Natural Resources Canada | Ressources naturelles Canada

G05-07

Guidelines for
Jet Perforating Gun Assembly Facilities

August 2017

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

Canada

Table of Contents

1. INTRODUCTION

1.1 Purpose

The assembly of a jet perforating gun requires a Division 1 factory licence in accordance with Part 5 of the *Explosives Regulations, 2013* (hereinafter Regulations). These guidelines are intended to assist an applicant to meet the regulatory requirements necessary to obtain a Division 1 factory licence for a jet perforating gun assembly facility from the Explosives Regulatory Division (hereinafter ERD).

1.2 Scope

An applicant 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 are intended to be a tool that applicants may use to assist them to better understand and meet the Regulations as they apply to a jet perforating gun assembly facility under a Division 1 factory licence.

1.3 Supporting Documents

These guidelines should be used in conjunction with the aforementioned Regulations, the *Explosives Act* and the following supporting documents (or their equivalents) which are available on the ERD website:

- National Standard of Canada, CAN/BNQ 2910-510/2015, Explosives – Quantity Distances;
- National Standard of Canada, CAN/BNQ 2910-500/2015, Explosives – Magazines for Industrial Explosives;
- G05-05 – Determination of Potential Effects for Explosives;
- G06-01 – Storage Guidelines for Non-Industrial Explosives;
- G06-08 – Guideline for Determining Storage Compatibility for Explosives;
- G05-04 – Site Security Plan Guideline;
- Sample Security Plan (available upon request);
- G06-06 – Key Control Plan Guideline;
- G08-02 – Guideline for Applying for an Approval Letter; and
- G09-01 – Transporting Detonators with Other Explosives.

1.4 Other Documents

Although the above documents set out the regulatory requirements for obtaining a Division 1 factory licence from the ERD, they are not a complete compilation of all legislation or codes issued by federal, provincial and municipal governments by which stakeholders must abide. The following list is not meant to be exhaustive, and is presented as a guide to some of the other documents or jurisdictions that must be considered:

- National Building Code of Canada (to be used as a guide to ensure conformance with good engineering practices);
- Canadian Electrical Code;
- National Fire Code of Canada;
- Transportation of Dangerous Goods Act and Regulations;
- Canadian Environmental Assessment Act;
- Provincial labour and/or safety acts and regulations; and

- Municipal by-laws and ordinances.

It is also recommended that stakeholders comply with the Perforating Industry Code of Practice.

1.5 Authorized activities

In accordance with Section 53 of the Regulations, the assembly of a jet perforating gun meets the definition of manufacturing. The disassembly of a jet perforating gun also meets this definition, and from this point forward, assembly will be taken to also include disassembly (also referred to as downloading), unless stated otherwise.

A holder of a Division 1 factory licence may acquire and store explosives, and may sell explosives, without a vendor magazine licence. All explosives imported into, or manufactured, transported, possessed or used in, Canada must appear on the List of Authorized Explosives. Each company must have the jet perforating guns that they intend to assemble (manufacture) authorized prior to submitting an application.

A holder of a Division 1 factory licence may not destroy explosives unless the Division 1 factory licence permits this activity (this is another activity that falls under the definition of manufacturing).

Perforating guns may only be assembled at a licensed factory site. If required, a limited number of guns may be assembled at the place where they will be used, but only if it is documented in the licence application as a possibility, and procedures for such an activity are in place (see also section 2.15 of these guidelines).

In addition to perforating guns, there may be other gun designs (such as gas guns) that require authorization and a Division 1 factory licence. It may be possible to assemble such designs at the same factory site as jet perforating guns as long as there are no compatibility issues and it is documented in the licence application.

A Division 1 factory licence will be granted to only one company per site. Sharing a perforating gun assembly facility with another company is not permitted. A given licence applies to one site only; a licence cannot include multiple sites. For example, off-site storage of explosives would require a separate user magazine licence (not covered by these guidelines).

1.6 Implementation

A new licence application must meet the requirements set out in these guidelines. Existing licences must also meet these requirements but may be given time to conform. Grandfathering may be granted in exceptional circumstances, as approved by the Chief Inspector of Explosives.

1.7 Definitions

Applicable definitions include the following:

- “Manufacturing” means making an explosives article, including the assembly and/or disassembly of an article from explosives and non-explosives components. It also includes the destruction of an explosives article (see Section 53 of the Regulations for a complete list of activities meeting the definition of manufacturing).

- “Division 1 Factory Licence” means a licence that is issued under paragraph 7(1)(*a*) of the *Explosives Act* and authorizes the manufacture of explosives at a factory.
- “Process Unit” means a building, structure, room, vehicle or place in which an explosives manufacturing operation is carried out at a factory.
- “Factory Magazine” means a magazine that is located at a licensed factory site.
- “Competent Person” means a person who has been certified as trained in accordance with section 83 under a Division 1 factory licence
- ”Attended” means to be constantly monitored by a person and, unless the Regulations provide otherwise, includes monitoring by a person using electronic means.
- “Licensed site” includes the footprint of the physical installations where explosives activities take place and to which access is controlled by the licence holder.

Refer to the Regulations for any additional definitions of importance.

2. REQUIREMENTS

2.1 General Features of a Jet Perforating Gun Assembly Facility

A jet perforating gun assembly facility normally consists of one or more of the following:

- Gun Assembly area (GA) – this is where the assembly (manufacturing) of the guns takes place. In accordance with the Regulations, this area is the process unit of the factory licence.
- Loaded Gun Storage (LGS) – this is a dedicated storage area for loaded perforating guns. A LGS is considered a magazine.
- Magazines (M1, M2, etc.) – this is where the explosives used to manufacture perforating guns are stored, along with other compatible explosives. Loaded perforating guns may also be stored in the same magazine with other compatible explosives, in which case a LGS may not be present.
- A Gun Loading Facility (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 definitions, 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).

2.2 Types of Explosives

Authorized explosives are classified according to their intended use and hazard classification. Authorized explosive types are listed in the Regulations. A jet perforating gun assembly facility would be expected to store the following types of explosives:

- Type E – high explosives, both Type E.1- blasting explosives (such as detonating cord) and Type E.2 - perforating explosives (such as shaped charges);
- Type I – initiation systems (detonators);
- Type S.1 – low hazard special purpose explosives (certain power charges and ignitors); and
- Type S.2 – high hazard special purpose explosives (more hazardous power devices and propellant charges).

A loaded jet perforating gun is classified as Type E.2 (UN0124).

Type E and I explosives are also referred to as industrial explosives.

2.3 Acceptable Distance Requirement - General

Every process unit and magazine must be located at an acceptable distance from surrounding structures and infrastructure and from places where people are likely to be present. In the case of a jet perforating gun assembly facility, the acceptable distances are determined by using the National Standard of Canada CAN/BNQ 2910-510/2015 - "Explosives - Quantity Distances" (hereinafter QD Standard).

The QD Standard is used to determine the minimum separation distances between potential explosion sites (process units and magazines) and exposed sites (such as public roads, inhabited buildings, power lines, fuel storage, etc.). A potential explosion site is also considered an exposed site when more than one is present.

2.3.1 Potential Effect (PE) Classification

The required minimum distance in the QD Standard is based on the potential effects (PE) classification of the explosives in question and the maximum quantity of explosives stored. If applicable, a PE category is assigned to each authorized explosive based upon several factors, including how it is packaged. There are four possible PE categories:

- PE 1 — mass explosion hazard;
- PE 2 — serious projection hazard but not a mass explosion hazard;
- PE 3 — fire hazard and either a minor blast or minor projection hazard, or both, but not a mass explosion hazard; or
- PE 4 — fire hazard or slight explosion hazard, or both, with only local effect.

In order to determine the minimum separation distance required, the corresponding PE table from the QD Standard must be used (or calculated using the applicable scaled factor equation). If the explosives to be stored and/or processed are from more than one PE category, then the most hazardous category must be applied for the combined total. For example, if a magazine contains a small quantity of PE 1 explosives and a larger quantity of PE 4 explosives, the total quantity would be considered PE 1 for QD purposes.

Unpackaged explosives, unless authorized as such, may not have the same hazard classification as packaged. An explosive should always be stored in its authorized packaging to ensure that the PE applied is appropriate.

2.3.2 Net Explosive Quantity and Net Effective Explosive Quantity

The Net Explosive Quantity (NEQ) is the mass of the explosive in a package or article (excluding the mass of any packaging and non-explosives components). QD is determined by using the NEQ of the explosives in question. The Net Effective Explosive Quantity (NEEQ) is a concept used when a test demonstrates that the effective quantity of explosive is significantly different than the NEQ. In the case of shaped charges, testing has determined that a NEEQ of 25% may be applied under the following provisions:

- can only be used for a NEQ of 200 kg or less;
- shaped charges are stored as packaged for transport; and
- shaped charges are stored by themselves and without any mass detonating explosive such as detonating cord.

Thus, in the case of shaped charges, 100 kg could be stored as packaged for transport as if it was only 25 kg for QD purposes. If using NEEQ, it must be described in the licence application so that it is clear that the above provisions are satisfied.

2.4 QD Requirements at a Jet Perforating Gun Assembly Facility

The QD Standard shall be used to determine the QD requirements at a jet perforating gun assembly facility.

2.4.1 General Provisions for Gun Assembly Facilities

For a jet perforating gun assembly facility where the GA is a stand-alone structure, it alone is considered the process unit. In this case, the GA should meet the process building distance to other magazines (LGS, M1, M2, etc.) on the site (which would mean either D4 if barricaded or D7 if not barricaded). However, if the site is limited to only personnel directly involved in the manufacturing of the guns, then the entire site may be considered as a single process unit and no internal process building distance need apply. A site with more than one stand-alone GA may have to meet the process building distance to each GA on the site depending on the extent of the operations and the number of personnel involved at each GA.

The required distance from a process unit or magazine to any place where personnel not directly involved in explosives-related operations work or congregate is D7. If an office, lunchroom or washroom is used exclusively by the personnel involved in the manufacturing of the guns and/or handling of the explosives, then these may be located at the factory site without regard for QD.

If a jet perforating gun assembly facility is located near another company's licensed factory site, then the process units from each site must be at least D7 distance apart from each other. However, magazines from another company may be permitted within D7 distance of a factory site's process units and magazines as long as access is controlled within D4 distance, and there is a letter of understanding between the parties detailing how such access will be controlled.

Table C.4 of the QD Standard may be used to reduce the required distance between a GA and magazines based upon the orientation of the perforating guns as depicted in Figure C.1 of the QD Standard. The containment barricade (CB) distances in Table C.4 of the QD Standard may only be used if the containment barricade has been approved by the ERD. Hazardous debris analysis is required as part of the approval process for a containment barricade.

With regards to Type S explosives, if the quantity stored is below the licensing limit, then these items may be stored in a storage unit located in a shop or another location without regard for QD. In this case, the requirements for a storage unit in accordance with the Regulations must be met. The factory licence application must indicate if Type S explosives are being stored in a storage unit

at the factory site.

Explosives storage areas should be situated as far away as possible from radioactive containment vessels. A minimum separation of D2 (≥ 10 m) must be maintained between all explosives magazines/process units and radioactive storage areas.

2.4.2 Provisions Specific to the GLF

The results of blast and hazardous debris analysis have been accepted by the ERD for the GLF design allowing for reduced QD for the storage of up to 25 kg NEQ of industrial explosives in each designated area of the GLF. Based upon the modelling conducted, the ERD has accepted the 1.3 and 0.7 psi distance contours around the GLF (Appendix A) as being equivalent to the D4 and D7 distances, respectively, of the QD Standard. For a GLF, these reduced distances are referred to as D4W and D7W in order to distinguish them from normal QD. The D4W and D7W distances for a GLF are fixed and apply to the storage of up to 25 kg NEQ of industrial explosives in each designated area; these distances cannot be reduced by storing less than the 25 kg NEQ of explosives. Despite the acceptance of the GLF design by the ERD, each GLF must be approved (certified) by the ERD to ensure that it meets the required specifications before it can be used.

A single GLF is considered as one process unit. A site with more than one GLF should maintain a minimum separation distance of at least 3 m between each GLF.

If a GLF is located in an industrial area, it is recommended that the entire D7W footprint be contained within the site property limit (fenced area). If a GLF footprint falls outside the site property limit, then measures must in place to ensure that that any area within the D7W footprint that is outside of the property limit remains QD compliant. This may include notifying affected neighbouring properties about the areas of concern and the dangers that are present, as well as implementing access control procedures for affected areas. The licence application for a GLF must clearly indicate whether or not the D7W footprint is within the site property limit (including on the site plan) and if not, detail how QD compliance will be met (including whether neighbouring properties have been notified). A new licence is unlikely to be approved if the D4W footprint of a GLF extends onto the property of a neighbouring business.

2.5 Personnel Limit

Minimizing the exposure of people to explosives is a fundamental operational principle. Exposure is reduced by restricting personnel to the minimum number required to operate safely, for the minimum amount of time, with the minimum amount of explosives. Only persons with jobs essential to a particular hazardous operation should be permitted access to the explosives areas. Personnel not directly involved with explosives, such as office staff, mechanics, etc., must be located at least D7 (D7W) distance from the explosives operations and storage. The personnel limit includes employees and visitors, and the limits are part of the licence application. A visitor must attend an orientation session on visitor safety before being given access to the factory site and must remain under the supervision of a competent person. Once the licence application has been approved, the personnel limit must be enforced by the licence holder at all times.

Changes, even temporary, must be approved by the ERD.

2.6 Structural Requirements

2.6.1 General Provisions for Gun Assembly Facilities

All unattended industrial explosives must be stored in a magazine that meets the National Standard of Canada CAN/BNQ 2910-500/2015 – "Explosives - Magazine for Industrial Explosives" (hereinafter Storage Standard). This includes the LGS. If the GA is also used for the unattended storage of perforating guns or other industrial explosives, then it also must meet this standard. If a magazine from the Storage Standard (such as a Type 4 magazine) is used as a GA, then the door must remain open during processing to serve as an emergency exit. Each magazine storing industrial explosives must have an ERD tag number affixed to the inside of the door. A Type 12 magazine is a unique design (not defined in the Storage Standard) and thus must be approved for use by the ERD. A certificate of use will be issued by the ERD for any Type 12 magazine that is approved.

If the GA is not used for the unattended storage of industrial explosives, it shall be designed, constructed and installed to conform to good engineering practices, and must comply with Section 63(3) of the Regulations. Electrical requirements must comply with section 2.8 of these guidelines. Doors for emergency exits must have panic hardware; the exact number of emergency exits would depend on the size and layout of the GA, although one or two doors would be sufficient in most cases. All interior surfaces that may come into contact with explosives must be made of, or lined with, non-sparking material.

Regarding the storage of industrial explosives in a Type 6 magazine; this type of magazine is no longer permitted as a stand-alone magazine type in accordance with the Storage Standard. However, this design of magazine may continue to be used for the storage of detonators in certain cases, such as inside a GLF. Going forward, a Type 6 magazine used for this purpose will be referred to as a Type 6/2001 to indicate that it is a Type 6 in accordance with the previous storage standard (2001).

Type S explosives may be stored in a storage unit as long as their quantities do not exceed the licensing limit (as previously described). If the licensing limit is exceeded, the Type S explosives must be stored in a magazine that meets the requirements of the Storage Guidelines for Non-Industrial Explosives.

2.6.2 Provisions Specific to the GLF

As already stated, each GLF must be approved by the ERD to ensure that it meets the required specifications before it can be used. Since a GLF is also used for the unattended storage of industrial explosives, a certificate of use as a Type 12 magazine will be issued for each GLF that is approved.

The main (man) doors to the GLF must remain open during processing. If internal personnel doors are present, they must be provided with panic hardware. The main doors, gun doors and any externally mounted air conditioning units must be barricaded outside of the GLF in order to prevent these entities from becoming potentially hazardous projectiles. A barricade must be constructed in accordance with Annex G of the QD Standard. Furthermore, a non-earth barricade must be

approved by the ERD.

No structural alterations (such as openings) may be made to a GLF after it has been approved for use without authorization from the ERD. Maintaining the structural integrity of the GLF is the responsibility of the licence holder.

2.7 Compatibility

Only explosives that are compatible with each other may be stored together. Storage compatibility for explosives is outlined in the Guideline for Determining Storage Compatibility for Explosives. The licence holder may refer to the List of Authorized Explosives which can be found on the ERD website and/or contact their vendor regarding the classification and compatibility group of any of the explosives that they possess.

Damaged, deteriorated or expired explosives must be safely destroyed as soon as circumstances permit (as per the Regulations). Until such time, these explosives may be stored in a magazine with other compatible explosives as long as the storage does not increase the likelihood of an ignition. Equipment may be brought into or stored in a process unit or magazine only if it is required for operations, including the handling of the explosives, and does not increase the likelihood of an ignition.

Oxidizers, flammable solids and other chemicals that are not authorized as explosives shall never be stored in any magazine, process unit or storage unit containing explosives.

2.8 Electrical Requirements

If electricity is required in a process unit or magazine, it must meet the Canadian Electrical Code as well as the additional requirements of Appendix B. All electrical equipment and associated specifications (electrical rating, etc.) must be listed on the licence application so that it may be approved as part of the licence. Further details regarding electrical requirements may also be found in the Storage Standard and/or the Storage Guidelines for Non-Industrial Explosives, as the case may apply. A building that does not contain explosives (or contains explosives below the licensing limit) is not required to meet these requirements.

If a building or room (such as office, lunchroom or washroom) adjoins a process unit or magazine and does not meet the electrical requirements of Appendix B, then it must meet the requirements for a separate room. The requirements for a separate room include a one hour fire rating for the shared wall, including the door, and the door must also have auto-enclosure installed with a 5 cm sill between the rooms. These details must be specified in the licence application.

Power source lead-ins must be placed underground at least 15 m from any structure containing explosives. The QD Standard stipulates the distances from any overhead power lines to any structure containing explosives.

A generator must be located at least 15 m from any structure containing explosives. The fuel source for the generator must be located at least 25 m from explosives. A generator/fuel combination must be located at least 25 m from explosives. A generator must be grounded and equipped with a suitable fire extinguisher. Special permission from the ERD is required for a generator using any fuel other than diesel.

2.9 Heating, Cooling and Insulation

If electrical heating or cooling is required in a process unit or magazine, it must be in accordance with section 2.8 above.

Any non-electric heating or cooling source for a process unit or magazine must be located outside and comply with the requirements found in the Storage Standard and/or the Storage Guidelines for Non-Industrial Explosives, as the case may apply.

Any insulation in the ceilings or walls of a process unit or magazine shall have a flame-spread rating of 25 or less, as defined in the National Building Code of Canada. All insulation shall be protected from mechanical damage.

2.10 Material Handling Equipment

Forklifts and other material handling equipment may only be used in a process unit or magazine if they are electrical. An EE-rating is required for use in a process unit while an ES-rating may be used in a magazine.

Diesel and propane material handling equipment may only be used outdoors (they cannot enter a process unit or magazine at any time).

2.11 Access Control

Only people authorized by the holder of a Division 1 factory licence may have access to the factory site. Access control must be described in the licence application (including the security plan) and approved accordingly.

Access control at a jet perforating gun assembly site in an industrial area (with neighbouring businesses) would be expected to consist of several aspects:

- A fence is to be installed around the entire perimeter of the site;
- Road access is to be restricted through a lockable gate;
- Personnel access is to be controlled through a building or another gate; and
- Site access gates/doors are to be kept locked whenever they are unattended.

A snow fence may be accepted as a temporary measure to control access until a permanent fence can be installed. Fencing restricted to only the part of the site that contains the explosives (such as around a GLF) may be approved upon request (for example, a large site where erecting a perimeter fence may not be practical or necessary). A perimeter fence is not required for a remote site where the terrain serves as a natural barrier or where fencing may be difficult to install. However, such a site may require road traffic to be controlled through the use of a lockable gate or other barrier.

Refer to section 2.13 of these guidelines for signage requirements at each entrance to a site.

2.12 Transport

Any person or company transporting explosives must ensure that they comply with Part 9 of the Regulations, as well as the Transportation of Dangerous Goods (TDG) Regulations. Both sets of regulations are to be consulted, since they each specify different requirements. The TDG Regulations are not covered by these guidelines.

Detonators must be stowed during transport in such a manner that they do not ignite the other explosives being transported. The document entitled Transporting Detonators with Other Explosives describes how to meet this requirement.

A permit in accordance with Section 191(5) of the Regulations is not required in order to transport perforating guns on a flatbed trailer as long as the guns are transported in accordance with the Perforating Industry Code of Practice (i.e. fifth wheel trailer, guns firmly secured, etc.).

The ERD must be consulted, and permission obtained, in the event that an explosive is damaged or deteriorated and needs to be transported back to the factory site or another location. An example of what would be considered a damaged/deteriorated perforating gun is a gun that has been roughly handled or exposed to heat in a manner that has potentially altered its original integrity or behaviour.

It is essential that the loading and unloading of explosives at a GLF take place without delay or interruption as the explosives may not meet QD to the surrounding area when they are outside of the GLF.

The carrier and driver of a vehicle that contains explosives must ensure that it is attended in person when it is not at a licensed factory. However, in accordance with Section 199(2) of the Regulations, up to 25 kg of Type E and up to 100 detonators (Type I) may be left unattended in a vehicle if:

- The explosives have been removed from a factory magazine or licensed magazine for a specific purpose set out in their authorization;
- The explosives are stored in a storage unit that has been serviced at the factory or magazine and is bolted or welded to the vehicle or, if the explosives are perforating guns, the guns are securely locked to the vehicle;
- No other item or substance that could increase the likelihood of an ignition is in the vehicle;
- A device or system is in place that will ensure that the vehicle is immobilized and that an alarm will alert the driver if an attempt is made to steal the explosives, tamper with the storage unit or tamper with or steal the vehicle; and
- If it is parked overnight, the vehicle is parked at least 30 m from any dwelling, highway or railway line and any place where flammable substances (for example, gasoline pumps, propane tanks or above-ground storage tanks for a flammable liquid or flammable gas) are stored.

Note that the alarm system referred to above must alert the driver if an attempt is made to steal either the vehicle with the explosives or the explosives directly. This means that the storage unit(s) for the explosives, as well as any guns on transport racks, must be connected to the alarm system accordingly.

The unattended storage of explosives in accordance with Section 199(2) applies specifically to explosives that are being transported. Once the explosives reach their final destination (job site), then they are no longer considered to be in transport and must either be attended or stored in a magazine that meets the Storage Standard (and the site licensed accordingly). However, it is understood that there are situations that occur in the field where a job may take several days to perform (often due to circumstances beyond the control of the perforator) and thus it is not possible to acquire a proper magazine for such a short duration (for example, on a drill site). In such cases, up to 25 kg of Type E

and up to 100 detonators (Type I) may be left unattended in a vehicle as if that vehicle is still in transport in accordance with Section 199(2). This allowance is for short duration projects only (a few days). Anything longer requires a proper magazine (and a separate licence) or special permission in writing from the ERD.

If a licence holder intends to use Section 199(2) as above, this should be indicated on the licence application and must include a description of the security system used. The security system should also be specified in the security plan for the factory site.

The transport of any explosive outside of its means of containment (packaging) may only take place if it is done so in accordance with the TDG Regulations (through an existing regulation, exemption, certificate of equivalency, etc.).

2.13 Signs

A sign that warns against unauthorized entry must be posted at each entrance to a factory site in a clearly visible location. The sign should warn of danger from explosives and indicate the precautions that must be taken to eliminate the possibility of an accidental ignition (no smoking, etc). If there are valid security concerns about posting a sign indicating explosives, then an exemption to this part may be granted (but a sign warning against unauthorized entry is still required). For a site that is unfenced, signs warning against unauthorized entry should also be posted along the perimeter of the site.

On the outside of each process unit and factory magazine, a sign that sets out either the number, letter or distinctive name specified in the Division 1 factory licence for that unit or magazine, or the activities for which the unit or magazine is used, must be posted at each entrance in a clearly visible location.

On the inside of each process unit and factory magazine, a sign that sets out the following information must be posted at the main entrance in a clearly visible location:

- The quantity of each type of explosive that is authorized to be in the unit or magazine at any one time expressed as NEQ/NEEQ or number of units (for a GLF, this information may be on the outside of the integral magazine doors and detonator magazine door);
- The number of people (personnel limit) who are authorized to be in the unit or magazine at any one time (for a GLF, the number of people is for the entire GLF, not each area) ; and
- Any other conditions or restrictions specified in the licence that apply to the unit or magazine (such as "*shaped charges as packaged for transport only*" for NEEQ designated mags).

2.14 Authorized Explosives Labelling

In accordance with Section 74 of Part 5 of the Regulations, the following information must be displayed on each perforating gun that is manufactured at the factory:

- The words "*Explosives*/*Explosifs*";
- The name and address of the company that obtained the explosive's authorization;
- Either the date of its manufacture and the shift during which it was manufactured, if any, or its lot number;
- Its product name;
- The Division 1 factory licence number; and

- Instructions, in both English and French, for its safe handling, storage, use and destruction.[1]

The above information must be legibly printed on a label that is affixed to the outside (carrier tube) of the perforating gun so that it can be readily observed. If required, the above information may be printed on more than one label as long as all the labels are clearly visible.

In addition to the above, all outer packaging of industrial explosives that are stored at the factory must be marked with the Division 1 factory licence number. Upon opening the outer packaging, all inner packaging and reels of detonating cord must likewise be marked with the factory licence number.

Any explosives that are damaged, deteriorated or expired must be clearly marked as such along with the factory licence number.

2.15 Point of Use Assembly

Perforating guns shall only be assembled at a licensed factory site. The exemption from requiring a factory licence to assemble explosives at the place where the explosives will be used, as specified under Section 135 of the Regulations, does not apply to the assembly of perforating guns. Section 135 refers to the assembly of an explosive train at the point of use and not to the manufacture of an article from explosive and non-explosive components, such as a jet perforating gun. The key difference is that the assembly of an explosive train does not result in a new explosive product.

Notwithstanding the above, it is understood that situations occur in the field where a perforating gun needs to be assembled at the point of use. Thus, as long as this activity is specified in the factory licence application, a limited number of perforating guns may be assembled at the place where they will be used. The licence application must describe the reason that this provision is required (with example situations) and provide an estimated yearly total of perforating guns that may be assembled at the point of use. A record must be kept of the guns assembled at the point of use. The licence must also include the specific procedures for the point of use assembly. As a minimum, the procedures must include the following:

- The assembly must be performed by a competent person;
- The assembly must take place as far as possible from any area where other people are present with at least 25 m being the goal; and
- The maximum personnel limit for point of use assembly should be no more than three persons.

Legitimate reasons for point of use assembly would include, but are not necessarily limited to, the following:

- The client changes specifications for the gun at the point of use;
- Charge(s) has/have to be removed from a gun at the point of use in order to avoid perforating a casing collar;
- A gun does not perform as expected, so another gun must be assembled and fired;
- Need to replace damaged parts; and
- For pipe recovery; the company does not know the requirements until an assessment

[1] If the perforating gun that is manufactured is used by the same company (meaning, it is not sold to another company for use), then the words "*Explosives-Danger-Explosifs*" may be displayed as meeting the intent of instructions.

can be made at the drill site.

The following would not be considered as legitimate reasons for point of use assembly:

- Unused guns downloaded at point of use;
- Preferable to spend time assembling guns at the point of use rather than to assemble beforehand at a factory site;
- Parts are not available at the factory and/or parts are easier to ship to the point of use;
- Easier to transport unloaded carriers; and
- Mistaken understanding that Type 4 guns can only be assembled at point of use because shaped charges are exposed, and thus dangerous to transport. This is not true, as Type 4 guns are authorized with carriers (a Shogun is considered to be a Type 4 gun).

If a company only performs pipe recovery, it may be possible to be issued a factory licence without requiring a fixed-site process area (GA). In this case, the point of use would be considered the process area. Such a licence would only be granted to a company that performs pipe recovery operations involving simple assembly operations such as string shots, split shots and casing cutters as well as the occasional perforating gun (normally limited to Type 4 guns). All the requirements of these guidelines, including those pertaining to point of use assembly described above, would apply to such a licence. The only exception being that the licence would not require a fixed-site process area.

2.16 Surveillance

All magazines (including a LGS and a GLF) that store industrial explosives shall have a surveillance program that meets the requirements of the Storage Standard. While the Storage Standard refers to two options (physical inspection and electronic surveillance), only the electronic surveillance option would normally be permitted for a jet perforating gun assembly facility located in an industrial area. The physical inspection option may be approved for sites where security is less of a concern (such as remote areas) and where physical inspection is easily performed (such as a site located on an owner's property).

The electronic surveillance system must comply with all the specifications described in the Storage Standard. Every access point (including main doors, roll-up doors, personnel doors, gun loading doors, etc.) must be connected to the surveillance system.

The type of surveillance system installed must be described in the licence application (including the security plan).

2.17 Key Control

A system must be in place to control the keys to every process unit and magazine where explosives may be stored. A key control guideline is available to assist the licence holder in putting into place a key control plan. The main point of such a plan is to ensure that the keys can only be obtained by authorized personnel (not every employee should have access to the keys). It is suggested, especially for larger companies, that keys be secured in a separate locked key box that only authorized personnel have access to (through, for example, a combination lock).

If a key is lost or stolen, the lock must be immediately replaced. For industrial explosives magazines (including the GLF), lock replacement may only be obtained through an authorized magazine door fabricator.

2.18 Security Screening

In accordance with Part 8 of the Regulations, any person who has access to high hazard explosives (Types E, I, and D (military)) must be in possession of an approval letter or equivalent document. An approval letter is obtained from the ERD by submitting the applicable application form along with an original criminal record check. An equivalent document is an alternate screening document such as a Permis Général, FAST card, NEXUS card, or a Firearms Possession and Acquisition Licence (PAL). Personnel in possession of a valid equivalent document do not require an approval letter.

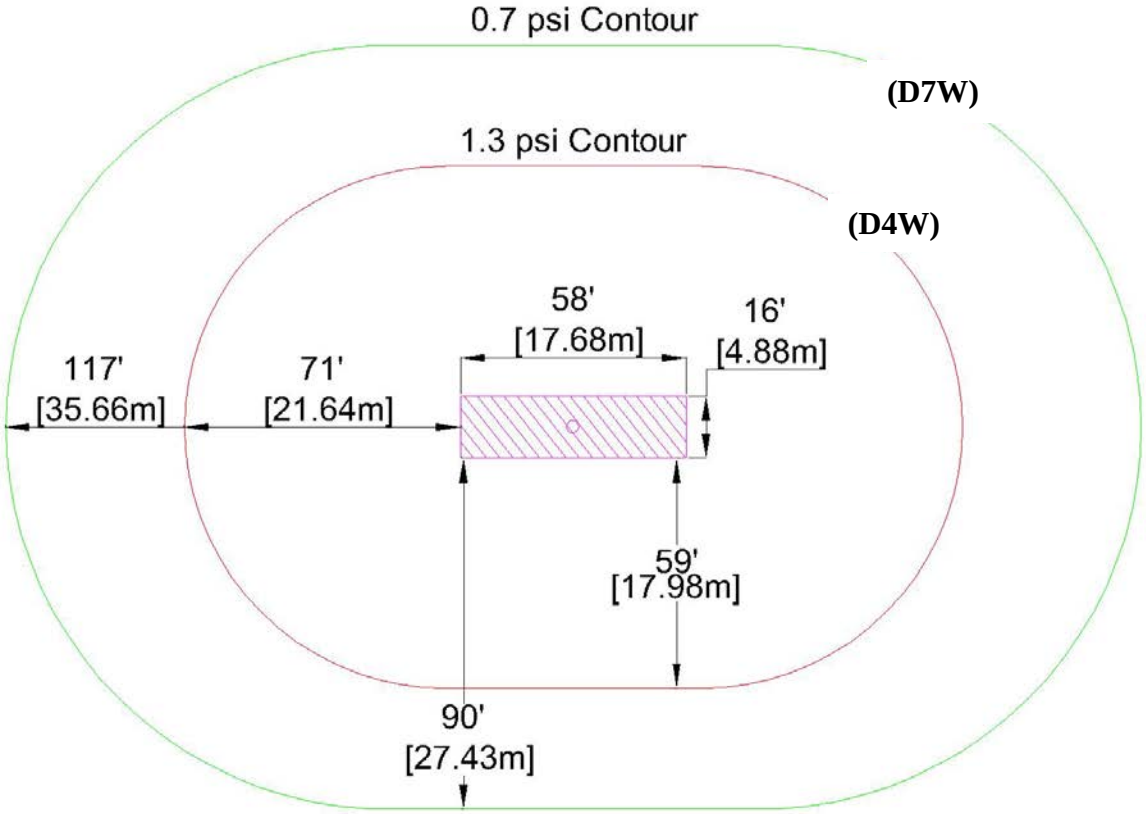
A list of all personnel in possession of an approval letter or equivalent document must be submitted with the factory licence application. Copies of all employee approval letters and equivalent documents should be held at the factory site (note, the original approval letter must be retained by the individual it was issued to and not by the company).

2.19 Other Requirements

Other requirements not detailed in these guidelines because they are clearly explained in the Regulations include training, operating procedures, record keeping (inventory control), incident reporting, annual reporting and decommissioning.

Appendix A

D4W & D7W Distance Contours for the GLF



Appendix B

Electrical Requirements for Process Units and Magazines

Type	Minimum Requirement	Notes
Enclosures	EEMAC/NEMA 4 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.
Air Conditioning	Class 2 Division 2	
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/NEMA 4 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).