.

Changes to principles in G06-01 Storage Guidelines for Non-Industrial Explosives

- Types of magazines were changed / combined from Types "A", "B", "C", "D", "F" to Types-13, -14, -15, -16.
- Added information on generic safety principles (principles of good housekeeping, reducing risks of fires, and reduce the likelihood of a fire spread).
- Simplified and aligned language on electricals, ventilations, and heating / cooling.
- Deleted language on forklifts.

Changes to principles in G06-05 Storage Guidelines for Compatibility of Explosives

- Combined four tables into one table.
- Updated various 'Notes' in the table.
- Added a section on special cases.

The *Storage of Explosives* document was developed to communicate to stakeholders how to meet the intent of requirements for the licensed storage of explosives under the *Explosives Regulations, 2013* (the Regulations), and to support explosives licence applications. The document will be used by ERD inspectors to support the issuance of licences and certificates, as well as the verification of compliance with regulatory requirements.

Some stakeholders outside of ERD's jurisdiction might find information in this document beneficial. However, these stakeholders would need to consult their Authority Having Jurisdiction (body or agency that may choose to use these principles in full or in part in support of their legislation) for any questions or determinations.

All interested parties are encouraged to review the document and provide feedback to ERD by May 30, 2025. Please submit all comments via email to pavel.zraly@nrcan-rncan.gc.ca. After all comments are received and analyzed, ERD will send out a summary of questions and answers and communicate any changes made to this draft.

Please be advised that this document is a draft and is subject to change. This document should not be used for determining regulatory requirements.

Contents

1. FOREWORD

The Explosives Regulatory Division (ERD) is a regulatory body within Natural Resources Canada (NRCan). ERD's mandate is to ensure the safety and security of the public and workers in the Canadian explosives industry by administering the *Explosives Act* (the Act) and the *Explosives Regulations, 2013* (the Regulations).

This document was developed to supersede the Bureau de normalisation du Québec (BNQ) Standard *CAN/BNQ 2910-500* entitled Storage of Industrial Explosives, ERD's G06-01 - *Storage Guidelines for Non-Industrial Explosives*, and ERD's G06-05 - *Storage Guidelines for Compatibility of Explosives: Types E, I, P, C, F, R and S*.

This document will be amended from time to time and the latest version will be published on ERD's website.

2. PURPOSE AND SCOPE

This document describes how stakeholders can meet the intent of the Regulations for the construction and monitoring of magazines at sites with manufacturing (factory) licences and/or certificates, and sites with storage (magazine) licences issued under paragraph 7(1)(a) of the Act, and in accordance with requirements in Parts 5-18 of the Regulations. This document is also intended to assist in determining the suitability for storage of multiple types and/or kinds of explosives in a single magazine. The document will be used by ERD inspectors to assist in evaluating licence applications and conducting compliance verifications of licensed sites.

This document does not apply to explosives that are stored below the licence limits stated in the Regulations, whether or not they are stored at a licensed site (see ERD's website for information on storage requirements below the licence limits stated in the Regulations).

A holder of a licence must comply with all applicable sections in the Regulations. These guidelines do not serve to substitute the Regulations, and in the event of any disagreement between these two documents, the Regulations shall prevail. These guidelines do not supersede any other regulation or law, be it federal, provincial, or municipal, or any codes specified in such legislation.

Stakeholders that use this document outside of NRCan's jurisdiction may also find this information useful, but they would need to consult their Authority Having Jurisdiction (body or agency that may choose to use this document in full or in part in support of their legal regime) for determinations or approvals.

3. DEFINITIONS

compatibility group is one of the 13 groups of explosives described in Appendix 2 of Part 2 of the *Transportation of Dangerous Goods Regulations* administered by Transport Canada.

magazine (in accordance with the *Explosives Act*) – means any building, storehouse, structure or place in which any explosive is kept or stored, but does not include

(a) a place where an explosive is kept or stored exclusively for use at or in a mine or quarry in a province in which provision is made by the law of that province for efficient inspection and control of explosives stored and used at or in mines and quarries, (note that provincial authorities may also refer to these structures as magazines);

(b) a vehicle in which an authorized explosive is being conveyed in accordance with the Act;

(c) the structure or place in which is kept for private use, and not for sale, an authorized explosive to an amount not exceeding that authorized by regulation;

(d) any store or warehouse in which are stored for sale authorized explosives to an amount not exceeding that authorized by regulation; or

(e) any place at which the blending or assembling of the inexplosive component parts of an authorized explosive is allowed under section 8.

licensed magazine – means a magazine in respect of which a licence issued under section 7 of the Act is in force.

type of explosive refers to an authorized explosive classified according to their intended use, as one of the following types:

1. E — high explosives:
    i. E.1 — blasting explosives
    ii. E.2 — perforating explosives
    iii. E.3 — special-application explosives
2. I — initiation systems
3. P — propellant powder:
    i. P.1 — black powder and hazard category PE 1 black powder substitutes
    ii. P.2 — smokeless powder and hazard category PE 3 black powder substitutes
4. C — cartridges:
    i. C.1 — small arms cartridges
    ii. C.2 — blank cartridges for tools
    iii. C.3 — percussion caps
5. D — military explosives and law enforcement explosives
6. F — fireworks:
    i. F.1 — consumer fireworks
    ii. F.2 — display fireworks
    iii. F.3 — special effect pyrotechnics
    iv. F.4 — fireworks accessories
    v. F.5 — novelty devices
7. R — rocket motors:
    i. R.1 — model rocket motors
    ii. R.2 — high-power rocket motors
    iii. R.3 — rocket motor accessories
8. S — special purpose explosives:
    i. S.1 — low-hazard special purpose explosives
    ii. S.2 — high-hazard special purpose explosives.

4. INTRODUCTION

Magazine construction and monitoring are cornerstones for the safe and secure storage of explosives.

A well-constructed magazine can prevent, deter, or delay intrusions or attempted break-ins. Magazine monitoring systems can deter intrusions and help with response for any attempted thefts or break-ins.

The risks of damage to explosives and accidental ignition can be reduced by storing explosives in a well-constructed and ventilated magazine and by only storing compatible explosives in the same magazine.

5. GENERAL PRINCIPLES

As per section 20 of the Regulations, any person carrying out an activity involving an explosive must take measures that minimize the likelihood of harm to people or property that could result from the activity. Licence holders are expected to:

a) understand and maintain the principles of good housekeeping;

b) reduce risks of fires, and reduce the likelihood of a fire spread; and

c) protect explosives from sources of ignition that could cause them to initiate (such as impact, friction, sparks, heat, temperature, electrical discharge, excessive pressure, and chemical incompatibility).

Construction materials should be chemically compatible with the product being stored and not pose a hazard to the explosives. All interior surfaces that could come into contact with explosives should be lined with non-sparking material (e.g., paint, resin, plywood, gypsum board, etc.). Brass and copper should not be used where they could come into contact with ammonium nitrate or ammonium nitrate-based substances. An exception may be permitted for the use of copper grounding cable used on the exterior of buildings for lightning protection. If the use of brass and copper is unavoidable (e.g., some fire extinguishing systems), they should be protected by a compatible paint (as to not interfere with the function, such as in the case of nozzles). Other materials that could increase the likelihood of an ignition should not be stored in magazines with explosives.

As per sections 63 and 148 of the Regulations, every magazine must be constructed and maintained so that it is well-ventilated and resistant to theft, weather and fire. As such, the design, construction, and maintenance of magazines need to take into consideration protection against weather, against intrusions, and against fire. Magazines built according to the principles in these guidelines would typically meet the intent of section 63 and section 148 of the Regulations.

Where a magazine stores a combination of different types of explosives, the most stringent construction and monitoring principles, as stated in this document, are to be followed.

6. MAGAZINES FOR TYPE E AND TYPE I EXPLOSIVES

6.1 Type-1 Magazines

6.1.1 General

Type-1 magazines are concrete walk-in magazines.

6.1.2 Structure

6.1.2.1 Floor and foundation

The magazine has either a concrete foundation with concrete floor or a concrete floor with thickened edge (acting as the footing). The sill of the door frame may be embedded in the floor or removed.

6.1.2.2 Walls

The magazine walls are constructed of standard concrete block masonry units, precast building panels or reinforced concrete. Standard concrete block masonry unit (CMU) walls are constructed with minimum 200-mm wide standard concrete block masonry units, with vertical steel reinforcing bars. CMU has the physical properties H/15/A/M as specified in Table 1 of Standard CAN/CSA A165.1.

The top of each wall is finished with a preservative treated wood (or commercial non-wood alternative) top plate over a sill gasket and anchored by the extended vertical steel reinforcing bars or the embedded anchor bolts. The interior walls are covered with at least 12 mm thick Good One Side (G1S) Exterior Grade A or B plywood. The good side faces the interior.

All assembly, materials and workmanship follow the specifications in Standards CAN/CSA A165.1 and CSA S304.1 and provincial/territorial codes where the magazine is used or the *National Building Code* (as applicable); the assembly is “running bond”.

Vertical steel reinforcing bars are provided at 200-mm spacing on-center and run continuously for the full height of the wall. Vertical steel reinforcing bars are also placed at wall ends and edges around rough openings. Shorter than full-height steel reinforcing bars may be used provided they are welded together or have at least 300 mm overlap and are tied as per normal practice. Ladder-type masonry reinforcing is installed at every course.

Extended vertical steel reinforcing bars or anchor bolts embedded at least 100 mm in the mortar of the top course of concrete blocks, and spaced not greater than 400 mm, are used to secure the roof. The top course is reinforced with two steel reinforcing bars in a continuously grouted bond beam.

All mortar joints are concave, full head and bed joints. Mortar joint thickness conforms to Standard CAN/CSA A371. Mortar is Type “M” or “S” conforming to Standard CAN/CSA A179 unless a professional engineer specifies otherwise. All cells (cores) are fully grouted and consolidated at the time of pouring. Grout conforms to specifications in Standard CAN/CSA A179 Table 3 or to the specification in Standard ASTM C1107.

All precast/tilt-up building panels are designed by a professional engineer to meet specifications of Standard CAN/CSA A23.3 and provincial/territorial codes where the magazine is used or the *National Building Code* (as applicable) and good engineering practice. Precast building panels are made of concrete of 35 MPa or better.

Insulated panels (sandwich type with insulation in the middle) can be used if the structure is to be heated. The inner (structural) face is at least 200 mm thick with steel reinforcing bars placed both horizontally and vertically to form a grid not larger than 300 mm square throughout. Any exterior insulation is covered with non-flammable cladding.

Uninsulated pre-cast concrete walls are at least 200 mm thick. Steel reinforcing bars are placed both horizontally and vertically to form a grid not larger than 300 mm square throughout.

Mechanical connections between the wall and the roof are not larger than 400 mm on-center and are used to secure the roof. Panels or components are keyed and sealed with a fire-resistant (4-hour rating) mastic or epoxy.

Poured reinforced concrete walls are at least 200 mm thick, minimum 35 MPa compressive strength and follow specifications in Standard CAN/CSA A23.3 and provincial/territorial building codes where the magazine is used, or the *National Building Code* (as applicable). The structural and connection design are as specified by the design engineer.

Steel reinforcing bars are placed both horizontally and vertically to form a grid not larger than 300 mm square throughout. Footing dowels are placed at a maximum spacing of 400 mm on-center and extend into the grouted cores of the first courses. Extended vertical steel reinforcing bars or anchor bolts are embedded at least 100 mm in the concrete along the top edge and spaced not greater than 400 mm are used to secure the roof.

Expansion joints or components are keyed and sealed with a fire-resistant (4-hour rating) mastic or epoxy. If formed separately, wall sections or components are keyed and sealed with a fire-resistant (4-hour rating) mastic or epoxy. Holes and recesses resulting from the removal of form ties are filled with mortar.

6.1.2.3 Roof

The roof is of two layers of at least 19 mm tongue and groove (T&G) sheathing plywood, sandwiching a layer of expanded steel mesh. Joints are offset. The roof area on the top of the wall is securely fastened to it by anchor bolts embedded in the wall or by other methods, provided the roof is secure against prying forces applied from the exterior. Where roof trusses or rafters are incorporated into the walls, these are secured against entry.

Plywood is Good One Side (G1S) Exterior Grade A or B. The good side faces the interior.

Expanded steel mesh reinforcing in the roof is 8 mm short way dimension (SWD) opening and 18 gauge. It is attached at a spacing less than 300 mm each way to inner sheathing (inner plywood) with screws and washers such that the washer sits tightly in the “V” of the mesh. There are no other openings other than ventilation.

Old construction

A roof that is not built in accordance with principles in this document may continue to be licensed without any upgrades if it is constructed according either of these two old design specifications and is in good condition:

a) The roof is of T&G lumber 5 cm thick over which is firmly fastened a layer of expanded metal followed by a layer of 12 mm plywood nailed with sheathing nails; or

b) The roof is of two layers of 20 mm T&G or shiplap sheathing plywood, sandwiching a layer of expanded metal. The layers of plywood alternate direction to provide an overlapping of joints.

To be in good condition typically means:

a) The weather resistant material does not have cracks or bubbles and still forms a continuous seal;

b) The wood layers are in good shape and do not show signs of water damage or rot;

c) The expanded metal is still in good shape and shows no or minimal signs of corrosion; and

d) The roof is still securely fastened to the walls by anchors embedded in the walls and no pry points are visible.

Examples of Type-1 magazines:

Figure 1 – example of Type-1 magazine

Figure 2 – example of Type-1 magazine

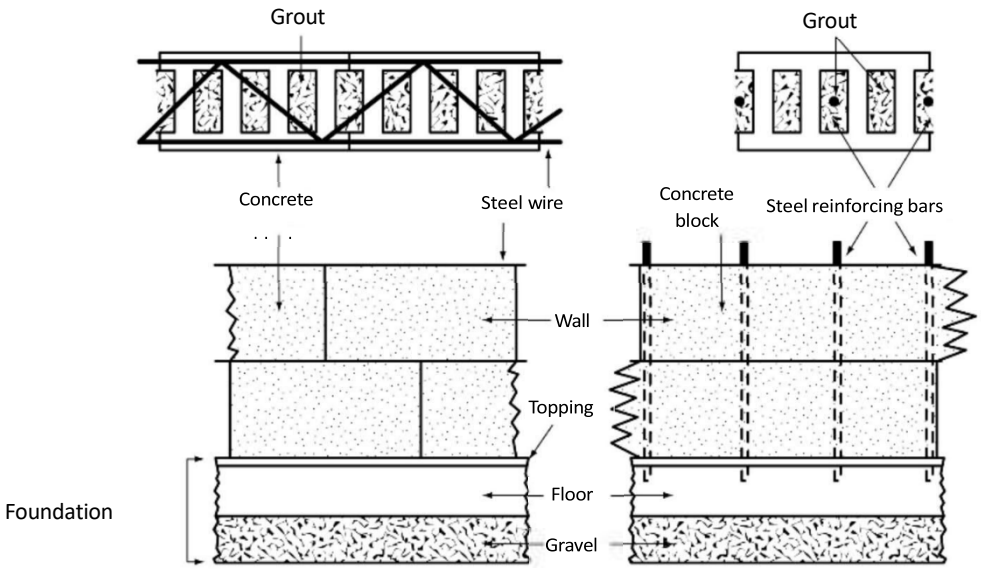

Figure 3 — typical foundation and wall design for standard concreate block masonry units of Type-1 magazines

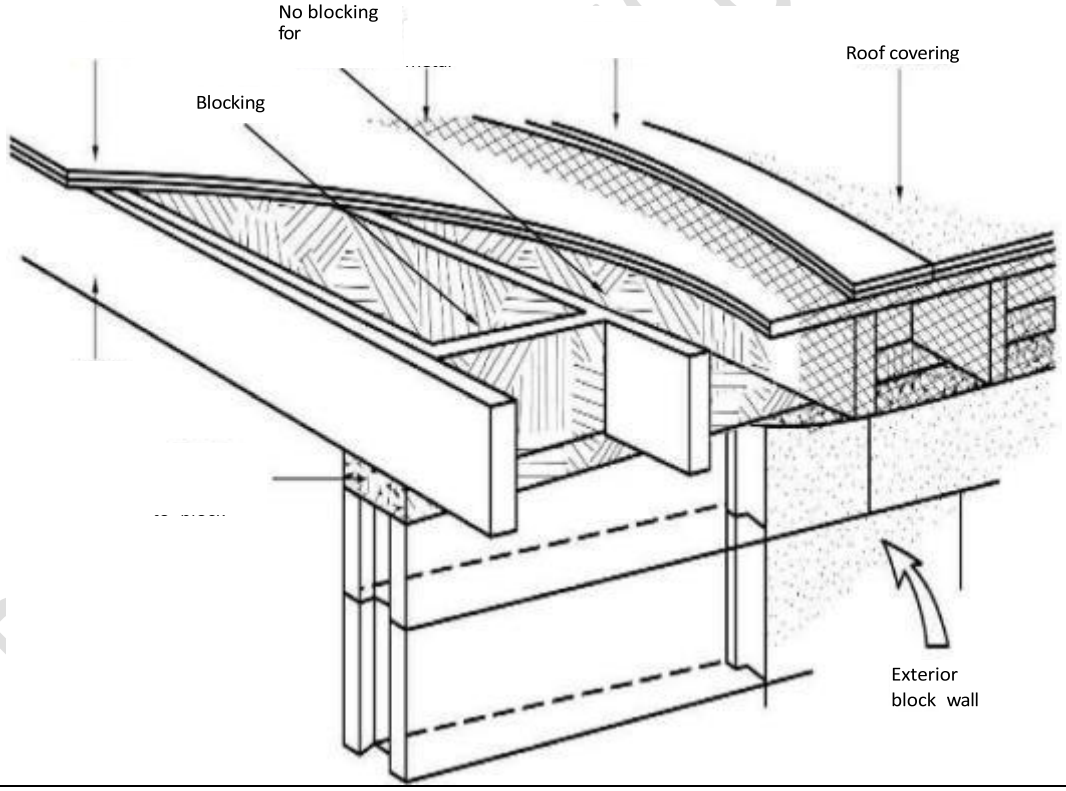

Figure 4 — Typical roof design for Type-1 magazines

6.2 Type-4 Magazines

6.2.1 General

Type4 magazines are reinforced steel structures.

6.2.2 Structure

6.2.2.1 Walls

All steel used for the construction of Type-4 magazines meet the requirements of Standard CAN/CSA G40.21, Grade 300W (metric) [44W imperial] or Method ASTM A36. Exterior walls are fabricated from 6 mm (minimum) thick steel plate with continuously welded seams. Corner seams are full-penetration weld.

Inner walls are fully sheathed with minimum 19 mm G1S exterior grade A or B plywood fastened to the flats of the wall spacers. The good side faces the interior. The top of the wall may be made as a horizontal removable panel to permit the installation of the bullet-resistant material. Fasteners are plated and countersunk. The door and ventilators are the only permitted openings.

The voids between the interior and exterior walls are at least 76 mm. These voids are filled with dry-washed 6 mm clear stone or crush.

Lifting lugs are designed and constructed to support the magazine weight with bullet-resistant material. If spacers are needed, they are made from steel.

6.2.2.2 Skids

All Type-4 magazines are mounted on large steel I-beam skids giving a minimum ground clearance of at least 100 mm.

6.2.2.3 Floor

The floor is fabricated from a 6 mm steel plate with continuously welded seams. Joints between the walls and floor are welded both inside and outside. The floor is completely covered with plywood or an alternate durable non-sparking surface suitable for rolling materials-handling equipment, such as aluminum checkered plate, concrete and shiplap hardwood.

Plywood is G1S Exterior Grade A or B. The good side faces the interior. The finished floor is level with the top of the door stop on the sill plate. The floor is finished is such a way as to prevent accumulation of explosives in cracks.

6.2.2.4 Roof

The roof is fabricated from 4.7 mm or thicker steel plate with continuously welded seams. Joints between the walls and roof are full penetration weld. Seams are watertight. No protrusions are permitted above the wall/roof joint to accommodate doors, heating/cooling units, etc.

6.2.3 Sectional Magazines

Sectional magazines are Type-4 magazines that are assembled on site. The joint between the two sections of the magazine is continuously welded or has 19 mm x 152 mm (3/8”x 6”) steel interior plate attached over the 6 mm (1/4”) steel wall sections in combination with 12 mm (1/2”) studs on a 76 mm x 305 mm (3” x 12”) bolt pattern, or has construction of an equivalent level, such that the structural integrity of the walls on either side is maintained. Sectional magazines are joined using continuous welds, both inside and outside, or if bolted, the bolts are located on the inside. Bolted joints are camouflaged on the exterior as much as is practical to deter punch/pry/drill attacks (for example, exterior joints are filled with a robust putty to conceal joined bolted sections). There are no voids in the walls, even over the joint. The entire wall is bullet resistant.

Examples of Type-4 magazines:

Figure 5 – example of Type-4 magazine

Figure 6 – example of Sectional Type-4 magazine

Figure 7 – example of Type-4 magazine

Figure 8 – example of Type-4 magazine

6.3 Type-6 Magazines

6.3.1 General

Type-6 magazines (also called a bin, box, or day-box) is a steel magazine used for storage of smaller amounts of explosives.

Type-6 magazines will not be permitted for Type E and Type I explosives after July 31, 2026, with the exception of these situations:

a) For law enforcement agencies;

b) For perforating sites where they are located inside a gun loading facility (GLF); and

c) For in-process storage of explosives.

Until July 31, 2026, currently licensed Type-6 magazines may be used provided they meet the principles and conditions stated in section 6.3.2 and 6.3.3 below. ERD would typically not license the addition of a new Type-6 magazine to an existing licence (even for the same company going to a different location) and would not license Type-6 magazines to be transferred between different licences (even if at the same location).

6.3.2 Structure

The magazines are properly constructed and in good condition (for example, the body of the magazine is constructed of 6 mm (¼ steel), the hood or the locks is installed; the tabs for the lock are of stainless steel, there are locking lugs on the hinge side, and the inside of the magazine is lined with wood or other non-sparking material).

To be in good condition typically means:

a) The magazine body has no physical damage due to impact or corrosion; and

b) The hinges and welds are not broken or corroded.

6.3.3 Security

Type-6 magazines would be located at a remote site, and/or in a secure compound or building as described below:

Remote site is a location that has extremely limited access (for example, accessed only by a helicopter or a private boat).

Secure Compound is an area surrounding an explosives storage magazine that is fenced and that has an established security protocol (for example, regular patrol during off-hours and weekends to verify the magazine storage security). The fence gate must be locked with a padlock type listed in this section.

Secure building is a substantial stand-alone structure, without windows, and equipped with a solid door that is locked when not attended. The magazine must be secured so it cannot be easily moved (anchored to floor/wall).

Secured buildings are typically:

a) Type-4 magazine built to the previous storage standards (such as old doors with 6 mm asbestos sheet sandwiched between two 6 mm steel plates closed and locked with a rim mount or mortise deadlock lock assembly);

b) Sea container with enhanced lock protection cover (such as a handle lock, or vertical keeper bars); or

c) Wooden shed built with 2x4 walls, where the walls are made of two layers of 15.5 mm plywood sheets, with a layer of expanded metal in between. Steel doors are either internal hinges or external prison type hinges secured solidly to the frame. There is a good quality deadbolt.

Door lock cylinders conform to either:

a) Grade 1 of Standard ANSI/BHMA 156.5 and Grade A of Standard ANSI/BHMA A156.30; or

b) the requirements of Standard CAN/UL 437.

Padlock cylinders conform to either:

a) Security level S3 of Standard ASTM F883; or

b) the requirements of Standard CAN/UL 437.

Examples of Type-6 magazines:

Figure 9 – example of Type-6 magazine

Figure 10 - example of Type-6 for law enforcement

Figure 11 – example of Type-6 magazine

Figure 12 – example of Type-6 magazine

6.4 Type-9 Magazines

Type-9 magazines (also called multi-compartment magazines) are a combination of two Type-4 magazines as one unit, with at least 50 mm separation between them. The minimum 50 mm air gap (separation) is enclosed with mild steel plate on each side. The top and the base of the separation can be enclosed by removable plates or parts.

Both joining walls of a combined magazine are bullet resistant.

There are two doors, one for each compartment, typically located at opposite ends of the multi-compartment magazine (only one door requires an ERD tag).

Type-9 magazines may be keyed alike.

Examples of Type-9 magazines:

Figure 13 - example of Type-9 magazine

Figure 14 - example of Type-9 magazine

6.4.1 Locking System

If applicable, the hitch of each Type-9 magazine trailer is equipped with a hitch cover locked by a locking system with a padlock of:

a) Force level of Standard ASTM F883; or

b) Grade 3 of Method EN 12320.

Figure 15 – example of a locking system

6.5 Type-12 Magazines

6.5.1 General

Type-12 magazines are unique magazines, and their construction is reviewed on a case-by-case basis. Every effort should be made to use Type-1, Type-4, or Type-9 magazines for storage needs. Type-12 magazines should be used only for special situations and applications where Type-1, Type-4, or Type-9 magazine are not suitable. ERD should be contacted prior to construction of a Type-12 magazine to ensure suitability for licensing.

As with the other types, Type-12 explosives storage structures must be well-ventilated and resistant to theft, weather and fire, and should be made of non-combustible construction materials.

6.5.2 Type-12 Gun Loading Facility (GLF)

A GLF is sometimes used as a generic term to refer to any gun assembly facility. However, it is more often used to refer to the GLF developed by Walker Holdings with blast and debris containment features. In order to distinguish between these two possible gun loading facilities, for the purposes of these guidelines, a GLF will be taken to mean the GLF developed by Walker Holdings with blast and debris containment features (and manufactured by approved fabricators). If two internal personnel doors are present, they are provided with panic hardware.

6.5.3 Type-12 in-Process Magazines

Storage of explosives within a process unit/building (also called in-process magazine) is allowed if

a) the storage is vital to the manufacturing operations on site;

b) the quantity is kept to a minimum, as required by the operation; and

c) safety and security precautions reflect the level of risk of the storage and are justified in the licence application.

An in-process magazine may be a Type-6 but could also be a Type-12.

Specific parameters of in-process magazines will be evaluated as part of the licensing process. Stakeholders should consult with ERD prior to any new installation. The in-process storage magazine(s) must be identified on the licence as part of the process unit/building.

6.5.4 Type-12 Storage of Bulk Pumpable Explosives

For tanks, tankers, intermediate bulk containers, pots, mobile process units, and laboratories storing water-based bulk explosives at Division 1 factory licenced sites, consult ERD's G05-01- *Guidelines for Division 1 Licences for Bulk Explosives Facilities*.

6.5.5 Type-12 Magazines for Law Enforcement Agencies

Magazines that are not constructed as one of the types of magazines described in this document (such as certain rapid access magazines) are considered Type-12 magazines. Law enforcement agencies are to consult ERD's G06-02 - *Guidelines for Law Enforcement Agencies* (available upon request) for construction details.

6.5.6 Type-12 Magazines located in underground mines

Magazines that are located in underground mines that fall under ERD's jurisdiction (for example, in Alberta, Nova Scotia and New Brunswick), and are not Type-1, Type-4, or Type-9 magazines, are considered Type-12 magazines.

6.5.7 Type-12 Containment Vessels

Certain containment vessels may be used as Type-12 magazines (for example, Golan and NABCO vessels). The specific design will be evaluated as part of a licence application review.

6.6 General Specifications for all Magazines

6.6.1 Door design and locking systems

The door design for Type-1, Type-4, Type-9, and some Type-12 magazines includes a number of force and torch resistant characteristics. Similarly, locking systems have features to minimize break-ins.

The detailed drawings are controlled by ERD to preserve and maintain security controls through the prevention of improper disclosure of designated information. This information is entrusted to ERD-approved door fabricators. Installation of doors and locking systems is performed by the approved fabricators or by someone under their supervision. Fabricators also oversee the provision of keys (keys are restricted by the key manufacturer and can be obtained only from the lock's manufacturer or a certified distributor designated by the lock manufacturer). Keys shall be patented and shall be free of direct code stamped on them. **"**Patented" means a key control system that prevents unauthorized duplication of keys. Different magazines cannot be keyed alike.

Please contact ERD for a list of approved fabricators or to apply to become an approved fabricator.

6.6.2 Door Marking

Outside
Each magazine must have an identifier on the outside of the magazine (such as M1, M2, M3 or a tag number) that matches what is with the licence application.

Inside
An alphanumeric code tag (tag) is to be secured on the interior of the magazine door at eye level. The tags will be issued by the door fabricator for all Type-1, Type-4, Type-9, Type-12 GLF and most Type-12 rapid-access magazines (RAMs). This indicates to ERD that the magazine doors were built according to specifications. For Type-4, Type-9, Type-12 GLF and most Type-12 RAM built after 2001, it also indicates that the whole magazine was built according to specifications.

In other cases, ERD will issue the tag for the magazines (mostly for unique Type-12 magazines).

Old construction of doors (sunset date of July 31, 2026, or as indicated)

The most common types of old doors are:

1. Doors that are taller than the magazine (for example, modifications have been made to the magazine to accommodate a door that extends higher than the magazine roof);

2. Doors and frames that have been mounted on the outside wall rather than being incorporated into the magazine wall (it is proud of the wall and not flush with the exterior of the wall) unless they meet **Equivalent Level of Security**;

    a) Equivalent Level of Security Type-4, -9 or -12-GLF Magazine - The total stitch weld length between the frame and the existing steel wall is at least 90 cm in length, and it is distributed evenly around the inside of the door frame. Welding around the entire inside frame is preferable.

b) Equivalent Level of Security Type-1 Magazine - Stitch welding of the entire inside of the door frame to the existing steel opening frame (if present); or angle brackets are welded to the door frame and extended to the inside wall of the magazine on a minimal surface totalling 90 cm high by 10 cm wide (36” high by 4” wide), distributed in two or more angles spaced roughly equally on each side of the door with a steel thickness of 47.5 mm (3/16”) or greater.

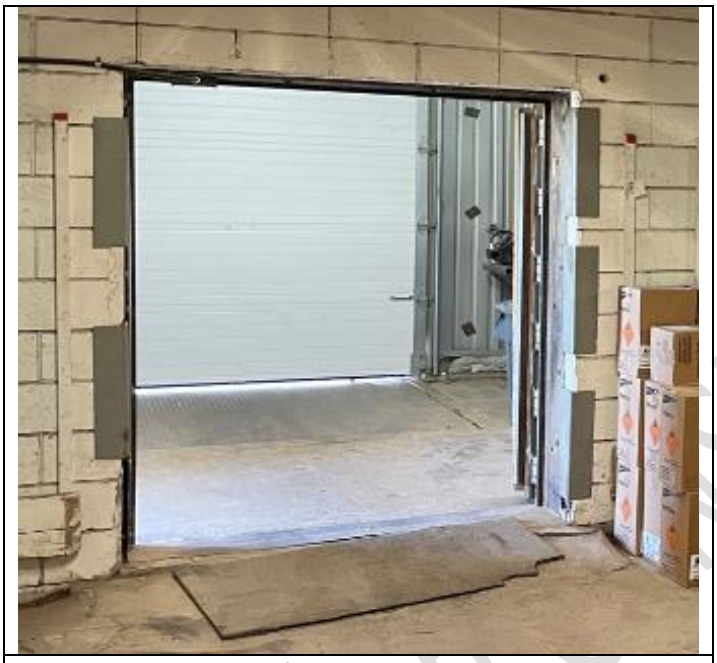

Figure 16 – example of Type-1 magazine door upgraded with steel brackets

3. Magazines with Stark doors that have 4 locking pins (one at the top and 3 on the side) which are angled into the frame rather than straight into the frame. There is no sunset date for Stark doors.

Magazines with such old doors may continue to be licensed without any upgrades until July 31, 2026, provided they are in good condition. After this date, any magazine with doors not built according to the principles in this document would not be licensed unless the applicant can demonstrate that the magazine has an equivalent level of security (for example, it is acceptable if the door frame is proud of the outside wall only by a few centimeters and it is properly welded).

To be in good condition typically means:

a) No damage due to corrosion or physical damage that affects the integrity of the door and frame;

b) Space between the door and frame does not exceed 3 mm;

c) Frame is continuously welded around the outside of the door;

d) Inside plywood is not damaged, rotted or missing; and

e) The door/frame and locking mechanism must be in good working condition and installed correctly.

Old locking mechanisms (sunset date of July 31, 2026)

Old magazines may continue to be licensed without any upgrades to the locking mechanisms until July 31, 2026, provided they are in good condition. After this date, any magazine with a locking mechanism not built according to the principles in this document would not be licensed unless the applicant can demonstrate that the magazine has an equivalent level of security (for example, magazines with the locking system in Stark doors are acceptable).

To be in good condition typically means:

a) The lock and locking system still function smoothly with no forcing, and there are no cracks in the lock body;

b) All the components of the locking system are in place (no missing straps, standoff plate, filler etc.); and

c) No major corrosion resulting in component damage is present.

6.6.3 Bullet Resistance for Magazines Storing Hazard Category PE 1 Explosives

Unless otherwise stated in this document, the intent of the Regulations is met when magazines storing hazard category PE 1 explosives have bullet resistant walls.

Metal magazines

Type-4 and Type -9 magazines are fabricated with bullet-resistant material in the walls (such as dry-washed 6 mm clear stone or crush).

Type-4 and Type-9 magazines can also include wall assemblies that meet or exceed Level 8 of the Standard UL752 or Level III of NIJ Standard 0108.01, tested in accordance with those standards. Examples of bullet-resistant material could be rigid fiberglass panels, fiber in matrix or other equivalent materials.

Old construction

Old walls built to be bullet resistant may continue to be licensed provided the walls are in good condition. Materials are either washed hard crushed stone or washed coarse gravel up to 6 mm in size. Magazines with walls with sand would not be licensed.

To be in good condition typically means:

a) The walls of the magazine have no physical damage or significant corrosion on the outside walls, floor, or the roof; and

b) There is proper bullet resistant material in the walls and the inside plywood is in good condition with no holes for material to escape.

Concrete magazines

Magazines constructed with only concrete in the walls, other than Type-1, would not be licensed to store PE1 explosives unless the wall construction has been tested to meet or exceed Level 8 of Standard UL 752 or Level III of NIJ Standard 0108.01.

6.6.4 Heating, Cooling and Insulation

6.6.4.1 Temperature limiting devices

The heating unit must be equipped with a high-temperature limiting control to ensure the heating core and elements do not overheat.

6.6.4.2 Heating or cooling sources inside the magazine

When an electrical heating or cooling source is installed inside the magazine, it:

a) complies with the Class II Division 2 specification of Code CSA C22.1;

b) is mounted above the stacking line; and

c) has mechanical protection.

A direct-fired or indirect-fired heating or cooling source located inside the magazine would typically not be licensed.

Figure 17 – example of a heater and protection

6.6.4.3 Heating or cooling sources outside the magazine

When a heating or cooling source is installed outside the magazine and requires certain components to be installed inside the magazine, the following specifications apply:

a) Motors, fans and electrical installation comply with the Class II Division 2 specification of Code CSA C22.1;

b) The heat exchanger or air-cooling unit is mounted above the stacking line; and

c) The heat exchanger or air-cooling unit has mechanical protection.

An indirect-fired heater, or heating/cooling system that is not in compliance with the requirements related to Class II Division 2 of Code CSA 221.1, is installed in a separate room with a one-hour fire rating. The heating and cooling system room have no direct access from the building or part of the building that contains explosives. Otherwise, the heating or cooling system is located in a fire-resistant building sited at least 8 m from the magazine.

For forced air systems, the magazine is protected by a fire damper activated via a fusible link or other safety device so that the duct can be closed and sealed as close to the heating or cooling unit as practical.

Systems with recirculation of heated air from a forced air system or direct-fired heating or cooling source in the magazine would typically not be licensed.

6.6.4.4 Insulation

Any insulation (e.g., in ceilings/walls) will have a flame-spread rating of 25 or less as defined in the *National Building Code of Canada*. All insulation would be protected from mechanical damage.

6.6.5 Ventilation

6.6.5.1 General

Magazines must be well-ventilated to ensure suitable storage conditions for explosives. The type and need for ventilation is dependent on many factors (such as local climate condition, size of the magazines, the type of explosives, and packaging).

Ventilation that would typically be deemed as appropriate would have a minimum ventilation area of 50 cm^2 per one cubic meter of magazine volume.

Below are specifications that are typically appropriate for ventilation design.

6.6.6 Straight-Through Ventilators

Straight-through ventilators do not exceed 200 mm x 200 mm and are protected on the exterior by a stand-off hood metal plate at least 12 mm thick and twice the dimensions of the opening, positioned not more than 80 mm from the wall. The stand-off plate is welded in position.

The inside openings are covered by a flattened expanded mesh welded to a steel frame that is fastened to the non-exposed face of the plywood. The underside of the outside ventilator opening is covered by a steel plate at least 4.7 mm thick. The plate is drilled with 10 mm holes minimum at a density of at 1 hole per 1450 mm^2.

Fly screens are installed on the exterior of ventilator openings.

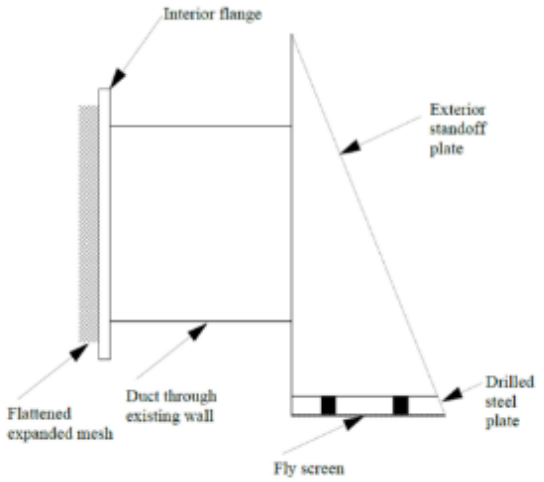

Figure 18 — typical straight-through ventilator

Figure 19 — typical straight-through ventilator

6.6.7 Roof Ventilators

Roof ventilators have openings of no more than 200 mm in any dimension and are protected by two orthogonal 10M steel reinforcing bars welded to a 6 mm steel anchor plate. The anchor plate is firmly fastened to the underside of the roof sheathing. In addition, a security cage fabricated from expanded steel or aluminum mesh and 6 mm steel or aluminum angles are firmly mounted over ventilators fixed to the roof sheathing.

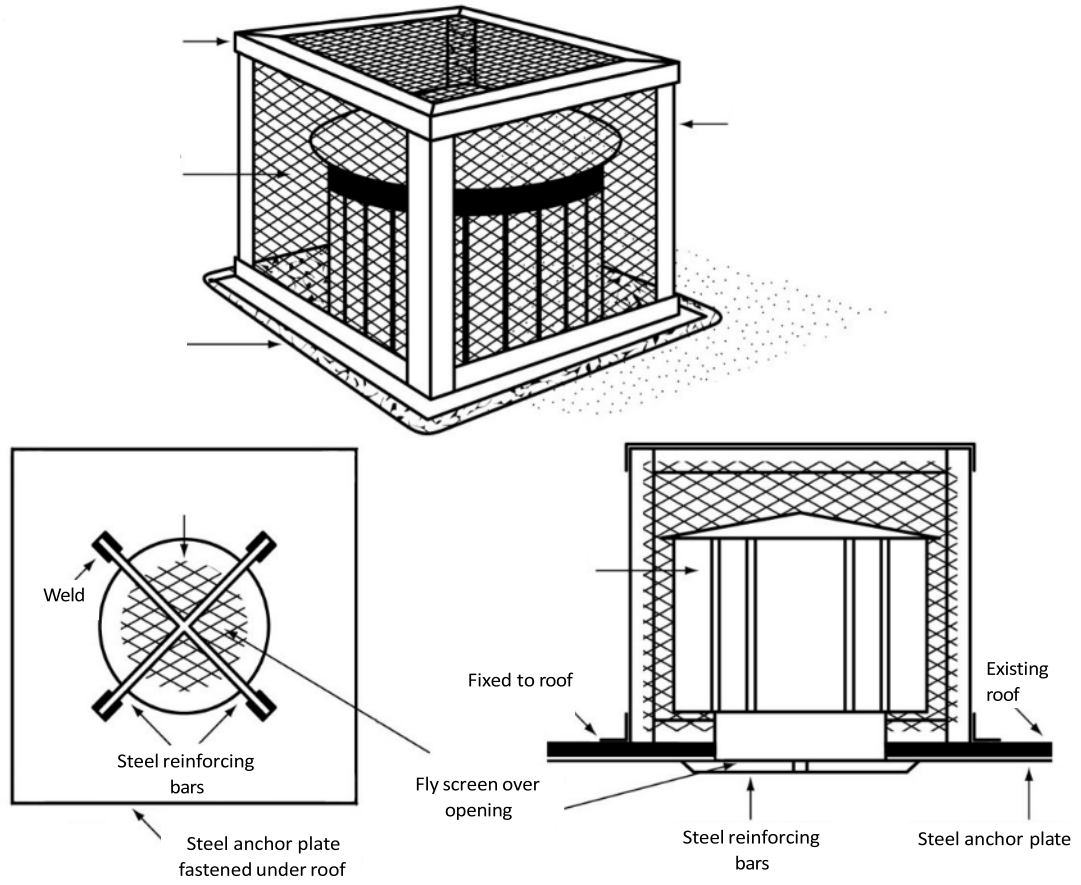

Figure 20 — typical roof ventilator design

6.6.8 Eave Ventilators

Eave ventilators are created by leaving out the blocking between rafters. These openings are protected by extending the expanded steel mesh from the roof over the opening and installing another screen on the inside. The inside screen is fabricated of flattened expanded steel mesh welded to a 16-gauge steel frame and secured to structural members.

Fly screens are installed on the exterior of the eave ventilator opening.

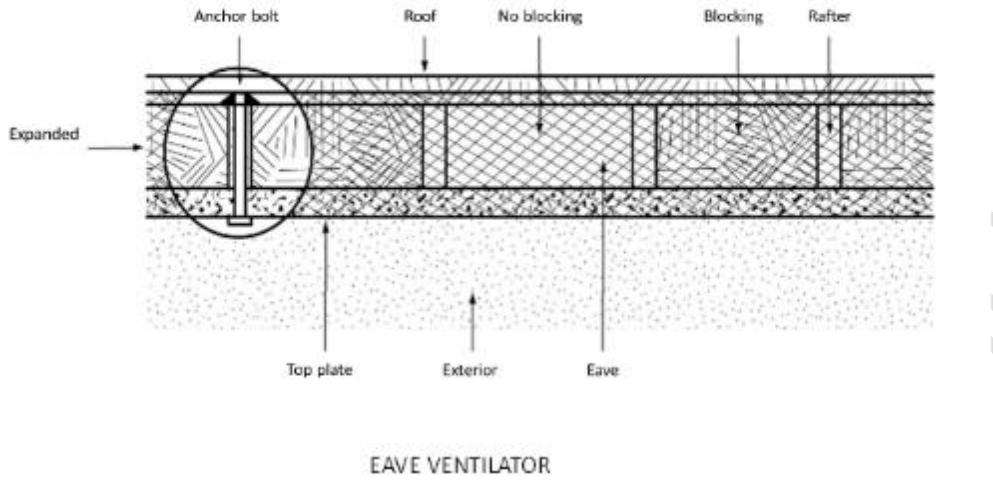

Figure 21 — typical eave ventilator design

Old construction

Older ventilation that is not built in accordance with principles in this document may continue to be licensed without any upgrades provided the ventilation is in good condition.

To be in good condition typically means:

a) The integrity of the exterior protection has not deteriorated from corrosion or physical damage;

b) For roof ventilators, the cross bars, mesh cage and ventilator housing are intact with no holes, corrosion, or physical damage, and water cannot enter; and

c) The openings are clear with no blockages or deterioration.

6.6.9 Electrical

The supply of electricity to a magazine that contains explosives is controlled by a single disconnecting means, which is installed at a minimum of 15 m from the magazine. It disconnects all underground conductors of that supply. The last 15 m from the disconnect to the magazine is buried underground.

Magazines include protection by grounding and surge protection at the main disconnect 15 m from the magazine. The protection by grounding meets the requirements of Code CAN/CSA B72 and surge protection is of Type-1 and in accordance with recommendations of Guide IEEE C62.41.1.

If additional lighting protection at the magazine is to be included, then it is installed according to Code CAN/CBA B72.

Only essential electrical equipment should be installed in an explosives magazine. All such equipment has enclosure ratings of EEMAC 4X or IP65.

Wiring is in conduit extending into all fittings and junctions. TECK90 XLPE or ACWU90 cable is an acceptable alternative to conduit. Where conduit or cable enters lights, electrical equipment, or junction boxes, the wire entries are sealed, and entry fittings designed for the purpose are used. Sealed wire entry into equipment meets EEMAC 4x or IP 65. All wiring has overcurrent protection. All exterior electrical boxes are EEMAC 4X with sealed wire entries.

All branch circuits within the magazine are protected by a Class-A type ground fault interrupter.

6.6.10 Interior Finish

6.6.11 Furring Strips and Base Plates

Furring strips and wood base plates / bellyboards are installed on all interior walls to provide air circulation, as needed, to prevent individual explosives boxes being stacked directly against the walls.

Vertical furring strips are at least 19 mm think and no more than 75 mm wide. They are at 300 mm (centre-to-centre) starting 150 mm from floor level and continuous to the stacking line.

Wood base plates are at least 25 mm thick and at least 125 mm wide. They are installed horizontally at floor level around the perimeter of the magazine.

All exposed steel surfaces on the interior are painted with a rust-inhibiting paint.

6.6.12 Stacking Line

A stacking line that is resistant to damage is marked on all interior walls. The top of the line is at a distance of at least 150 mm from the top of the lowest wall and at least 150 mm below the bullet-resistant material. If the bullet-resistant material settles or leaks out over time, then the stacking line is lowered accordingly, or the bullet-resistant material is topped up.

6.6.13 Exterior Finish

Exterior steel surfaces are painted with rust-inhibiting paint in a heat-reflecting color. Water repellent coating is applied on exterior walls as needed.

6.7 Monitoring

There are two options for monitoring of magazines: physical inspection or electronic surveillance.

6.7.1 Physical Inspection

The intent of the physical inspection is met when each magazine is visited at regular intervals (daily unless the terms and conditions of the licence specify otherwise) and a record of that visit is retained.

A system used for this purpose provides evidence of a person visiting the magazine site and verifying that each magazine is secure. The system used is to provide the following:

a) The time and date of the record; and

b) The GPS position at the recorded time.

This is electronically recorded in such a way that these records cannot be edited and may be inspected at any time. These records are to be retained for a minimum of 2 years and made available for inspection as required.

6.7.2 Electronic Surveillance

Monitoring through electronic surveillance consists of electronic equipment located at the magazine (terminal equipment). The terminal equipment is intended for providing continuous surveillance for entries to the magazine and transmission of information. Electronic surveillance also uses a monitoring center or internet platform for the purpose of reception, storage and distribution of information received from the terminal equipment. Together, these are referred to as the "electronic surveillance system".

Monitoring can be performed either by the licensee or by an outside security service provider.
The electronic surveillance system is designed to allow the licensee to verify the functionality of the surveillance system.

The terminal equipment complies with the following hardware and electrical specifications:

a) Electricals are in accordance with the specifications of this document;

b) Intrusion detection sensors include at least an internal door contact with optional motion/vibration/fire type detection sensors;

c) Radio transmission components are mounted outside, or inside the magazine with antennas placed outside the magazine;

Note: When storing electric detonators, it is recommended to consult *SLP 20: Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators (Blasting Caps)* of the Institute of Makers of Explosives (IME) to evaluate possible hazards.

d) If mounted on the roof, antenna solar panels are less than 300 mm in height;

e) Solar panel antennas may be mounted on the walls of the magazine;

f) Batteries are mounted inside an enclosure that takes into account fire hazards outside or inside of the magazine;

g) Wiring entering magazines is buried within 15 m of the magazine unless this is not practical,

such as:

i when interconnecting multiple magazines to the terminal equipment, the span or distance is less than 3 m, in which case the cable is installed as not to be damaged by vehicles or personnel (for example, overhead). They are installed with adequate cable trays or other support to ensure it does not become cut or damaged; or

ii Northern climates or in bedrock, in which case any cabling is resistant to tampering, weather and impact, and is routed such that it will not be cut or damaged.

The terminal equipment complies with the following functional specifications:

a) It is capable of transmitting information (notifications) to the monitoring center or internet platform automatically;

b) Each notification includes the date, time, and unique identifier corresponding to licence documentation (Tag #, Mag #, etc.) of the magazine;

c) It is capable of distinguishing between entries to the magazine by personnel supplying proper credentials ("authorized access") and entries associated with the activation of an intrusion detection sensor or improper credential use ("unauthorized access");

d) Upon reception of proper credentials, the terminal equipment notifies the monitoring center or platform of an authorized entry when a door is opened;

e) It incorporates an auto re-arm feature;

f) Any enclosures used with the terminal equipment mounted outside the magazine that can be opened are monitored and notifications sent in the same manner as for other accesses;

g) It transmits a periodic status notification at least once every 24 hours to confirm the terminal equipment and surveillance functions are working properly;

h) It is capable of detecting a low power condition and sends a notification with sufficient notice to initiate corrective action before the electronic surveillance system becomes inactive.

The monitoring center or internet platform follow these specifications:

a) It maintains a history in electronic format of all information received from the terminal equipment for a period of at least two years;

b) It creates an alarm if no status notification has been received from the terminal equipment within the last 24 hours; and

c) Alarms are forwarded to personnel on a call-down list. This shall repeat until the alarm is acknowledged by at least one person whose name appears on the call-down list. Upon

acknowledgement, the monitoring center or platform informs all persons whose names appear on the call-down list that the alarm has been acknowledged. It is permissible to maintain a separate call down list for access alarms and equipment alarms.

Event notifications do not have to be forwarded to a call down list but shall remain stored at the monitoring center or platform. Optionally, they may be sent to system users.

7. MAGAZINES FOR TYPE C, R, P, F AND S EXPLOSIVES

There are four principal types of magazines that can be used for the storage of type C, R, P, F and S explosives:

a) **Type-13 Indoor Cupboard/Cabinet/Container Magazine** (previously called Type "A" or Type "B")- a box, chest, cupboard, or container made of plywood and/or metal that is located inside a locked building;

b) **Type-14 Indoor Partition/Chamber Magazine** (previously called Type "C" or Type "D")- a walk-in storage space that incorporates existing wall structures inside a locked building;

c) **Type-15 Outdoor Building Magazine** (previously called Type "D" or Type "E")- outdoor stand-alone storage magazine; and

d) **Type-16 Outdoor Container Magazine** (previously called Type "F") - outdoor stand-alone storage magazine.

Other types of magazines may be considered by ERD on a case-by-case basis.

7.1 Types of Magazines

7.1.1 Type-13 Magazine

A Type-13 magazine (Cupboard/Container Magazine) is a box, chest, cupboard, or container typically made of plywood and/or metal. These magazines should be not moveable (for example, anchored). The area surrounding the magazine should be free of combustible and flammable material.

Type-13 magazines are licensed when inside buildings only. The building that contains the Type-13 magazines must be locked. Buildings containing Type-13 magazines should be alarmed. If the buildings are not alarmed, additional security features might be required.

Examples of Type-13 magazines:

Figure 22 – example of Type-13 magazine

Figure 23 – example of Type-13 magazine

7.1.2 Type-14 Magazine

A Type-14 magazine (Partition/Chamber Magazine) is a walk-in storage space that incorporates the existing wall structures of a locked building. The area surrounding the magazine should be free of combustible and flammable material. Type-14 magazines are licensed when inside buildings only. The building that contains the Type-14 magazines must be locked. Buildings containing Type-14 magazines should be alarmed. If the buildings are not alarmed, additional security features might be required.

7.1.3 Type-15 Magazine

A Type-15 magazine (ex. industrial, pre-engineered building, or concrete structure) is a stand-alone magazine. The area surrounding the magazine should be free of combustible and flammable material.

The magazine must be locked. Buildings containing Type-15 magazines should be alarmed. There should be no accessible openings in the magazine other than the door(s). Windows should be avoided, if possible. Any openings for windows need to be evaluated for proper protection.

Figure 24 - Example of Type-15 magazine

7.1.4 Type-16 Magazine

A Type-16 magazine (Container Magazines) is a stand-alone magazine typically for the storage of large quantities of explosives. These steel-only transport containers are commonly known as ISO containers or “sea cans”. The area surrounding the magazine should be free of combustible and flammable material.

There should be no accessible openings in the magazine other than the door(s). Windows should be avoided, if possible. Any openings for windows need to be evaluated for proper protection.

The locking mechanism should be designed to fit snugly over or cover the container swing locking bar (hasp) in a manner that:

a) Disables the vertical keeper bars from turning, including the horizontal swing locking bar pin;

b) Conceals the shackle of the padlock;

c) Deters a drill attack on the horizontal swing locking bar pin; and,

d) Hampers a pry attack on the swing locking bar itself.

Examples of Type-16 magazines:

Figure 25 - examples of Type-16 magazines

Figure 26 - examples of Type-16 magazines

7.2 Locking Systems, Heating, Cooling, Ventilation and Electricals

The principles in section 7.2 typically apply to outdoor magazines only.

7.2.1 Locking Systems

7.2.1.1 Mortise, locks and cylinders

The following are acceptable (or any other robust theft-resistant locking systems):

a) UL437 key locks;

b) ANSI/BHMA A156.13, Security Grade 1 Mortise Locks & Latches;

c) ANSI/BHMA 156.5, Grade 1 Cylinders and input devices for locks; or

d) ANSI/BHMA A156.30, Grade A American National Standard for High Security Cylinders.

7.2.1.2 Padlocks

Shackles and hasps are of hardened steel. Cylinders have anti-drill features. The following are acceptable (or any other robust padlocks):

a) ASTM F883-13, Force 3 Standard Performance Specification for Padlocks;

b) UL437 Key Locks; or

c) BS EN 12320 Building hardware. Padlocks and padlock fittings.

7.2.2 Doors

Commercial doors with the following principles are acceptable (or any other robust theft-resistant doors):

a) 16-gauge welded pressed steel frame, A-40 galvanneal steel;

b) 16-gauge insulated polystyrene hollow metal door, A-40 galvanneal steel;

c) Exposed interlocking seam;

d) Open outwards; and

e) Fit snugly and recessed to resist prying.

As per subsection 63(6) of the Regulations, escape routes from a factory magazine must permit all the people in a magazine to egress quickly and easily in an emergency.

7.2.3 Heating, Cooling, and Insulation

7.2.3.1 General

A high temperature limiting control is installed or accompanies the heating unit (often built-in) to protect the heating core and elements from overheating.

7.2.3.2 Heating or cooling source inside the magazine

When installed inside a magazine, any heating or cooling sources are designed, constructed, and maintained to good engineering practices. There is a suitable stand off between any heating or cooling systems and the explosives. Heating or cooling exchange units have mechanical protection if there is a risk of damage to the unit.

A direct-fired or indirect-fired heating or cooling source located inside the magazine would typically not be licensed.

7.2.3.3 Heating or cooling source outside the magazine

When a heating or cooling source is installed outside the magazine and requires some components to be installed inside the magazine, all inside components are designed, constructed, and maintained to good engineering practices. Motors, fans and electrical installation have heating or cooling exchange units mounted above the location where the explosives are stacked. Heating or cooling exchange units have mechanical protection if there is a risk of damage to the unit.

Indirect-fired flame heaters are installed in a separate room with a one-hour fire rating. The heating or cooling system room have no direct access from the building or part of the building that contains

explosives. Otherwise, the heating or cooling system are in a fire-resistant building located at least 8 metres from the magazine.

For forced air systems, the magazine is protected by a fire damper activated via a fusible link or other safety device so that the duct can be closed and sealed as close to the heating or cooling unit system as practical.

If recirculated heated air from a forced air system heating or cooling source is used, then an efficient filtering unit is used to prevent dust accumulation in the forced air system.

Direct-fired flame heating would typically not licensed.

7.2.4 Ventilation

7.2.4.1 General

Magazines must be well-ventilated to ensure suitable storage conditions for explosives. The type and need for ventilation is dependent on many factors (such as local climate condition, size of the magazines, the type of explosives, and packaging).

Ventilation that would typically be deemed as appropriate would have a minimum ventilation area of 50 cm^2 per one cubic meter of magazine volume.

7.2.5 Electricals

The supply of electricity to a standalone magazine is controlled by a single disconnecting means which is installed a minimum of 15 m away from the magazine. It disconnects all ungrounded conductors of that supply. The last 15 m from the disconnect to the magazine is buried underground.

Magazines include protection by grounding and surge protection at the main disconnect 15 m from the magazine. Only essential electrical equipment should be installed in an explosives magazine. All such equipment have enclosure ratings of EEMAC 4X or be IP65 rating.

Wiring is in conduit extending into all fittings and junctions. TECK90 XLPE or ACWU90 cable is an acceptable alternative to conduit. Where conduit or cable enters lights, electrical equipment, or junction boxes, the wire entries are sealed, and entry fittings designed for the purpose are used. Sealed wire entry into equipment meet EEMAC 4x or IP 65. All wiring has overcurrent protection. All exterior electrical boxes should be EEMAC 4X with sealed wire entries.

All branch circuits within the magazine are protected by a Class-Aground gault circuit Interrupter.

8. MAGAZINES FOR TYPE D EXPLOSIVES

Type D products are divided into three categories so that security and safety risks can be addressed effectively and consistently. The below classification is for information only. Stakeholders need to consult ERD for clarifications, special situations, and final determinations.

8.1 Highest Risk

These Type D explosives have security and/or safety risks similar to Type E and Type I explosives (for example, all 1.1 and 1.2 explosives). Storage guidelines are typically the same as for Type E and Type I explosives.

UN numbers: 0005, 0006, 0009, 0015, 0018, 0029, 0030, 0034, 0042, 0048, 0050, 0054, 0056, 0060, 0065, 0070, 0072, 0073, 0082, 0084, 0101, 0104, 0105, 0106, 0107, 0118, 0121, 0130, 0131, 0137, 0150, 0151, 0160, 0168, 0169, 0171, 0181, 0182, 0183, 0208, 0209, 0220, 0221, 0226, 0237, 0245, 0246, 0249, 0254, 0255, 0257, 0266, 0267, 0281, 0286, 0287, 0292, 0294, 0321, 0326, 0328, 0329, 0334, 0336, 0344, 0346, 0352, 0360, 0361, 0365, 0367, 0369, 0374, 0375, 0378, 0390, 0392, 0394, 0396, 0397, 0408, 0409, 0410, 0411, 0412, 0424, 0428, 0429, 0434, 0436, 0437, 0456, 0457, 0463, 0471, 0473, 0475, 0476, 0480, 0483, 0484, 0500, 0502

8.2 Medium Risk

These Type D explosives have security and/or safety risks in-between highest and lowest risk. Magazine construction, surveillance requirements, and security plan need to be evaluated on case-by-case basis to address the risks.

UN numbers: 0016, 0019, 0066, 0110, 0173, 186, 0240, 0242, 0272, 0276, 0297, 0300, 0301, 0303, 0319, 0327, 0351, 0353, 0362, 0368, 0376, 0417, 0430, 0452, 0454, 0477, 0478, 0479, 0499,

8.3 Lowest Risk

These Type D explosives have security and/or safety risks similar to Type C, R, P, F, and S explosives. Storage guidelines are typically the same as for Type C, R, P, F, and S explosives.

UN numbers: 0012, 0014, 0027, 0044, 0055, 0092, 0093, 0161, 0191, 0195, 0197, 0212, 0275, 0306, 0312, 0317, 0320, 0323, 0325, 0338, 0339, 0345, 0373, 0379, 0405, 0425, 0431, 0432, 0507, 0509, 0510

8.4 Unique Cases

The following explosives are evaluated on case-by-case basis:

a) UN0190 (that are not 1.1 or 1.2);
b) ARTICLES, EXPLOSIVE, N.O.S. and SUBSTANCES, EXPLOSIVE, N.O.S.; and
c) Classified as “Not Class 1”

There may be other situations where the specific scenario will have to be evaluated by ERD.

9. STORAGE COMPATIBILITY OF EXPLOSIVES

When different Types of explosives are stored together in a licensed magazine, they should be compatible for storage. Explosives are deemed to be compatible if their combined storage does not significantly increase the likelihood of an initiation, or if there is an initiation, the magnitude of the effects.

9.1 Types of explosives vs compatibility groups

This document outlines storage compatibilities based mostly on the Types of explosives. While these guidelines are mostly based on the same principles as compatibility groups for transport, some differences exist (for example, 1.4S Type I initiation systems should not be stored with any Type E high explosives).

In most cases, Type D is assigned with the purpose of restricting access. Type D explosives storage compatibility can be assessed based on an analogy with another Type of explosive that has similar safety risks and properties. Where analogy cannot be easily established, ERD should be contacted for further information.

9.2 Compatibility table

Table 9.2 shows what is typically considered as compatible or not compatible to be stored together in a licensed magazine. When different explosive types are indicated as being compatible to be stored together in a magazine, the different types of explosives should be stored separately from one another (for example, on different shelves or separated by a wooden barrier). Due to the varied nature of Type S explosives, the table makes distinction between various compatibility groups for Type S.

Table 9.2 – Compatibility of explosives

			N	Y	N	N	N	N	N	N	N	N	N	
		N		N	N	N	N	N	N	N	N	Y	N	
		Y	N		Y	Y	N[5]		N	N	Y	N	Y	
		N	N	Y		Y	Y	Y	Y	N	Y	N	Y	
		N	N	Y	Y		N[4]	Y	N	Y	Y	N	Y	
		N	N	N[5]	Y	N[4]		N	Y	N	N	N	N	
		N	N	Y	Y	Y	N		Y	Y	Y	N	Y	
		N	N	N	Y	N	Y	Y		N	N	N	N	
		N	N	N	N	Y	N	Y	N		Y	N	N	
		N	N	Y	Y	Y	N	Y	N	Y		N	Y	
		N	Y	N	N	N	N	N	N		N		N	
		N	N	Y	Y	Y	N	Y	N		Y	N		
		N	N	Y	Y	Y	Y	Y	Y		Y	Y	Y	
		Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	

Legend
Y means that explosives are typically compatible for storage.
N means that explosives that explosives are typically not compatible for storage.
NC1 means that the product is Not Class 1 for transport (as shown on the List of Authorized Explosives).
1 Type E explosives classified as 1.1A (UN0114, UN0130, and UN0129) and 1.3L (UN0359) should be segregated from all other explosives by storing in a separate magazine.

2 Type F.3 articles classify as UN0255 can only be stored with other Type F.3 articles.

3 Type S reactive targets can be stored with propellant powders (P.1 & P.2), small arms cartridges (C.1), blank cartridges for tools (C.2), and percussion caps (C.3) in the same magazine if they are stored separately from one another (for example, on different shelves or separated by a wooden barrier). Other combinations and other NC1 products will need to be evaluated for compatibility on case-by-case basis.

4 Electric matches cannot be stored with display fireworks F.2 as per subsections 416 (2) and 425 (2) of the Regulations. Electric matches should not be stored with consumer fireworks. Electric matching can be stored with pyrotechnics F.3.

5 Holders of a special effects pyrotechnician fireworks operator certificate may store F.4 with Type P if they are stored separately from one another (for example, on different shelves or separated by a wooden barrier).

9.3 Special Cases

There could be certain cases where these guidelines may indicate incompatibility, while ERD may still licence these explosives to be stored in the same magazine.

Examples of special cases that may be considered for licensing:

a) Storage of Type S explosives used in the perforating industry stored with Type E explosives; or

b) Storage of Type S rock breaking cartridges, when classified as 1.4S for transport, stored with Type E explosives; or

c) Storage of small amounts of explosives in rapid access magazines for law enforcement agencies; or

d) Storage of similar products that were authorized as different Types of explosives by different companies.

ERD would address special situations with the licensee.