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G05-09

Picking and Assembly Guidelines for Display Fireworks

Explosives Safety and Security Branch
Explosives Regulatory Division
Lands and Minerals Sector

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Table of Contents

1. INTRODUCTION

1.1 Purpose

The aim of this document is to provide guidelines for the minimum requirements for sites where display fireworks (referred to as fireworks in the rest of the document) are handled, and picking and/or assembly operations occur. Licensing of these sites is required by Part 5 of the *Explosives Regulations, 2013* (ER, 2013), under Division 2 factory licences. Sections 106 through 132 of ER, 2013 describes the regulatory requirements to obtain a Division 2 factory licence. These sections also outline the requirements for holders of the license and for the workers at, and visitors to, the site.

1.2 Intent

Many incidents that have occurred in the fireworks industry are associated with the handling of fireworks. Therefore for safety reasons, picking, assembly and re-packing of fireworks must be done in a location that is a safe distance from the magazine(s) at a designated and licensed location. A limited number of cases can be opened, articles selected and re-packed for shipment, or prepared for displays.

When incidents have occurred at locations where fireworks are handled, the following probable causes are often listed:

- Electrical faults;
- Friction;
- Impact;
- Heat source (e.g. fire);
- Spark (from the use of sparking tools); and
- Static electricity.

The guidelines, in part, aim to minimize the aforementioned hazards.

Activities that have been associated with incidents include the following:

- Mishandling / rough handling of materials;
- Packing / loading / transferring operations;
- Cutting of fuse; and
- Installing fuses in fireworks.

Operating instructions for the handling of fireworks should take into account the sensitivities of the explosive compounds used.

A company is expected to know the properties and behavior of products and articles found on the site, whether as final products (e.g. classification for transport) or under processing conditions (i.e. assembly operations).

The basic principles of minimizing the amount of fireworks in picking and assembly areas, minimizing the number of people and the amount of time they spend in the vicinity of the fireworks, and adequately separating fireworks locations to prevent sympathetic detonation, must be considered for all locations where fireworks may be found on a site.

1.3 Other Documents

Although these guidelines set out the minimum requirements for an operation involving fireworks, they do not encompass all of the legislation or codes issued by federal, provincial and municipal governments by which companies must abide.

The following list is presented as a guide to other documents or jurisdictions that must be considered and is not meant to be exhaustive:

- Explosives Act and Regulations;
- Documents issued by, and obtainable, from the Explosives Regulatory Division (ERD):
    - Display Fireworks Manual (G18-01);
    - Authorization Guidelines for Consumer and Display Fireworks (G03-03);
    - Determination of Potential Effects (G05-05);
    - ERD Directives, issued as required;
    - Storage Guidelines for Non-Industrial Explosives (G06-01);
- Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances published by the National Standard of Canada;
- National Building Code of Canada;
- Canadian Electrical Code;
- National Fire Code of Canada;
- Transportation of Dangerous Goods Act and Regulations;
- Provincial labour and/or safety acts and regulations; and
- Municipal by-laws and ordinances.

1.4 Using the Guidelines

Applicants should become familiar with the contents of these guidelines and consider them when applying for licences. Approvals will be based on these guidelines.

Applications and their approval can be broken down into three elements: the licence forms, the authorized locations and equipment, and a company's internal procedures and documentation.

1.4.1 The Licence

Forms F05-02A, F05-02B, F05-02D, F05-02E and the site and building drawings are the basis for approving an application. The forms and drawings describe the site, facilities, equipment, and operations. The forms and drawings will be evaluated based on the guidelines set-forth in this document. Any agreed exception to the guidelines must be recorded in these forms. Only the structures and operations described on the licence are allowed on a site. An amendment to the licence is required for any changes to the structures and/or operations on a site.

1.4.2 Company Procedures and Documentation

A company must provide a detailed description of operations taking place at the site and show that its operations are controlled through formal, written procedures and internal documents. Procedures and documentation must be in place before a licence will be issued. As a term and condition of the licence, a company must implement the procedures and ensure they are being followed.

2. BACKGROUND INFORMATION

2.1 Definitions

The following information is provided as a guide to the definitions and terms found in the *Explosives Act*, Part 5 of the *Explosives Regulations, 2013* and these guidelines.

General Definitions:

"Manufacturing" - includes the assembly of an article from explosive and non-explosive components; and packaging of explosives.

"Division 2 Factory Licence" - a licence that is issued by the Minister of Natural Resources under paragraph 7(1) (a) of the *Explosives Act* and authorizes a manufacturing activity referred to in Section 107 of the ER, 2013 at a workplace.

"Factory Magazine" - a magazine that is located at a factory licence.

"Division 2 Worker" - a person who is at a workplace to carry out a manufacturing operation or other kind of work (for example, maintenance of facilities or repair of equipment) for the holder of a Division 2 factory licence.

Definitions associated with Picking and Assembly:

"Picking"- the process of selecting and repacking fireworks according to type, variety and destination.

"Picking Area" - the area where picking takes place. This cannot be located in a magazine.

"Assembly" - the process of linking pyrotechnics together by chain fusing or making set pieces for the purpose of using in a display. This process includes repacking of the assembled fireworks for transport. These assembly operations fall under the "preparation of display fireworks" referred to in the ER, 2013 subsection 107(i).

"Assembly area" - the area where the assembly operations take place. This cannot be located in a magazine.

2.2 Disposal of Scrap at Division 2 Factory Licences

All fireworks waste and fireworks-contaminated material must be destroyed in a manner that does not increase the likelihood of an accidental ignition during or after the destruction. It should be noted that these materials have not been authorized for transport and therefore may not be transported. Arrangements will need to be in place to properly store and dispose of such scrap. The destruction site must be indicated on the site plan.

2.3 Authorized Products

Authorized products are those that appear on the List of Authorized Explosives. Only authorized products may be stored, possessed, transported or used. The authorization process comprises the following steps: submission of drawings and specifications to ERD, review by ERD, decision on sampling by ERD, testing by the Canadian Explosives Research Laboratory (CanmetCERL) if required, the review of the testing results by ERD, and a decision on authorizing and issuing authorization notification.

2.4 Quantity – Distance

Quantity-Distance (or Q-D) and Potential Effect (PE) principles are outlined in the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances* and the Determination of Potential Effects (G05-05) respectively.

2.5 Personnel Limits

One of the fundamental safety principles involving explosives is to minimize the exposure of people by keeping the number of personnel exposed to hazards to the practical minimum. This means that only persons with jobs essential to a particular hazardous operation should be in the vicinity of the operation. Personnel not directly involved with the fireworks, such as administration personnel, must be located at minimum separation distances as per the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances.*

3. DOCUMENTATION, FEES AND PROCESSING TIME

The application for a licence includes Forms F05-02A, F05-02B, F05-02D and F05-02E, as well as all site and area plans and drawings.

Supporting documentation, such as operating or maintenance procedures, must be shown to be available, where applicable.

Note: *Before a licence is issued, ERD may ask for copies of supporting documentation and ERD may inspect the site to ensure compliance with the licence proposal.*

It should be noted that the storage of fireworks articles will be included in a factory licence, and that a separate storage licence will not be required.

3.1 Plans and Licence Forms

The licence forms and the plans or drawings describe the operation. Once approved, they become part of the conditions for the legal operation of a site. The application is reviewed and approved based on these guidelines.

3.1.1 Plans and Drawings

Several types of plans or drawings are listed on Form F05-02A. These include the Area Plan, Site Plan, and Building Layout. For the factory licences discussed in these guidelines, an Area Plan and a Site Plan will be required, and a Building Layout Plan may be required.

Every drawing, sketch or plan must be drawn to scale, or be a reasonable approximation of actual distances and dimensions, and must include a legend. Engineering drawings to scale, with the scale indicated on the drawings, are preferred. The drawings should carry a standard scale since size reduction may occur during copying. Small and simple sites (less than 10 items on the plan) can be described by a sketch. All drawings, sketches or plans must be identified with a title, revision number, and applicable date.

The Area Plan should clearly show the location of the site and any neighboring vulnerable features or hazardous facilities such as dwellings, other businesses, power lines, and other fireworks operations.

A Site Plan is required for each site. The plan must include: i) distances between operations, fences/barriers, and magazines; ii) distances to offices and welfare or

administrative areas; iii) distances to roads and public thoroughfares; and iv) distances to dwellings and other assembly points. Distances must be in metres.

In some situations, the Site Plan can be used as an Area Plan as well, but it should identify all vulnerable sites as required in the Area Plan.

Building Layout Plans are required for buildings with multiple rooms and/or multiple areas used for different purposes.

Plans or drawings must clearly identify the company, proposed location, and license number, if known. When applicable, layout sketches or plans should show emergency exits, and storage, picking and assembly areas for individual magazines and buildings.

IMPORTANT: The building identification (number or legend) used must be consistent throughout all the plans, forms, and other documents.

Process Schematics or Piping, Instrumentation and Equipment layouts will usually not be needed for fireworks operations.

3.1.2 Form F05-02A: Factory Licence Application

The form must include the legal company name and a recognized location name for the site. The latter name must remain constant in all correspondence and references to the site. A letter authorizing an individual to sign on behalf of the company must be included for a new company or when there is a change in a licensing officer at an existing company.

Upon renewal, one completed copy of Form F05-02A must be included, with amended forms and/or updated reference documents if there are changes.

For each amendment request, a new Form F05-02A application is required to summarize and record the changes made to forms, drawings, and documentation.

Drawings and documentation need not be resubmitted for renewals or amendments if they have not been changed.

When supporting documentation referenced on Form F05-02A has been changed, the licence holder may wait until annual renewal of the licence before making the changes to the information on Form F05-02A.

3.1.3 Form F05-02B: Site Description

Form F05-02B describes the physical aspects of the site, the site security, facilities and equipment. This includes storage magazines, picking and assembly areas, destruction areas or any other facilities (e.g. offices, washroom, etc.) located on the site.

Form F05-02B also describes any deviation or derogation that applies to the physical aspects of the licence.

Form F05-02B must start with a site description that includes access roads, gates, fencing, security, and other such general features. Following that, specific buildings and are addressed. Geographical coordinates for at least one structure or building on the site should be provided on Form F05-02B.

Building descriptions should include, as applicable: dimensions, construction design and general details. General details could include: heating, material of construction, walls,

roofs, floors, dividing walls, vent walls, firewalls, operational shields, barricades, doors (including doors that have panic hardware installed) floor finishing, fire protection installations, electrical classification and equipment, ventilation systems and equipment, services, lightning protection systems, and static grounding systems.

Terms such as “approved magazine” or “approved equipment” should not be used. For example, in describing electrical installations, DO state “meets Class 2 Div 2” (if that is the case). DO NOT state “approved electrical installations” or “explosion-proof”, etc.

When documentation regarding equipment has been submitted to ERD, the documentation should be referenced by a date, e.g., “Information on heater submitted to ERD November 30, 2016”.

Magazines should be described at a minimum by giving the dimensions in metres (L x W x H) and magazine type based on the information in the *Storage Guidelines for Non-Industrial Explosives 2015 (G06-01)*. This information should be shown in the left-hand column.

Barricades, berms, or other natural protective features against explosions must be described, especially when the distances or types of distances shown on Form F05-02E require barricades, e.g., D2 and D4 for Hazard Division PE1. For all buildings or operations that are mounded, describe the type of mound and the directions in which the mounding is effective. For more information regarding barricades see Annex G in the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances*.

3.1.4 Form F05-02D: Manufacturing Operations Description

Form F05-02D must describe the manufacturing operation. The form also contains the type and quantity of the explosive and the personnel limits with references to each specific assembly area, picking area or magazine, as given on Form F05-02B.

Any special circumstances must be described on Forms F05-02B, F05-02D and, if applicable, F05-02E, e.g., circumstances that would allow an inspector to relax quantity-distance requirements would be explained on Form F05-02B and described on Forms F05-02D and F05-02E.

Permitted Operations:
The operation(s) allowed in a particular building must be stated. Operations that run simultaneously are denoted by (AND) while alternatives are denoted by (OR) on the form.

Quantities:
The PE type of the fireworks, as well as the quantity (NEQ*) for each type that will be present in a particular area, must be listed for each area.

* NEQ (Net Explosives Quantity) means the mass of an explosive excluding the mass of any packaging or container and, in the case of an explosive article, excluding any component that is not an explosive substance.

Personnel:
The number of workers or visitors (casuals or transients) is listed for each operation or area. Workers are considered by ERD to be personnel who remain in the particular area and are required to accomplish the particular intention of an operation. Visitors are defined as personnel who have a need to go into a particular area to carry out their duties, such as delivery personnel, grass cutters, and supervisors, but are not normally required to carry out the intentions of the operations. Visitors may also be external, such

as inspectors of explosives or contractors. Personnel limits must be set at the minimum number required to carry out the work.

When there are several operations at a site, each with their own personnel limit, there should also be a global site limit. For example, a site may have five magazines or processes each with a limit of 3 operators and 2 visitors, but that does not mean a combined limit for the site of 15 operators and 10 visitors, but perhaps 5 operators and 2 visitors.

3.1.5 Form F05-02E: Distances

Each building/operation/location with fireworks is listed in the left-hand column, entitled "Reference Number" of Form F05-02E. These sites are regarded as potential donors or Potential Explosions Sites (PESs). It is useful to record the quantity (NEQ) and the hazard category (PE number) of fireworks in the appropriate column to facilitate using the correct table from the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances*. The columns to the right contain the vulnerable locations and explosives building/operations/locations, or Exposed Sites (ESs) to be used when working with the standard. The second set of columns on this form should be used to show distance to vulnerable features on site such as office(s), as well as features outside the site such as roads, hydro lines and dwellings, etc.

The third set of columns are used to show distance to all fireworks storage areas (i.e. magazines), and the fourth set of columns to all picking areas, assembly areas, and packing areas.

Form F05-02E must show the minimum distance to be maintained and the actual distance between a given building/operation/location, and the building/operation/location/ activity listed in the column headings (assembly areas, picking areas, magazines, etc.). This distance will depend on the quantity of fireworks at the location listed in column 1 and can be found in the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances*.

When completing Form F05-02E, it is helpful to record the applicable Q-D type (e.g. D4, D2) used for the required distance so that misunderstandings can be quickly identified, e.g., the distances between assembly areas and magazines are sometimes directly affected by the presence or absence of barricades.

If the actual distance is less than that required by the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances*, the deviation must be identified on Form F05-02E and explained on Form F05-02B and, if needed, referenced on Form F05-02D. These annotations and explanations formally record the conditions under which a derogation has been approved, e.g., risk assessment.

3.1.6 Form F05-03: Licence & Terms and Conditions

This is issued by ERD. Form F05-03 is the licence and sets out the specific terms and conditions of the licence and includes the expiry date.

3.1.7 Deviations from these Guidelines

Occasionally, situations can occur where approval may be granted even when a certain requirement is not met. The best way to approach this is to declare the deviation or non-conformance to the guideline on the appropriate form (F05-02B, F05-02D and/or F05-02E). When a deviation has been approved by a letter, this must then be recorded on the appropriate form (F05-02B, F05-02D and/or F05-02E). Reference should be made to the

date it was approved, to the name of the inspector who first approved it, if this is known, and, as appropriate, to the conditions under which the derogation was allowed and any deviation or non-conformance information must be carried forward each year upon renewal. Any documentation referred to in Form F05-02A must be dated with revision numbers.

3.2 Supporting Documentation

All manufacturing and handling of any fireworks carries inherent risks. Unwanted dangerous events may be reduced by protecting people and facilities and/or by reducing quantities. The probability of initiation may be reduced by:

- careful design of equipment and facilities;
- hazard analysis;
- understanding the risks associated with the products;
- maintaining operations to the original design criteria;
- controlling changes;
- selecting and training personnel; and
- preserving an acute awareness of general safety.

In support of the license application, the documents or procedures set out below must be listed on Form F05-02A and shown to be available.

As required by ER, 2013 operating procedures must be put into place to ensure that proper discipline is maintained in the factory and that the provisions of the *Explosives Act* and Regulations and terms and conditions of the license related to safety are observed.

The format of these procedures is left to the individual companies. However, the documents must clearly detail the correct, acceptable and understandable way of accomplishing a task. They must be titled, be dated, have the pages numbered, and must approved by a competent company employee.

Note: ERD does not approve procedures or drawings. Nevertheless, and when appropriate, ERD will comment.

During an inspection, applicants may be requested to demonstrate the adequacy of these procedures; e.g., are they available and understood, do operators and supervisors follow the declared procedures, are procedures routinely reviewed and revised, are changes recorded, are operators trained?

Copies of documents, procedures, and records may also be requested prior to the issuing of the licence.

3.2.1 General Safety Rules

Companies must establish and apply the documented safety rules addressing both general safety and safety specific to fireworks handling. The latter should include the identification of products and process hazards, the controls being exercised, and any other specific rules needed to protect personnel and installations.

Safety rules specific to an operation must be posted and observed. Personnel - both site operators and management - must be trained and work diligently to apply those safety rules.

Explosive inspectors may examine records and question personnel to determine how well the rules are known and applied; e.g., are special safety related procedures and records kept and followed.

3.2.2 Training

Every employee must be competent and carry out their duties in a manner that is safe and lawful.

A formal training program must be prepared where training requirements identified, courses are prepared (both theoretical and practical), safety critical procedures and controls are identified, trainers are chosen and trained, and records of all training kept. In addition to operations, the training program should address the organization's needs related to first aid, general safety induction, and any other subject in support of operational safety.

Training procedures and training records may be requested during inspections by ERD or prior to issuing the licence.

All employees involved in the transportation of dangerous goods must be trained in the appropriate Transportation of Dangerous Goods regulations.

There is a requirement for training regarding hazardous products under the Workplace Hazardous Materials Information System (WHMIS). Employers must comply with this legislation.

Explosives are currently exempt from WHMIS so ERD requires that comparable training and information is made available regarding the hazards of explosives. In the case of small operations that are exempt from WHMIS requirements, ERD requires that all personnel be trained on the hazards associated with the materials in use. Information regarding chemicals other than explosives must be made available, i.e. Material Safety Data Sheets (MSDS), and those hazardous materials must be clearly labeled.

Note that when the new international system for hazardous products destined to replace WHIMS comes into force it will include explosives.

A licence holder must certify that workers as having been trained when the holder has reasonable grounds to believe that the workers are able to perform their duties and understand the hazards of the materials to which they may be exposed.

The duration of an employee's training certification must not exceed five years, and workers must be retrained or recertified within five years. If a change occurs in the operating procedures for which the certification was issued, the workers must be trained in the new operating procedures but the expiry date of the certification must remain the same. Certified workers must be reassessed if they have not conducted the activities in question in the preceding twelve (12) months.

When training personnel on procedures, it is important to show not only the tasks to be carried out, but also why the tasks are performed (the basis of safety). Thus, the operator will know why a task is to be done a certain way and the possible consequences of not performing the task in a given way.

3.2.3 Procedures

Operating procedures must be put in place to ensure the correct and acceptable way of accomplishing a task is understood by the workers. Procedures should be developed by qualified personnel and expressed in such a way as to avoid confusion and ensure control at all times. Procedures should be reviewed annually.

The following procedures must be available:

- Operating procedures for the site and processes, including any specialty or safety procedure;
- Burning ground and/or waste explosive disposal procedures;
- Emergency response and site evacuation plans;
- Maintenance procedures; and
- Miscellaneous safety procedures for tasks that are not normally part of day to day operations, but that may be required occasionally.

When procedures referenced on Form F05-02A have been changed, the licence holder may wait until annual renewal of the licence before making the changes to Form F05-02A; however, the latest procedures must be available at the site. The intent is not for ERD to approve procedures; however, changes are to be reflected in the licence so that inspectors can verify that the latest procedures are used.

Operating Procedures:
The procedures must clearly identify the steps to be followed for a particular operation. Procedures must include sections on dealing with emergency situations, and must list the materials, tools and equipment, including personal protective equipment, to be used.

Maintenance Procedures:
Companies must have documented maintenance procedures for site equipment, and records of maintenance must be kept up to date.

Scrap Fireworks Disposal and Burning Ground:
Two operators must be present during disposal of fireworks or packaging that may be contaminated with fireworks. Initiation of disposal must be done remotely. A minimum of two burning pads must be provided or the time between burns must be specified to ensure a cold, clean area for a new burn. The burning pad must be raked and cleaned before a second burn is attempted.

Emergency Response Plan:
All sites must develop formal emergency response procedures and site evacuation plans. This should be done in conjunction with local authorities where appropriate.

The plan should explore reasonable and credible scenarios of possible events. The events can include vehicle collision, fire on the site, explosion, fire encroaching on the site, spills, electrical storms, and power failure, as well as events regarding security. The plan should:

- Establish the criteria needed to trigger a response;
- Give procedures, chronologically organized, to use during the response, including directing personnel to safe locations;
- List the resources available and needed during the response, including contact information such as names and phone numbers; and
- Provide site plans showing safe locations.

Miscellaneous Safety Procedures:
Companies must develop the procedures required by ERD and/or provincial safety regulations for any potential hazardous tasks that an employee may be required to undertake. Employees need not know the details of each procedure, but must know when the safety procedures are required, and must be trained on the procedure prior to undertaking the task.

3.2.4 Smoking

Smoking is prohibited within all Division 2 Factory Licences.

3.3 Fees

A fee is payable at the time an application is submitted.
If bank cheques are used, they must be made payable to “Receiver General for Canada”. All forms of payment must make reference to the licence number to which they are to be applied. Contact ERD for a listing of fees.

3.4 Processing Time

If the application is complete, the target processing time to review and issue the licence at ERD is as follows:

- For new factories: maximum of 60 calendar days.
- For renewal and amendments: maximum of 30 calendar days.

If there are aspects that are unclear, or if additional information is required, then ERD will issue an information request. From receipt of the additional information or revised application, the target processing time will be 30 calendar days.

4. SITES, FACILITIES AND EQUIPMENT

4.1 Licence Site

4.1.1 Location

Every picking area, assembly area, and magazine must be located at safe distances from each other and surrounding structures, infrastructure and places where people are likely to be present.

4.1.2 Controlling Access to the Site (fencing, other barriers)

Access to the factory site must be restricted and controlled to limit the exposure of persons who do not need to be on site. Limiting and controlling access to the site enhances both public safety and security of fireworks. The measures in place to control site access must be described on Form F05-02B. If any of the measures stipulated in this section have not been implemented, the alternative must be described and justified on Form F05-02B.

All sites must restrict road access with a lockable gate at the entrance to the site perimeter. There must be barriers to prevent access at any other site access points. Barriers may be man-made or natural such as trees, difficult terrain, etc. Page wire or chain link fences might be acceptable man-made barriers, but the exact fencing requirements might vary based on the types of operation and appropriate security measures to be taken due to the site’s location. Barriers may be erected around assembly areas rather than the perimeter of a large site. Man-made barriers other than a fence will be considered on a case-by-case basis.

Site gates must be kept closed except when the site is attended and the person or persons at the site can observe persons entering the gate. The site gate must be locked when the site is not attended.

When fireworks sites are located on land that a fireworks company does not own or fully control, the fireworks operation must be delineated from the rest of the site.

Some barriers described may not be effective in preventing access by persons on foot or with ATVs, motorcycles, snowmobiles, etc. Therefore, the perimeter of the site must also be posted with signs warning against unauthorized entry. These signs may also have to meet the requirements of the province or territory.

In the vicinity of any structures with fireworks, e.g., magazines, assembly areas, etc., a sign that warns against unauthorized entry must be posted at each entrance to the structure in a clearly visible location.

4.1.3 Control of Fire-Producing Devices

A box for keeping matches and lighters or other fire producing items must be provided before entry onto the site. The normal location for this is at the gate entering the site, placed near a warning sign described in the previous section.

4.2 Picking Areas and Assembly Areas

4.2.1 Location

The minimum distances that must be maintained between picking and assembly areas, magazines and each vulnerable place shown on the site plan are set out in the *Standard CAN/BNQ 2910-510/2015 Explosives - Quantity Distances*.

4.2.2 Codes

All standard industrial installations must comply with the Canadian Electrical Code (CEC), National Fire Code of Canada (NFC), and the National Building Code of Canada (NBC), or with any other code such as commercial industrial standards, or provincial or municipal requirements.

Proof that installation complies with appropriate codes may be requested during inspections by ERD or prior to issuing the licence.

4.2.3 Building Construction

The building construction must be aimed:

a) To reduce the likelihood of any firework initiation while people are present; and
b) To allow workers to escape as quickly as possible.

When a picking area or assembly area is also licensed for the storage of fireworks, the building should, at minimum, meet the structural requirements for magazines used to store non-industrial explosives. These requirements can be found in the *Storage Guidelines for Non-Industrial Explosives (G06-01)*.

Buildings must meet good engineering practice. The structure must be adequate for the purpose, i.e., durable, suitable for the local climate, and able to meet the intent of these guidelines.

Noncombustible construction as detailed in Section 3.1.5 of the Canadian Building Code (CBC) is preferred but not required.

Buildings and structures must be provided with adequate lighting for activities to be carried out, as specified by labor codes.

Buildings may need to be provided with two or more emergency exits depending on the processes taking place and the set-up of the workplace.

ISO containers equal to or greater than 12.192m (40 feet) will have to be provided with two emergency exits (one at each end). At least one of the exits must be provided with panic hardware and marked. The other exit door must remain open and unobstructed for the duration of the process or activity taking place.

ISO containers smaller than 12.192m (40 feet) are not required to have two exits if the container doors remain open and unobstructed for the duration of the process or activity taking place.

Emergency exits must lead directly to the outside.

Exits must be unobstructed and lead to clear areas where operators can access refuge in the case of a hazardous incident. Buildings may also have roll up doors or truck doors but they are not considered emergency exits unless they remain open for the duration of process or activity taking place.

Picking and assembly areas can be temporary structures (i.e. fabric building, tent). These locations must be shown on the licence forms F05-02B, F05-02D, F05-02E, and site plan. These areas will not be licensed for storage. All fireworks must be returned to the licensed magazine for storage. Tents must be made of flame-retardant material.

4.2.4 Interior Construction

It is most important to ensure that the inside of the building is easy to clean and that there are no cracks or crevices where explosive could accumulate. All cracks and crevices on floors, or workbenches (including where they meet walls) must be filled and sealed. A catch rim around the perimeter of the workbench or table must be present so to prevent articles from falling to the ground.

Thermal insulation on the walls or ceiling must be covered. Gypsum board or plywood is acceptable. If the building has steel interior cladding it may need to be covered with softer material. For some operations a concrete floor will need to be covered with softer material to reduce impact or friction.

Tool boards are recommended for brushes, dustpans and other tools required for use in the building. All tools must be non-sparking.

4.2.5 Sprinkler Systems

Some specific hazardous operations may be required to have sprinklers or deluge systems. Refer to the National Building Code for further guidance on sprinklers.

4.2.6 Electrical Requirements

At minimum, the areas for picking and/or assembly of fireworks must meet the electrical requirements for magazines used to store non-industrial explosives. For further guidance refer to the Canadian Electrical Code and the document *Storage Guidelines for Non-Industrial Explosives (G06-01).* See Appendix A at the end of this document for a summary of the specific electrical requirements for picking or assembly areas.

4.2.7 Heating and Furnaces

For all hot air furnaces, no matter how they are powered, a high temperature limiting control must be included along with an area thermostat control. All fire protection must

be in accordance with the building code. See Appendix A below for a summary of the specific electrical requirements for picking or assembly areas.

Any interior unit heaters, when not installed at the ceiling level, must have mechanical protection installed at the required standoff distance as specified by the manufacturer of the equipment. Mechanical protection consists of a welded cage fabricated from expanded steel or aluminum mesh and 6-mm steel or aluminum angle firmly mounted over the heating source and fixed to the wall or the roof. The mesh consists of expanded metal with a 5-mm short way dimension (SWD) opening and minimum 20 gauge.

4.2.8 Static Electricity

If static sensitive material will be handled then appropriate precautions must be taken. This might include humidity control, static control *via* semi-conductive floor mats, conductive bench coverings, cotton or conductive clothing, and grounding straps worn by the operators.

4.2.9 Operating Procedures in Picking Areas

Closed TDG approved cases of fireworks are taken directly from the licensed magazine(s) to the Picking Area for picking and repacking.

Only finished fireworks may be stored in the Picking Area. No exposed explosives materials (i.e. black power, flash powder, etc.) or damaged fireworks may be stored in the Picking Area.

Fuse caps must be securely affixed to quickmatch leaders to prevent exposure of the black match.

No fireworks with electric matches pre-assembled (i.e. as part of their authorization) or PE1 fireworks (e.g. aerial shell with a calibre size greater than 155mm) are permitted in the Picking Area.

Fireworks must be removed from the Picking Area as soon as circumstances permit after they are picked. Properly packaged boxes of picked fireworks can be returned to a magazine for storage or may be loaded on a truck for immediate delivery. Any partially filled cases or bins can be left in the picking area overnight.

If bins are used to store fireworks in the picking area they do not need to have lids. However, all fireworks, including the quickmatch leaders, must be fully contained within any containers or bins.

If cases are returned to a magazine for storage, voids created when articles were removed from the individual cases/boxes are to be filled with suitable inert stuffing in order to maintain the original integrity of the TDG shipping cases and the cases are to be closed.

4.2.10 Primed / Matched Articles

The priming of fireworks with electric matches at a site other than where the fireworks will be used is prohibited at all times.

5. MAGAZINES AND OTHER STORAGE

Refer to the *Storage Guidelines for Non-Industrial Explosives (G06-01)* for the requirements of safe storage of fireworks.

6. WASTE AND SCRAP

6.1 Fireworks Waste Materials

All waste and scrap materials must be handled according to the principles of good housekeeping. Containers must be labeled to identify contents. Note that TDG regulations apply to transportation of waste and scrap materials on public roads, and they need to be handled accordingly.

Arrangements to get rid of fireworks waste and scrap should be made to prevent the accumulation of this waste and scrap, and procedures documented.

6.2 Fireworks Packaging

Packaging that is no longer needed to re-pack unused fireworks materials must be inspected to ensure that it is free of explosive. It is good practice to flatten packaging and boxes prior to disposal.

Packaging may be:
- Burned where permitted by local authorities;
- Recycled where permitted; or
- Land filled where permitted.

Explosive markings should be defaced prior to disposal to avoid subsequent undue concern by others about the presence of explosives.

7. FORKLIFTS AND PALLET MOVERS

7.1 Electrical Forklifts

These must conform to the EE rating when in an operating area. ES rated forklifts may be used with packaged fireworks in magazines.

7.1.1 Charging

Charging of forklifts is allowed if the area meets Canadian Electrical Code requirements for adequate air exchange, no production is in progress, proper engineering standards have been followed to vent excess hydrogen, no other flammables are present, and lights and fans meet Class 1, Zone 1 electrical ratings.

Forklifts may be charged during production under the additional conditions that the charging is done in a separate room meeting a Class 1, Zone 1 electrical rating and that the door, charger and ventilation fan are wired to prevent charging while the door is opened.

7.2 Diesel and Propane Forklifts

These will be allowed for outdoor use only.

APPENDIX A

Electrical Requirements for Picking and Assembly Areas

Type	Minimum Requirement	Notes
Enclosures	EEMAC 4X or IP65 for enclosures	Includes lighting, receptacles, interior control panels and any other electrics including security systems located within the assembly zone, excluding electrical heating.
Heating	Class 2, Division 2 for any electrical heating units located within the assembly zone.	1) Potential for dust layering, controlled exposed heater fin temperature, and limited ventilation is of prime concern. 2) Gas fired open flame heaters are not permitted within the assembly zone.
Lighting	Class 2 Division 2	
Wiring	Wiring must be in rigid threaded aluminium conduit or TECK 90 flexible conduit.	
Crane, Hoist, Fan or Delivery Door Motors	Meet TEFC requirements with EEMAC or IP65 enclosures if located within assembly area.	Totally Enclosed, Fan Cooled (TEFC)
Receptacles	No receptacles permitted on or below the work bench area.	Receptacles and plugs must be EEMAC/NEMA 4. When not in use the receptacles must be closed.
Portable Luminaries	CEC 20-110(3)	Applies only to portable luminaries used on the work bench or floor areas above 50 mm. (due to possible presence of volatile fluid spills or heavy vapours at floor level).