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General Standard for the Authorization and Classification of Explosives

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Explosives Regulatory Division
www.erd.nrcan.gc.ca

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Canada

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1. INTRODUCTION

The authorization is the process by which an explosive substance or explosive article, as defined in the *Explosives Act and Regulations*, is declared authorized by the *Chief Inspector of Explosives* (CIE), at which time it becomes legal to manufacture, sell, possess or use that explosive or explosive article in Canada or import it into Canada; only after approval is the item added to the list of authorized explosives. As part of this process, the explosive substances or explosive articles are classified. Only the explosives listed in section 5 of the *Explosives Regulations* and those under the care and control of the Department of National Defence are exempt from authorization.

1.1 Purpose

This document has been prepared as a guide to industry and the public. It describes the process for the authorization and classification of explosives in Canada. The authorization of an explosive is done in accordance with the *Explosives Act and Regulations*. As per section 8 of the *Explosives Regulations*, a person may carry out an activity involving explosives only if the explosives have been authorized by the CIE.

1.2 Scope

This standard applies to all types of explosives regulated under the *Explosives Act and Regulations* (Part 3, section 22). All new submissions and any significant change to existing products will be subject to this standard.

Products and systems which are now authorized and which now appear on the current list of authorized explosives, unless materially changed, involved in safety related incidents, or, related to any safety issues, which may be currently unknown or not well understood, will not be required:

(a) to meet all requirements of this standard;
(b) to resubmit documentation; or,
(c) to perform additional testing.

In addition, when a manufacturer submits a new product for authorization that is similar to products that are already authorized by that specific manufacturer, the requirements for documentation and additional testing may be limited.

Other standards provide the detailed requirements for different types of explosives such as fireworks, pyrotechnic special effects, initiation systems, high explosives and cartridges. This document must be used in combination with the other standards in order to determine all requirements.

1.3 Disclosure of Confidential Information

Every applicant must submit a technical declaration to the *Explosives Security and Safety Branch* (ESSB) in support of their request to obtain authorization of an explosive. Documentation may describe the details of design that is the intellectual property of the manufacturer. The submission is

kept confidential in accordance with section 23 of the *Explosives Act*.

In accordance with the *Explosives Act,* the information submitted to the ESSB may be shared with the RCMP, CSIS, ATF and FBI or other similar statutorily-created agencies in Canada or the United States to address security issues and ensure the protection of persons and properties.

Documentation is used to ascertain that the manufacturer has applied sound principles in design and exercised due diligence in evaluating the safety-related properties of the explosive.

1.4 Components and Accessories

Though the CIE authorizes explosives, he does not authorize or otherwise approve components or accessories used in conjunction with them. However, when the explosives (usually articles) are part of a system that requires specialized components, the CIE will authorize the explosive for use only with the manufacturer-specified documents.

1.5 Changes to the Design of an Authorized Explosive

As per section 37 of the *Explosives Regulations*, any person who wants to make a change to an authorized explosive must obtain the written permission of the CIE if the change affects any of the information provided in the application for authorization of the explosive. Change(s) to any authorized products and to any of the related systems, or use with non-manufacturer specified components, unless otherwise indicated in the approval, void the authorization or approval.

2. RESPONSIBILITIES

2.1 Chief Inspector of Explosives

The CIE authorizes new explosive substances and articles in accordance with section 32 of the *Explosives Regulations*.

2.2 Explosives Regulatory Division

The explosives inspectors from the *Explosives Regulatory Division* (ERD) review the submissions, decide on the sampling, develop test plans in conjunction with the *Canadian Explosives Research Laboratory* (CERL), revise test results, determine the appropriate classification and prepare the authorization certificate for the CIE's approval.

2.3 Canadian Explosives Research Laboratory

The CERL tests products at the request of the CIE, develops test plans in conjunction with the inspectorate of the ERD, assists the ERD in the review of laboratory reports and test results from other competent authority test agencies/manufacturers/or commercial test agencies, and submits laboratory reports for the testing performed.

3. OTHER REFERENCE DOCUMENTS

The primary documents of reference are the *Explosives Act and Regulations*. Nothing in this standard waives any obligation of the *Explosives Act and Regulations*.

There are other supplementary documents that can be used in conjunction with this standard, i.e.:

(a) Detailed product standards that provide performance criteria, sampling and labeling requirements for some types of explosives:
- Initiation Devices and Initiation Device Systems;
- Cartridges;
- Consumer and Display Fireworks;
- High Explosives;
- Pyrotechnic Special Effects;

(b) *Recommendations on the Transport of Dangerous Goods* published by the United Nations;

(c) *Quantity-Distance Principles* published by the ERD; and,

(d) *Classification by Potential Effect* published by the ERD.

4. DEFINITIONS

4.1 Authorization

Authorization is the process by which an explosive substance or explosive article, as defined in the *Explosives Act and Regulations*, is declared authorized by the CIE, at which time it becomes legal to manufacture, sell, possess or use that explosive or explosive article in Canada or import it into Canada; only after approval is the item added to the list of authorized explosives. As part of this process, the explosives substances or explosive articles are classified in accordance with section 4.2.

Only the explosives listed in section 5 of the *Explosives Regulations* and those under the care and control of the Department of National Defence are exempt from authorization.

4.2 Classification of Authorized Explosives

As per section 36 of the *Explosives Regulations*, the CIE must classify each authorized explosive by type, hazard category and UN number.

4.2.1 Types of Explosives

The item's intended purpose will be used to determine which Parts of the *Explosives Act and Regulations* are applicable to an explosive. According to its intended purpose, each authorized explosive is classified as one of the following types (*Explosives Regulations*, section 36):

(a) E - high explosives:
- E.1 - blasting and bulk explosives,

- E.2 - perforating explosives,
- E.3 - special-application explosives;

(b) I - initiation systems;

(c) P - propellant:
- P.1 - black powder and hazard category PE 1 black powder substitutes,
- P.2 - smokeless powder and hazard category PE 3 black powder substitutes;

(d) C - cartridges:
- C.1 - small arms cartridges,
- C.2 - power device cartridges,
- C.3 - cartridge accessories;

(e) D - national defence and law enforcement explosives;

(f) F - fireworks:
- F.1 - consumer fireworks,
- F.2 - display fireworks,
- F.3 - special effect pyrotechnics,
- F.4 - fireworks accessories;

(g) R - rocket motors:
- R.1 - model rocket motors,
- R.2 - high-power rocket motors,
- R.3 - rocket motor accessories;

(h) S - special-purpose explosives:
- S.1 - low hazard explosives,
- S.2 - high hazard explosives.

4.2.2 UN Number

Each authorized explosive is assigned the most appropriate UN number (set out in Column 1 of Schedule 1 of the *Transport of Dangerous Goods Regulations* and in the latest version of the *Recommendations on the Transport of Dangerous Goods* published by the United Nations) based on the type, hazard classification and intended purpose of the explosive.

Each UN number is associated with a hazard classification and a compatibility group.

4.2.2.1 Hazard Classification

Explosives are assigned to one of the following divisions, depending on the type of hazard they present:

(a) Division 1.1 - mass explosion hazard;

(b) Division 1.2 - projection hazard but not a mass explosion hazard;

(c) Division 1.3 - fire hazard and either a minor blast or minor projection hazard or both, but not a mass explosion hazard;

(d) Division 1.4 - no significant hazard beyond the package in the event of ignition or initiation during transport;
(e) Division 1.5 - very insensitive with a mass explosion hazard;
(f) Division 1.6 - extremely insensitive articles with no mass explosion hazard.

4.2.2.2 Compatibility Group

Explosives are also assigned to one of the thirteen compatibility groups (A, B, C, D, E, F, G, H, J, K, L, N and S) which identify the kinds of explosive substances and articles that are deemed to be compatible. The document *Recommendations on the Transport of Dangerous Goods, Model Regulations* from the UN explains the scheme of classification into compatibility groups, the possible hazard divisions associated with each group and the consequential classification codes.

4.2.3 Potential Effects

Each authorized explosive is, if appropriate, classified for the purposes of manufacturing and storage into one of more of the following potential effects (PE) categories according to hazard, determined on the basis of processing conditions, the quantity of explosives and packaging:

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

These PE classifications are intended to provide information needed for the appropriate licensing of both storage and manufacturing operations, namely, selection of the appropriate type of quantity-distance requirements that are needed for site layout, barriers, building construction, and also for identifying any special terms and conditions that may be required. These PE classifications will also assist in the definition of regulations that are needed to support the unlicensed storage of some explosive(s), e.g. small quantity of gunpowder used to reload personal ammunition.

The document titled *Classification by Potential Effects* specifies the methodology used for the determination of the PE of an explosive.

4.3 Classification of Explosives for Transport

The CERL may test explosive substances and articles under contract from external sources or agencies and submit laboratory reports with classification recommendations to the CIE. The CIE may then classify the explosive.

4.4 Explosives

Throughout this standard, whenever the word *explosives* appears, it refers to explosives and pyrotechnics substances and articles as well as to supporting systems when these are the ones to be specifically used with the device. When there is need to differentiate between these products, this

will be stated. Definitions or description for the explosives, articles and devices will be found in the detailed standards references in Section 3 above. There are several definitions to bear in mind from the *Explosives Act and Regulations* and the *UN Recommendations for the Transport of Dangerous Goods*.

(a) From the *Explosives Act*, *explosive* means any thing that is made, manufactured or used to produce an explosion or a detonation or pyrotechnic effect, and includes anything prescribed to be an explosive by the regulations, but does not include gases, organic peroxides or any thing prescribed not to be an explosive by the regulations;

(b) From the *Explosives Regulations*, *explosive* means a substance that is made, manufactured or used to produce an explosion or detonation or a pyrotechnic effect and includes gunpowder, propellant powders, blasting agents, dynamite, detonating cord, lead azide, detonators, ammunition of all descriptions, rockets, fireworks, fireworks compositions, safety flares and other safety signals;

(c) From the *UN Recommendations for the Transport of Dangerous Goods*, an *explosive substance* is a solid or liquid substance (or a mixture of substances) that is in itself capable by chemical reaction of producing gas at a temperature and pressure and at such a speed as to cause damage to surroundings. Pyrotechnic substances are included even when they do not evolve gases;

(d) From the *UN Recommendations for the Transport of Dangerous Goods*, an *explosive article* is an article containing one or more explosive substances.

4.5 Novelty Explosives

A novelty explosive is an explosive whose design and characteristics differ from previously authorized explosives.

4.6 Advanced System

An advanced system is a highly developed combination of devices that function together and where at least one of these devices is an explosive. Advanced systems may require hazard and operability studies as well as operational and training manuals for safe use. Examples of advanced systems are electronic detonators, a firing board with fireworks, etc.

4.7 Authorization Period

Explosives may be authorized for an indefinite or a specified period.

4.7.1 Authorization for an Indefinite Period

Most explosives are authorized for an indefinite period. The approval remains valid as long as the conditions listed in section 5.12 below are observed.

4.7.2 Authorization for a Specified Period

An explosive may be declared to be an authorized explosive for a specified period if the explosive is intended to be used for an occasional and temporary purpose such as chemical analysis, scientific

research, a product trial or a fireworks competition.

Such authorization is useful for novelty explosives for which no history exists, or, for mature products used elsewhere but not yet authorized in Canada. After review of the documentation and technical data such as hazard classification, foreign approvals and competent authority documentation, authorization may be issued for a specified period.

Authorization for a specified period may be subject to restrictions or conditions including: reporting of safety related incidents, no sale(s), limited quantities, use only under direct care and control of the manufacturer or its representatives at specified durations and locations, disposal or destruction at the end of the specified period.

Occasionally, authorization for a specified period may be granted pending consideration for authorization for an indefinite period. It is the case for example when preliminary testing appears acceptable but more samples and tests are required. In such a case, a limit date will be given for the company to comply with the provisions or conditions of the provisional authorization. Failure to comply with the stated conditions will be considered as a failure to the submission, and thereby remove the explosive from consideration for authorization for an indefinite period.

This authorization expires at the end of the specified period.

5. AUTHORIZATION PROCESS

The Canadian *Explosives Act and Regulations* control explosives and pyrotechnics in the interest of public and worker safety. The *Explosives Act* provides for a CIE who, by regulation, is required to authorize an explosive or a pyrotechnic on request if he is satisfied as to its safety.

To facilitate evaluation of a submission by the inspectorate of the ERD, the documentation must be submitted in the format described below in either the French or English language.

5.1 Steps of the Authorization Process

The Canadian authorization and classification process comprises the following steps:

(a) An applicant who wants to have an explosive authorized must complete, sign and send to the Chief Inspector of Explosives the application form provided by the ERD (www.erd.nrcan.gc.ca). The application must contain the following information:
- The name, address, telephone number, fax number and email address of the applicant and of the manufacturer if the applicant is not the manufacturer;
- A short description of the explosive and its properties, as well as its trade name;
- Its intended use;
- For an explosive article, a technical drawing of the article, prepared to scale, that

sets out its physical dimensions, its components and the materials of its construction;
- The composition of the explosive and the percent tolerance or range of each of its ingredients;
- The composition of any substitute explosive and the percent tolerance or range of each of its ingredients;
- The results of any tests conducted by or on behalf of a foreign state that has authorized the explosive or a similar explosive, or the classification of the explosive by a foreign state;
- The expected classification of the explosive under section 22 of the *Explosives Regulations*;
- In the case of an explosive to be manufactured in Canada for the first time, the intended manufacturing operations;
- For an explosive article, its performance characteristics, the way in which it functions and the instructions for its use;
- A description of any packaging or container in which the explosive will be handled, used or displayed for sale;
- A description of the packaging in which the explosive will be transported and stored, and the standards to which the packaging must conform under the *Transportation of Dangerous Goods Act*;
- The information that will be printed on the explosive and on the packaging;
- The safety instructions, in both English and French, that will accompany the explosive, including procedures for preventing accidents when handling, storing, using or disposing of the explosive and procedures to follow if the explosive is lost or stolen.

(b) The ERD will send an invoice to the applicant (as per Part 19 of the *Explosives Regulations)* for the applicable fees to review the new application for authorization.

(c) The ERD will review the supplied information for completeness, self-consistency and traceability. If information is missing, a letter or email is sent requesting the missing information. No work continues until all information is present and acceptable. If the information is incorrect, the submission is rejected. If all documentation is satisfactory, the authorization may be granted at this stage.

(d) The ERD determines which articles from a submission will be tested, if any.

(e) If necessary, the ERD and the CERL will then develop a test plan specifying sample requirements, estimates of cost and completion date. The applicant will decide whether or not to proceed with the test plan.

(f) Testing and reporting will be done by the CERL in accordance with the test plan.

(g) Based on the results and the submitted documentation, the ERD will decide to accept or reject the authorization request and will send a letter to the applicant confirming the authorizing decision.

(h) If the authorization is granted, the explosives will be added to the list of authorized

explosives.

(i) At any time thereafter, sampling and testing of explosives may be carried out to confirm their suitability for continuing authorization.

(j) The ERD will invoice the applicant on a yearly basis for the annual user fee to maintain their list of authorized explosives.

It must be emphasized that the drawings and specifications become the binding, legal documents supporting authorization. No changes may be made to the authorized explosive without prior approval from the ERD and without a corresponding approved change to the authorized drawings and specifications.

When applicable, the authorization document will specify the conditions under which the explosives may be used. When testing has not been performed or test results do not exist to support a manufacturer's claim for use in a specific application, then authorization may be withheld until satisfactory documentation has been submitted by the requester.

5.2 Criteria for Authorization

During the authorization process, the ERD evaluates whether the explosive meets Canadian standards and whether the company is able to reproducibly meet its own drawings and specifications. It is imperative that the product meets the manufacturer's drawings and specifications. Firstly, the documentation describes the explosive to be authorized. Secondly, it provides an indication of the quality control exercised within the company. A good quality control is an indication of the continuing safety of the product in question. The detailed requirements for some types of explosives are provided in the supplementary documents listed in section 3 above.

In addition to this evaluation, the CIE decides on the appropriate classifications, basing the decision on safety issues, on test results and occasionally by analogy.

5.3 Authorization of Restricted Explosives

An explosive is declared to be a restricted authorized explosive if the CIE determines that the explosive is only appropriate for use by a particular body or class of persons for a specific purpose. Examples would be military or law enforcement devices. Restricted explosives are not published on the list of authorized explosives.

5.4 Special Permission for Manufacturing Samples

In Canada, special permission must be obtained from the ERD prior to the manufacture of any samples that are to be prepared in a licensed pilot plant or production facility.

5.5 Sampling of a Submission for Testing

Not all explosives are tested; selected articles may be chosen to represent the whole of a submission. The basis for the number of samples selected for testing is described in the appropriate reference documents listed in section 3 above.

New explosives may be authorized by analogy to similar existing products already authorized for that company. However, authorization by analogy to another company's' product or designs is not possible. Novelty products whose design and characteristics differ from previously authorized products, or that are submitted by companies not familiar to the ERD are more carefully scrutinized and likely to be tested.

For a simple submission from a known company with similar products on the list of authorized explosives, samples may not be requested. In case of a simple submission from an unknown company, or a new type of product from a known company, a sample will be requested. The number of units that are requested for each sample will be determined by the test plan prepared by CERL.

Sampling can be of two types:

(a) the only product in the submission is provided to CERL for testing; or,
(b) for a large submission of many articles, a sample of some of the articles may be requested.

In the first case, the behavior of the unit will determine its fate; in the second case, the behavior of the sample will determine whether all of the articles that are part of the submission will be authorized.

A company presenting a large submission may elect to have each individual article tested in the hope that the failure of one will not impact on the total submission. Whether a selected sample is chosen or whether all articles are tested, the acceptance of the submission will be judged by application of statistical tables. For example, if nine out of ten articles fail, the single article that passed will not be authorized because the company did not demonstrate its ability to make good products.

Alternately, a company presenting a large submission may also elect to divide a submission into groupings of related articles or families. In this case, each family or grouping is sampled statistically according to the number of articles in that family. The acceptance of that family depends only on the behavior of that family's sample. The acceptance of other parts of the submission is based on their own individual sample performance.

The choice to sample rests with the inspector and depends on factors such as past experiences, history of complaints and availability of articles from the same company to use as analogues or the lapse of time since articles from the company were last tested.

5.6 Testing and Reporting

5.6.1 Testing
Any required test documentation may originate from the manufacturer, a commercial test agency or a

national competent authority test agency such as the CERL. After review of the information supplied to the ERD, testing may be required. The scope of testing and additional information is identified in a test plan that is determined by the ERD in conjunction with the CERL. This test plan also includes the cost of testing when performed by the CERL.

An applicant may witness the testing with permission from the CERL and the ERD. The testing may be conducted by:

(a) The CERL; or,
(b) A research laboratory selected by the manufacturer and qualified by the ERD (most competent authority test facilities or ISO certified test agencies); or,
(c) A manufacturer and witnessed by CERL personnel.

5.6.2 Reporting
Once completed, a report is written for the ERD stating whether the samples met or did not meet the test plan requirements. When applicable, a recommended hazard classification is given in the report.

The report issued by the CERL will typically include for each sample: sample identification, packaging description and photographs, sample description and photographs, physical dimensions such as explosive mass, consistency and physical integrity, examination and test results, chemical analyses, summary of function testing results and a recommendation on the authorization and classification.

5.7 Approval
The decision to approve a product rests with the CIE who must be convinced that the product is safe. A statement by the test agency that the product met the requirements does not assure authorization but is used in support of the decision. The laboratory tests for compliance with standards and for the ability to meet the drawings and specifications submitted by the company. The complete picture, including quality of the submission, proven competency in the field, company reputation, the quality of the samples when chosen, etc., is taken into account.

If the product is not to be authorized, an explanation for failure is given.

If the product is to be authorized, a certificate of authorization signed by the CIE is issued to the applicant and the item is added to the list of authorized explosives (www.erd.nrcan.gc.ca).

5.8 Turnaround Time
The time to process a submission will depend on its complexity. A total of thirty (30) days should be allocated to review an application. If samples are requested for testing, the processing time will be about four (4) months *after* the establishment of a formal test plan and receipt of the samples at the CERL.

5.9 Associated Costs

The cost to review an application for authorization and the cost to maintain the list of authorized explosives are outlined in Part 19 of the *Explosives Regulations*.

If a desk audit or testing is required at the CERL, the applicant will have to pay for the samples, the shipping of the samples, the costs of the testing and the laboratory report.

5.10 Re-submission

If a company has been refused authorization, it may reapply under certain conditions, i.e.:

(a) A new submission is required; drawings that had originally been submitted will not be considered.

(b) An explanation of the failure is required together with a plan on how the failure will be eliminated. This must be found acceptable; that is, the explanation must show that the root cause of the problem has been corrected.

It is not in the interest of the Canadian public to review, test and retest submissions from companies whose products continue to fail or whose submissions consistently demonstrate a poor quality. The purpose of this process is to assure safety for the public.

5.11 Continuing Acceptability

5.11.1 Continuing Authorization Auditing

Companies located in Canada will be audited to determine what manufacturing controls are used to ensure that a product consistently meets the drawings, specifications and requirements. Foreign manufacturers will either be audited or subject to continuing authorization testing.

5.11.2 Continuing Authorization Testing

Samples may be withdrawn from the field or requested from the manufacturer at any time and subjected to testing. The cost of such testing is borne by the Government of Canada.

All samples must be faithful to the authorized drawings. Failure to meet these drawings is a cause for removal of the authorization.

5.12 Validity of an Authorization

The CIE may cancel the authorization of an explosive in any of the following circumstances:

(a) The holder of the authorization has not paid the applicable fee within 30 days after the date of the invoice from the Department of Natural Resources;

(b) The CIE determines, as a result of periodic testing or on the basis of new information that the explosive can no longer be safety manufactured, handled, stored, transported, used and disposed of;

(c) The CIE is unable to determine if the explosive can still be safely manufactured,,

handled, stored, transported, used and disposed of because he - cannot obtain a sample for periodic testing;

(d) The holder of the authorization requests the cancellation;

(e) The holder of the authorization is no longer in business and the CIE has reasonable grounds to believe that the explosive is no longer in the possession of any person.

The authorization remains valid unless:

(a) A change occurs to the product or packaging as declared in the original authorization. It must be noted however:

- The original documentation used for authorization approvals may specify substitutions or changes that fall within the scope of the original authorization approval;
- Whenever any change occurs which is not so recorded in the original approval, a new authorization application may be required;
- Typically, an applicant who wants to make a significant change to an authorized explosive must re-submit a new authorization request and obtain the written permission of the CIE, whereas an applicant wishing to make a minor change to an authorized explosive will advise the CIE in writing of the change and receive acknowledgment of the change. The CIE may give the permission to modify the design of an explosive if he determines that the proposed change would not affect the performance or classification of the explosive. The applicant must submit a new technical declaration if the CIE determines that the change would affect the performance or classification of the explosive.
- To avoid re-examination and retesting, the application submission must clearly demonstrate that the change will not materially affect hazard classification, function or safety of the product, that is, that the change is not significant, e.g., the package color.

(b) An amendment of regulations occurs which affects any stipulation(s) of the original authorization. In this case, time will be provided to deplete any stocks.

5.13 Reporting an Incident with an Authorized Explosive

The ERD does not regulate the use of explosives with the exception of fireworks and pyrotechnics special effects. However, the ERD has the responsibility to ensure that an item can be safely used as recommended by the manufacturer. As a condition of authorization, explosive safety-related incidents or accidents involving authorized products, including use, are to be reported within one month after becoming aware of the incident. Note that significant reportable safety-related incidents are those that could necessitate product re-call due to complete failure, on-going malfunction or an accident.

6. REQUEST FOR AUTHORIZATION

This section describes what must be present in a submission and how it will be judged. Note that specific requirements for each type of explosive are given in the supplementary documents (listed in section 3 above).

The application is a legal declaration to the Government of Canada in order to obtain authorization. It is the first indication of the care a company exercises in achieving a product of acceptable quality. Poor submissions do affect perception.

6.1 General

Every application must be accompanied by the *Submission Form for Authorization and Classification of Explosives,* properly completed (www.erd.nrcan.gc.ca). An electronic and interactive copy of the form may be obtained through the ERD upon request. Paragraphs 6.2 to 6.7 below describe each section of the form in detail.

Every submission receives a unique file number, dependent on the company name and the date. This number must be quoted in all subsequent correspondence on the submission in question.

6.2 Applicant Information

The contact information of the requesting company and the manufacturing company must be provided in section 1 of the form. If the applicant differs from the manufacturer, the requesting company must provide to the ERD a letter from the manufacturer authorizing them to act on their behalf.

6.3 Trade Names and Part Numbers

A list of all of the products in the submission by name and/or part number is required. For requests containing many items (≥ 10), this list must be supplied electronically in Microsoft Excel format. In this case, part numbers and product names must be listed in two separate columns. Borders or special characters must not be used.

Note that the product name or part number identified here will be used to identify the product on the list of authorized explosives. All related documentation required for transport, importation and export must use this declared name.

6.4 Technical Declaration

To avoid invalidation of the authorization and the need for subsequent re-examination and re-testing, the submission must clearly describe any intended substitute(s) or change(s), especially those that will materially affect hazard classification, function or safety of the product.

6.4.1 Specification Detailing the Product(s)

6.4.1.1 Engineering Drawing

An engineering drawing of the product is required, if applicable. It must include: dimensions, charge weights of all explosive components, gross weight of the article, construction materials and tolerances for charge weights and dimensions. The drawings and documents provided by the company for their products must be controlled and dated in a fashion that preserves the validity of the authorization as described in 5.13. They must be legible or they will not be considered.

6.4.1.2 Chemical Composition

The composition of all explosive components must be given. This can be provided on the drawing(s) or a reference may be made on the drawing(s) to a table of compositions. It must list all ingredients used and must give the percentages used and the tolerances or ranges for each. The ingredients must be listed by their chemical names as much as possible. Generic names may be used only when the ingredient is best known by the generic name.

6.4.1.3 Shelf Life

State the shelf life of the explosive under normal storage conditions.

6.4.1.4 Data Sheets on Hazards

Provide sheets for the explosive describing hazard, including explosion, fire, toxicity, environment and measures to be taken to prevent an incident or when an incident happens.

6.4.1.5 Safety and Security Features

Describe any safety features or special characteristics of the explosive, explosive device, its system and components that improve public or worker safety and prevent misuse via accident or intent. When applicable, describe precautions taken to preserve security of the control equipment software/hardware from origin or the manufacturer down to user levels.

Describe any protective features required for the assigned UN transport hazard classification.

State recommended safeguards for security of the special components needed for the explosive or device to function, and without which theft would be redundant.

6.4.1.6 Advanced Systems

When applicable, demonstrate or provide assurance that the design basis and operation of the explosive device and its system satisfy the following criteria:

(a) All controls, in all cases, shall fail to safety and shall have self-tests and checks;
(b) System to allow for status checks and for report functions, both before and after use, to report both the system condition and the integrity of the systems, such as for the control equipment hardware and software;

(c) For use only as intended.

A hazard study may be required for advanced systems to demonstrate that safe handling of the system cannot be compromised in any way.

6.4.1.7 Components from another Source

For components purchased from another source, a reference to that source must be given.

6.4.2 Packaging and Labeling

Except for the shipping container or external packaging where either the French or English language may be used for UN marking requirements, all labeling, instructions for use, operating manuals and safety warnings must be in both the French and English languages.

When it is judged not to be practicable to print on or to affix a label to the explosive as described below, contact the ERD to establish a suitable means of marking the article. For example, information could be printed on the inner and outer packaging containing the explosive, or, a label could be affixed to the packaging, or a label affixed to the explosive, or safety instructions could be included within the package as a case insert or a pamphlet.

6.4.2.1 Required Information about the Packaging

The following information must be provided:

(a) Drawing and description of all shipping packaging, i.e. external, internal and on the item (if applicable);
(b) Packaging certification;
(c) Labeling as it appears on the packaging, i.e., external, internal and on the item (if applicable);
(d) Any unique identification via imbedded technology such as electronic chips;
(e) Example of all instructions for use and any safety warnings; when applicable, confirm that the instructions for use are also available for all declared means of distribution, sale or use;
(f) State if the packaging and packing method provide mitigation of explosive effects. Provide UN hazard classification test results to support the claim.

6.4.2.2 Markings on the Packaging

Described below are the requirements for markings on an explosive package. The markings must be printed clearly and permanently on the explosive, packaging or label. Note that if a package contains more than one type of explosive, the information for each type of explosive must appear on the package or label.

6.4.2.2.1 Shipping Package

Markings on the case used for transport must include:

(a) Markings required by the *Transportation of Dangerous Goods Regulations* including UN classification, proper shipping name, UN number and labeling;
(b) Product name as it appears on the list of authorized explosives;
(c) A means of permanently marking the external shipping package with the explosive magazine licence number as per the *Explosives Act* and *Regulations* (sections 85 and 104) such as the *magazine ladder* which is now routinely used (this applies to explosives other than fireworks, propellants and safety cartridges);
(d) The name and address of the requester of the authorization as it appears on the list of authorized explosives;
(e) When applicable, the bar code, the date of manufacture and the batch or other manufacturing control information (an applicant may contact the ERD to establish a suitable alternate means that provides the information and/or records needed to reliably provide for the traceability of a product and of product ownership);
(f) Any other requirements set out in the supplementary documents listed in section 3;
(g) When required as a condition of authorization or in accordance with the manufacturer-declared shelf life, mark the *best before date* based on the shelf life when stored in original packaging according to manufacturer's recommendations.

6.4.2.2.2 Other Packaging
When a shipping package contains other packages that may be used for shipping or for display and sale to the public, other requirements may apply.

(a) Shipping
- Markings on all inner packaging or on a label affixed to the inner packaging must be in accordance with section 6.4.2.2.1.

(b) For display and sale to the public
- Markings on all packaging (both inner and outer) or on a label affixed to all packaging (both inner and outer) must contain the following information:
  - The word *explosive*, *fireworks* or *pyrotechnic*, as applicable;
  - The brand or trade name of the explosive as it appears on the list of authorized explosives;
  - The complete hazard classification of the explosive;
  - The name and address of the requester of the authorization as it appears on the list of authorized explosives;
  - Any other requirements set out in the supplementary documents listed in section 3.

6.4.2.3 Markings on the Explosive
The following information must appear on the explosive or on a label affixed to the explosive:

(a) The name and address of the requester of the authorization as it appears on the list of authorized explosives;
(b) The brand or trade name of the explosive as it appears on the list of authorized explosives;
(c) The safety instructions for the explosive. Instructions must describe how the explosive is to be used for proper function and define any adverse behavior or any deterioration - loss of function or malfunction (e.g. misfires) that can reasonably occur during use. The user must know what to reasonably expect when used in accordance with the instructions. The proposed safety instructions must indicate the procedures for preventing accidents when handling, storing or using the explosive. Manuals may be needed for some complicated devices and advanced systems. Instructions or manuals must contain sufficient information in order to allow the user to apply the system correctly, safely and effectively.
(d) Whenever possible, the words *Explosif-Danger-Explosive* should be written on the explosive. The word *explosive* shall be replaced by the word *fireworks* in the case of fireworks. A bomb-burst logo may also be used for smaller articles.
(e) Some instructions regarding the safe disposal of the explosive and packaging may be provided or be limited to a directive such as "*Consult the manufacturer for safe disposal of the explosive"*.
(f) Any other requirements set out in the supplementary documents listed in section 3.

The CIE may require that the markings or safety instructions include additional information respecting identification of the explosive, safety instructions or the safe use of the explosive.

6.5 Manufacturer Product Scope Declaration

6.5.1 Scope of the Explosive
The applicant must provide a short description of the explosive and its method of function. In addition, he must specify what the scope or the intended use of the explosive is.

6.5.2 Reliability Statement
In order to demonstrate the reliability of an explosive, the applicant should provide a summary of the test results obtained during the development work and/or the commercialization of the product.

6.6 Intended Distribution

6.6.1 Means of Distribution
Describe how the explosive is intended to be distributed. If applicable, describe how less than full case quantities will be sold and distributed; that is, describe what viable options are available to end users for compliance with the *Transportation of Dangerous Goods Regulations* and for receipt of specialized use instructions such as specialized boxes, internal packaging(s) suitable for shipping, etc.

This is required so that the appropriate UN transport hazard classification is assigned, i.e., a transport hazard classification for part cases or perhaps for internal packages designed for use as shipping containers that may be different from the shipping container.

6.7 Hazard Classification for Transport

Every explosive authorized in Canada is assigned a hazard classification for transport.

6.7.1 Foreign Approvals

If available, provide the hazard classification information as per the *UN Recommendations for the Transportation of Dangerous Goods*, i.e.:

(a) Certificate or a letter from a national competent authority recommending a hazard classification for transport;
(b) Test results from a competent authority or a statement that the classification was based analogously to previous test results for a similar product;
(c) The national competent authority test history for the product in question with the date, test agency, test results and resulting hazard classification.

Note that competent authority test reports are required for all 1.4 hazard classifications.

In addition, manufacturer-supplied test results as well as any statistical analysis performed on the results are useful to demonstrate normal or aberrant test behavior.

Refer to section 6.7.2 of this document if the information listed above is not available.

6.7.2 Domestic Approvals

State the expected hazard classification for transport and explain the reason for this expectation, e.g. shipping mode, freight cost, and compatibility issues. Indicate willingness to proceed with hazard classification testing and incur test costs. Without the hazard classification testing, give the expected worst-case classification.

If a default classification is used, the most stringent will apply provided the outcome of UN Series 3 and 4 are either known or can be deducted from the known information. If this outcome is unknown, Series 3 and perhaps Series 4 must be conducted.

7. PRODUCT TESTING

The ERD will review the technical documentation submitted by the applicant to confirm compliance with Canadian requirements. If necessary, a test plan will be developed by the CERL outlining the sample requirements and the need for any additional or supplementary test documentation.

Testing is carried out to ensure that the explosive may be safely made (applicable to Canadian

manufacturers), handled, stored, transported and used. Additionally, testing is carried out to classify a product whether for transportation purposes (UN Class 1) or for manufacturing or storage purposes.

The manufacturer may demonstrate that the product complies with the test requirements by providing test documentation and/or by submitting the product(s) for testing. The required test data may include information from sources such as the manufacturer, a commercial test agency, or a national competent authority test agency including the CERL.

The following describes the general principles for testing. The details are found in the individual standards for each type of explosive (section 3 above). These standards specify the test data, test methods and test criteria. In addition to the specified test methods, the ERD may require that other tests be done to judge the performance and safety of new or unusual products or systems.

7.1 Scope of Product Testing
Explosives are tested to confirm their suitability for authorization. The test results will support the authorization decision. A product may be submitted for testing only by prior written approval from the ERD and the CERL.

7.2 Sampling
Refer to paragraph 5.5 of this document for more details on the sampling of a submission for testing.

7.3 Special Product Application
When the product is intended for special applications or use in difficult environments, additional tests may be required. The applicant must show the suitability of the product for use in these special situations or hazardous environments such as coal mines where methane gas or coal dust could ignite.

This may also apply for products to be used in new applications not previously envisaged. Such cases may involve developing tests to show suitability.

7.4 Testing by the Manufacturer
As mentioned in section 5.6, not all testing can or need be done at the CERL. When the CERL cannot perform a required test, the work may be subcontracted. Where key safety issues may be involved and in order to confirm results, the CERL may go witness the tests and the clients would pay the costs incurred.

7.4.1 Field Testing and Field Use Experience
Field test results in Canada or abroad provide supporting evidence that a product is fit for use. When available, a summary of the field test and the results obtained must be provided with the authorization application.

This summary and supporting information will be used to evaluate which category of authorization is appropriate for a product and system. For example, products having extensive satisfactory test and commercial use experience are much more likely to be considered for authorization for an indefinite period than products with only test experience and no commercial experience. Similarly, prototype products and systems with no field use might only be considered for provisional authorization for a specified period and then only when submitted by companies known to the ERD and known to have an established product development protocol which demonstrates reliability before actual field trials and results are available.

Submissions requesting authorization for an indefinite or specified period should summarize field use results such as:

(a) details of usage including reports of all observed successes, problems and misfires as well as any findings, corrective actions and recommendations for use;
(b) statistics based on use that demonstrate the safety and reliability of the product and system;
(c) any incident, accident or unusual occurrence associated with use and a list of the corrective actions taken to prevent re-occurrence.

7.4.2 Development Testing

When little or no usage data is available, or when field-test data is unavailable, prototype products or new products similar to those already authorized by a company may only be considered for provisional authorization for a specified period. The conditions and the time given for testing are based on factors such as:

(a) Is the product and system similar to current company products or is it based on a new technology?
(b) Is the company known to the ERD and known to have an established product development protocol that demonstrates reliability before actual field trials and for which results are available, and that also defines probability for normal and aberrant test behavior?

Submissions granted provisional authorization for a specified period would be expected to generate similar information to that described in section 7.4.1.

7.4.3 Test Equivalency

When no test method is specified in the supplementary documents, another test may be proposed. If available, the information needed to support its adoption should be provided.

Alternately, if a test history provides similar information or when analogous results to the specified requisites are available, the applicant must state so and explain why the two test methods are equivalent.

7.4.4 Format of Test Documentation

The test documentation must include some test data and a description of the test methodology including the title, objective and test method. The test method must include the following: scope of the test, equipment, sample, procedure, tolerances, standard test conditions and the criteria used to evaluate the attribute(s) including the number of tests to be performed.

7.5 Test Elements and Methods

Testing described in the supplementary documents may fall into one or more of the following elements:

(a) UN hazard classification testing
- This covers the process and testing needed to assign a hazard classification to an explosive in accordance with the *UN Recommendations for the Transportation of Dangerous Goods*.

(b) Function testing
- This element covers function testing of the explosive in accordance with the manufacturer's recommendations. It is performed in order to demonstrate the safety and reliability of a product.

(c) Shelf life and environmental exposure
- Following exposure to the specified environmental effect, this demonstrates the safety and reliability of explosives after storage and use. This test is required for products whose function may be compromised by time or environment.

(d) Sensitiveness to energy input (impact, friction, heat and electrostatic discharge)
- Sensitivity to energy such as impact, heat and friction is part of the UN testing scheme and required to allow transportation. These tests may also be called for in certain cases such as for manufacture.

(e) Description and physical properties
- The manufacturer will be asked to provide physical characteristics of the explosive such as dimensions, melting points, etc. Any sample received at CERL will be assessed against the manufacturer's technical declaration.

(f) Other tests (abuse testing, 1 m drop test, etc.)
- For example, consumer fireworks are subjected to abuse after which function is evaluated to show that some abuse (which could be expected in the course of shipping) does not compromise safe operation.
- As required, specific tests will be called for including fume classification, RF sensitivity for detonators, gallery tests for permitted explosives and any other tests that the CIE might require.

8. TEST RESULTS AND ACCEPTANCE CRITERIA

Following testing and review of the laboratory report from the CERL, the ERD decides to accept or reject the authorization request and sends written confirmation of the authorization decision to the applicant. The certificate of authorization specifies the conditions under which the explosives may be used. If approval is granted, the explosives are added to the list of authorized explosives. The process leading to classification parallels the authorization process.

8.1 Test Criteria

The defects and failures noted during the testing phase can be rated as minor, major or critical.

A minor failure is a defect that is not likely to reduce materially the usability of the considered product for its intended purpose or that its departure from specifications has little bearing on the effective use or operation of the product. Examples of minor defects are the product labeling, a misfire of one single detonator in a blast, etc.

A major failure is a defect that is likely to result in failure or to reduce materially the usability of the considered product for its intended purpose. The misfire of more than one detonator in a blast is an example of a major failure. A critical failure is a defect that, according to judgement and experience and depending upon the considered product, is likely to result in hazardous or unsafe conditions to individuals or public during its use, handling, transport or storage. A critical defect is also likely to prevent performance of function.

8.2 Acceptance Criteria

Testing of an explosive will be evaluated based on the detailed criteria of each type of explosive (section 3 above). The minimum requirements are:

(a) The product or the system must be robust and must comply with the test requirements;
(b) The safety and security of a product or a system must not be compromised in any way; and,
(c) The product or the system must function as stated and described by the manufacturer.