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Guidelines for Authorization of Type F Fireworks, Special Effect Pyrotechnics, Fireworks Accessories and Novelty Devices

Explosives Regulatory Division
Geosciences and Earth Monitoring Sector
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Guidelines for Authorization of Type F Fireworks, Special Effect Pyrotechnics, Fireworks Accessories and Novelty Devices

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1 Introduction

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

As per section 11 of the Regulations, a person may carry out an activity involving explosives only if the explosives have been authorized by the Chief Inspector of Explosives (CIE). As per sections 32 and 33 of the Regulations, the CIE must authorize the use of an explosive if the CIE determines that the explosive can be safely manufactured, handled, stored, transported, used and destroyed.

An explosive may be authorized for an indefinite period or for a specified period.

An authorization for an indefinite period is issued if the explosive is intended to be used in ongoing or recurring activities. The authorization may be issued with restrictions. In accordance with section 32 of the Regulations, the CIE must authorize the use of an explosive if they determine, on the basis of the results of testing this explosive or a similar explosive, that the explosive can be safely manufactured, handled, stored, transported, used and destroyed. Once a product is authorized, the item is added to the list of authorized explosives that is published on NRCan's web site.

An authorization for a specified period is issued if the explosive is intended to be used for a specific purpose within a specified period (for example, a chemical analysis, a product trial, scientific research or a special event, tour or international competition involving fireworks).

2 Purpose and Scope

This document was developed to inform ERD's stakeholders how to achieve compliance with relevant provisions in the Regulations regarding the authorization of fireworks. It describes the process for the authorization and classification of fireworks in Canada.

Information in this document sets out authorization criteria for the following types of explosives:

- F.1 - Consumer Fireworks - low-hazard fireworks used for entertainment purposes, such as cakes, fountains, wheels, roman candles, and mines.
- F.2 - Display Fireworks - high-hazard fireworks that are intended for use in fireworks displays, such as aerial shells, cakes, large roman candles and firecrackers.
- F.3 - Special Effect Pyrotechnics - effects, such as gerbs, mines, comets and airbursts used in the entertainment industry for stage and film.
- F.4 - Fireworks Accessories - accessories that are used with display fireworks and special effect pyrotechnics, such as electric matches.
- F.5 - Novelty Devices – very low-hazard effects that contain small amounts of pyrotechnics that produce limited visible or audible effects and are considered a lower hazard than the category of consumer fireworks, such as sparklers.

3 Prohibited Fireworks

Certain firework articles are considered by the CIE to be unsafe because they cannot be safely manufactured, handled, stored, transported, used or destroyed. Fireworks will not be considered for authorization if they are:

- Designed to be hand-held, except sparklers and hand-held fountains.
- Self-propelled from the ground and rising in the air with unpredictable flight paths or moving erratically.
- Excessively violent or have a history of injuries.
- Not properly labelled.
- Trick or joke devices.

The following are examples of fireworks which would not be suitable for authorization:

- *Auto-Foolers*: Articles designed as a burglar alarm. When wired to the ignition system of a car, they operate with a loud screeching whistle followed by copious amounts of thick smoke, with or without an explosion. These articles can cause fires within the engine compartment.
- *Blaster Balls*: They are solid substrate balls coated with a pyrotechnic composition such that when two balls are struck together there is an ignition at the point of contact resulting in a low level noise.
- *Cherry Bombs, M-80 and Silver Salutes, Flash Crackers*: These are very violent firecrackers that often contain excessive charge mass and/or hazardous fireworks compositions.
- *Cigarette Loads*: Small charges designed for insertion into the end of a cigarette or a cigar. When the heat from the embers reaches the charge, it explodes, ejects sparks, gives off obnoxious fumes, or creates "snow."
- *Exploding or Smoking Golf Balls*: These are designed to look like golf balls. When impacted they either explode or emit copious amounts of coloured smoke generated by a pyrotechnic reaction.
- *Parachute Shells*: Night-time parachute shells are not allowed due to their unpredictable paths. Daytime parachute shells displaying logos, banners and the like may be considered.
- *Rockets*: These have unpredictable paths and, in the case of rockets with a stick, they have been the cause of injuries when the guiding stick fell back to the ground.
- *Stink or Smoke Bombs*: These articles are designed to resemble other fireworks, most often cherry bombs or salutes. They release a stench or coloured smoke, or both.
- *Table or Bottle Rockets*: Small tubes or "rockets" with propelling charges that are secured to a stick. When lit they rise out of the neck of a bottle, or from a pipe or a tabletop.
- *Tear Gas Pens and Launchers*: These can resemble a pen and may contain a mechanism activated by an explosive. They are marketed as protection against muggers but may be used as an offensive weapon or as a practical joke.
- *Trick Matches*: These resemble ordinary book matches or boxed matches, but are designed to produce various effects when lit, including explosion, sparking, foul odour, snow, etc.

4 Application for Authorization for an Indefinite Period

This section describes the information required to be submitted in a new application for authorization for an indefinite period using the electronic License Management System (eLMS) on ERD's website.

4.1 Period of Authorization

Authorization for indefinite period is selected if the firework is intended to be used in ongoing or recurring activities.

If the firework is intended to be used in a special event, tour or international fireworks competition, refer to Section 11 of this document for application requirements as they differ from the application requirements for authorization for an indefinite period.

4.2 Manufacturer Information

The following information for the manufacturer is required:

- Manufacturer name;
- Contact name;
- Email address; and
- Address of factory.

If the applicant is not the manufacturer of the fireworks, the applicant must have written permission from the manufacturer to act on their behalf in Canada. This document must be submitted in the application.

An application for an indefinite period of authorization can only contain fireworks made by one manufacturer.

4.3 Type of Fireworks

The applicant must specify the type of fireworks:

- F.1 Consumer Fireworks
- F.2 Display Fireworks
- F.3 Special Effect Pyrotechnics
- F.4 Fireworks Accessories
- F.5 Novelty Devices

4.4 Transport Classification

The applicant must specify the expected UN number for each article. Classification for transport will be assigned through one or a combination of the following methods:

- Testing;
- Analogy to existing products;
- On the basis of the UN default fireworks classification table; or
- In the case of imported articles, by acceptance of a classification assigned by a competent authority in the country of origin.

When possible, the applicant for products manufactured abroad should provide a certificate of transport classification from a competent authority of the country of origin. If the firework is not classified as per the UN default classification table, the certificate/letter of classification should be supported by test results. If a certificate/letter of classification is not available, the default classification will be the basis for

that classification, in addition to other considerations in this guideline. Classification testing may be conducted at the Canadian Explosives Research Laboratory (CERL) at the request of the applicant or as required.

Transport classification based on testing is the preferred approach. However, it is recognized that not all fireworks may be tested. Assignment of fireworks to UN Nos 0333, 0334, 0335 or 0336 may also be made on the basis of analogy without the need of testing in accordance with the default fireworks classification table in Section 2.1.3.5.5 of the UN Model Regulations regarding the transport of dangerous goods. When an applicant prefers a more favorable classification, they have the option of testing.

In accordance with the latest revised edition of the United Nations *Recommendations on the Transport of Dangerous Goods – Model Regulations*, fireworks may be classified as follows:

TYPE	Shipping Name	UN Number	Classification
Type F.1	FIREWORKS	0336	1.4G
Type F.1	FIREWORKS	0337	1.4S
Type F.2	FIREWORKS	0333	1.1G
Type F.2	FIREWORKS	0334	1.2G
Type F.2	FIREWORKS	0335	1.3G
Type F.3	ARTICLES, PYROTECHNIC	0431	1.4G
Type F.3	ARTICLES, PYROTECHNIC	0432	1.4S
Type F.4	IGNITERS	0454	1.4S
Type F.4	IGNITERS	0325	1.4G
Type F.5	FIREWORKS	0336	1.4G
Type F.5	FIREWORKS	0337	1.4S

Note that a firework could be classified as Type F.2 because of its intended use but assigned a transport classification normally used for Type F.1.

4.5 Intended use

Articles can be authorized for a variety of reasons. However, for articles that will be authorized for an indefinite period, the intended use is considered “commercial”.

4.5.1 Restrictions

A type F.3 special effect pyrotechnic may be identified as suitable to be used unsupervised by a holder of a fireworks operator certificate – Pyrotechnician. For more details, refer to section 7.3.

4.6 List of Articles

A product name (or product code) must be submitted for each article.

4.7 Required Technical Documents

4.7.1 Technical Drawings

A technical drawing of the article is required. This drawing of the article, prepared to scale, sets out its dimensions with tolerances, its components, and the materials of its construction. If the same construction is used for different sizes or colours, then one drawing may be used to represent the different articles. Ensure to date all documentation.

4.7.1.1 Tolerances on Dimensions

The tolerances on dimensions must be declared by the manufacturer. They should be set so as not to interfere with proper function and should not be greater than $\pm 25\%$ of the nominal dimensions. Where a maximum or a minimum size of a fireworks article is specified in these guidelines, it represents the limit of the tolerance range.

For example, if the maximum diameter of a Roman candle (consumer firework) is specified as 22 mm in these guidelines, that number should be considered by the applicant when stating tolerances. A diameter described as $22 \text{ mm} \pm 10\%$ would not be acceptable, since it means that diameters larger than 22 mm may be found.

4.7.2 Chemical Composition

The chemical composition of all explosive components must be given. This can be provided on the technical drawing, or a reference may be made on the drawing to a table of compositions.

Compositions must list all ingredients used and must give the percentages and the tolerances for each. The ingredients should be listed by their chemical names wherever possible. Generic names should be used only when the ingredient is best known by the generic name. All ingredients declared must be present in the fireworks. Ingredients not declared must not be present in the fireworks.

If an effect is composed of more than one composition, the manufacturer needs to provide the ingredients information for each composition used in the construction of the effect, e.g., ignition composition and colour composition for a primed star.

Chemical stability is a chief consideration for authorization. The chemicals listed in section 4.7.2.3 are known as components of stable fireworks. It is recognized that not all articles submitted for authorization can be sampled to prove their stability. Samples will be typically requested for any chemicals other than those listed in section 4.7.2.3 or if unusual combinations of chemicals are presented.

4.7.2.1 Flash Composition

Flash composition refers to pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks that are used to produce an aural effect or used as a bursting charge, or propellant charge

unless the time taken for the pressure rise is demonstrated to be more than 6 ms for 0.5 g of pyrotechnic substance in the HSL Flash Composition Test or the pyrotechnic substance gives a negative results in the US Flash Composition Test (Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, 19th revised edition).

4.7.2.2 Tolerances on Chemicals

Tolerances on chemicals should be less than $\pm 20\%$ of the quantity for any component that represents less than 25% of the composition, and $\pm 10\%$ of the quantity for any component that represents 25% or more of the composition.

For example, if the quantity is 30%, and 10% of 30% is 3%, then the quantity and tolerance are specified as $30\% \pm 3\%$; if the quantity is 10%, and 20% of 10% is 2%, then the quantity and tolerance are specified as $10 \pm 2\%$. Applicants may use more stringent tolerances.

4.7.2.3 List of Standard Chemicals in Fireworks

- aluminum;
- ammonium perchlorate;
- antimony;
- antimony sulphide;
- barium carbonate;
- barium nitrate;
- barium sulphate;
- bismuth oxide;
- boric acid;
- calcium carbonate;
- calcium sulphate;
- carbon or charcoal;
- copper;
- copper oxide;
- dextrine;
- hexamethylenetetramine;
- iron and iron alloys (ferro-titanium);
- iron oxide;
- magnalium;
- magnesium;
- magnesium carbonate;
- magnesium sulphate;
- nitrocellulose-based lacquers;
- red phosphorus (toy pistol caps only);
- potassium or sodium benzoate;
- potassium hydrogen phthalate;
- potassium nitrate;
- potassium perchlorate;
- potassium sulphate;
- potassium teraphthalate;

- sodium bicarbonate;
- sodium nitrate;
- sodium salicylate;
- sodium sulphate;
- strontium carbonate;
- strontium nitrate;
- strontium sulphate;
- sulfur; and,
- titanium (mesh greater than 100).

Organic compounds (lactose, shellac, red gum, chlorinated paraffin and PVC B consisting of some combination of carbon with hydrogen, oxygen and/or chlorine and nitrogen) may be present if they account for less than 10% mass/mass of the compound.

4.7.2.4 List of Chemicals Normally Precluding Authorization

- arsenic compounds - poisons;
 - boron - readily oxidizable;
 - chlorates with sulfur, sulfides, ammonium salts, elemental metals (such as magnesium, aluminum, copper) or soluble copper salts - such mixtures are friction-sensitive and liable to spontaneous combustion;
 - chromium and chromium compounds;
 - gallates or gallic acid - incompatible with many chemicals;
 - lead and lead compounds or salts - poisons;
 - mercury compounds - poisons;
 - phosphorus, except for red phosphorus in toy pistol caps;
 - picric acid and picrates - incompatible with many chemicals;
 - thiocyanates, except for snakes - explosively oxidizable;
 - zirconium - explosively oxidizable;
 - hexachlorobenzene (C₆Cl₆) (Chemical Abstracts Service (CAS) No. 118-74-1); and,
- any carcinogenic chemicals.

4.7.3 Safety Data Sheets

The applicant should provide a copy of the Safety Data Sheet for any ingredients that are not listed in the list of standard chemicals.

4.7.4 Net Explosives Charge Mass and Gross Mass

The net explosive charge mass of all explosive components, gross mass of the article, and tolerances are required. For multi-tube articles, the fusing pattern and the charge mass of each individual explosive component in each individual tube must be clearly indicated on the drawing.

4.7.4.1 Tolerances on Charge Mass

If a maximum charge mass is specified in these guidelines, it represents the maximum of the tolerance range. Otherwise, the following Table applies to charge masses:

Charge Mass	Tolerance
< 10 g	±25 %
≥ 10 g	±10 %

4.7.4.2 Tolerances on Gross Mass

±25 % tolerance applies to gross mass.

4.7.5 Packaging, Labelling and Safety Instructions

The following packaging and labelling information are required:

- Packaging description - a description of any packaging or container in which the explosive will be handled, used, stored, or displayed for sale.
- Packaging transportation description - a description of the packaging or container in which the explosive will be transported and stored, and the safety standards to which the packaging or container must conform under the *Transportation of Dangerous Goods Act, 1992*
- Printed information on the explosive and its packaging - the information that will be printed on the explosive and its packaging. As prescribed by Parts 3, 4 and 5 of the *Explosives Regulations, 2013*, it is the name and address of the holder of the authorization that appears on the list of authorized explosives, that must be printed on the packaging and on the article. The information must be:
 - a) legibly printed on the explosive;
 - b) legibly printed on a label affixed to the explosive, if it is not possible to comply with paragraph (a).
 - c) is contained in a barcode or matrix code that is printed on the explosive, or on a label affixed to it, and can be read by a device that is available to the general public (for example, a smartphone), if it is not possible to comply with paragraph (a) and (b); or
 - d) legibly printed on the packaging containing the explosive or on a label affixed to the packaging, if it is not possible to comply with paragraphs (a) to (c).
- Safety instructions in both official languages - the safety instructions, in both official languages (English and French), that are to accompany the explosive, including procedures for preventing accidents when handling, storing, using, or destroying the explosive and the procedures to follow if the explosive is lost or stolen.

More details on the labels and markings for specific categories are available in the sections for general and specific criteria for each type of fireworks article.

Where fireworks that are too small to carry all markings are to be sold to the end user without the factory packaging, they should carry the most important safety messages appropriate to their mode of functioning and satisfactory to the CIE.

Every firework component ejected from a tube (e.g., small effects, whistles, etc.) must carry the following label: "Explosives - Danger – Explosifs".

Consumer fireworks (Type F.1) and Novelty Devices (Type F.5) must also conform to the *Consumer Packaging and Labelling Regulations*.

4.8 Sampling of a Submission

Samples may be required for testing. If samples are tested, the acceptance of the submission will be based on the behaviour of the sample.

Sampling will be at the discretion of the ERD and may depend on previous test results, the history of complaints, the availability of articles from the same manufacturer to use as analogies, or the time elapsed since articles from the manufacturer were last tested.

Samples selected for testing must be transported to NRCAN in packaging compliant with the standard, CAN/CGSB-43.151, *Packaging, handling, offering for transport and transport of Explosives (Class 1)* or equivalent document and labelled in accordance with sections 47 or 74 of the Regulations.

4.9 Authorization by Analogy

New articles may be authorized on the basis of tests that were conducted on similar articles.

When applying for an authorization by analogy, the applicant must submit all the necessary documentation required for an application for a new authorization and a written request for analogy which includes a reference to a specific authorized explosive to which this new article is analogous, a list of the laboratory reports from NRCAN (CIE #) with the date on which they were issued, and a reference to the category of fireworks, i.e. Roman candles, cakes, etc.

5 Criteria for Consumer Fireworks (Type F.1)

Applications will be evaluated against the following general and specific criteria to determine that the consumer firework can be safely manufactured, handled, stored, transported, used and destroyed in Canada.

5.1 General Criteria

ITEM	CHARACTERISTIC	GENERAL CRITERIA
5.1.1	Shipping Packaging	Packaging must comply with the <i>Transportation of Dangerous Goods Act</i> and <i>Regulations</i> and the standards referred to therein.
5.1.2	Marking of Shipping Packaging	Markings on the case used for transport: - UN classification - Proper UN shipping name - UN number - Dangerous goods safety marks - Type F.1 - Product name - Name and address of the holder of the authorization - Packaging registration number
5.1.3	Condition of Shipping Packaging	Loose composition is not permitted in packaging (C) .
5.1.4	Labelling of Articles	The following information to be legibly printed on the firework or a label affixed to the firework: - Type F.1 - Product name - Name and address of the holder of the authorization - Instructions for use and safety warnings in both English and French (refer to section 5.2 for specific cautionary wording) - Maximum height of the effect - Safe separation distance for spectators (The separation distance must be at least twice the height of the effects for straight articles and two and a half times the height of the effects for angled articles.) - For angled articles, an arrow indicating the direction of the effect/fire/flame - Date of its manufacture and the shift during which it was manufactured, if any, or its lot number It is important to ensure all the information required to use the firework safely is readily accessible to the user. If the firework is too small and it is not possible to print all the information on the explosive or a label affixed to the fireworks, information

		may be contained in a barcode or matrix code that is printed on the explosive, or on a label affixed to it, and can be read by a device that is available to the general public. If a barcode or matrix code is not used, the information may be printed on the packaging of the fireworks or on a label affixed to the packaging.
5.1.5	Labels on Ejected Articles	Ejected components must carry the label " <i>Explosives - Danger – Explosifs</i> ". This label must remain attached to the tube or shell after firing (C) .
5.1.6	Construction of Articles	Articles must not: - Contain metal, such as staples or wire, or hard plastic, which could be a possible missile hazard when fired or in the event of a malfunction (C) - Be a missile hazard when functioned or malfunctioned (C) - Have pyrotechnic powder falling out of the casing (C) - Contain loose pyrotechnic powder in an unintended part of the article (C) - Be damaged through normal shipping and handling - Show signs of breaking or cracking in the casing or composition - Be constructed so that any rolled paper tubes allow the composition to migrate under the inner layer of paper - Have secondary components that are easily removable from any tubes
5.1.7	Bases and Spikes	When present, bases and spikes must not: - Become detached or unsecured during handling (C) When present, the base must not: - allow the article to topple over when tilted to 12° (C)
5.1.8	Main Fuse	Main fuse must be: - Present on all categories of consumer fireworks (C) - Visible (C) - Permanently and securely attached (C) - Covered with a fuse cover to protect the fuse from ignition - Igniter cord, safety fuse or fuse encased in plastic tubing (C) Fusing must provide a reliable ignition (C) . The fuse burning time from the ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds. Main fuse must not be primed with an electric match.

5.1.9	Interconnecting fuse	Interconnecting fuse must: - Be covered in a manner that prevents accidental or unintentional ignition (C) - Be securely attached (C) - Provide proper firing sequence
5.1.10	Function	Articles must: - Function as described on the label - Function in a safe, reliable, reproducible and predictable manner (C) Articles must not: - Project effects or burning debris on the ground more than 5 m from the article (C) - Topple over before the last effect has functioned (C) - Have a delay between visible or audible effects of more than 5 s (C) - Bulge, shatter, rupture or burn through the case and/or closures unless designed to do so (C) - Have a base or spike that comes loose during functioning (C) - Burn after function is complete (C) - Have unconsumed pyrotechnic composition after functioning (C) - Have loose plugs after functioning (for tubes having plugs at the base) - Explode (unless designed to do so) (C) - Have a noise level higher than 140 dB (AI) within a 5-m radius (C)
5.1.11	Height	Minimum heights: - Articles with reports containing more than 130 mg of flash composition or more than 500 mg of black powder must function at a minimum height of 10 m. - Shells or colour effects must function at a minimum height of 10 m.
5.1.12	Charge Mass and Gross Mass	The charge mass and gross mass measured during testing must be consistent and within tolerances as declared in the technical declaration submitted by the applicant.
5.1.13	Stability	All units subject to stability testing (75°C for 48 h) must pass (C) .

5.1.14	Chemical Analysis	All chemical ingredients as declared in the application must be present. The following discrepancies are not permitted: - Detection of more than 0.5% of a component not present in the declaration - Non-detection of a component present in the declaration - Detection of over 200% for components specified as under 25% in the declaration (C) - Detection of over 150% for other components specified as 25% or over in the declaration (C) - Detection of under 50% for components specified as over 10% in the declaration (C) - Detection of a chemical or combination of chemicals listed in section 4.7.2.4 (C)
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5.2 Specific Criteria

5.2.1 Battery/Combination

Battery/Combinations consist of a rapidly fired sequence of aerial or low-level fireworks with one or two points of ignition. It is an assembly including several elements either containing the same category or several categories each corresponding to one of the following: Roman candles, mines, fountains, flares or ground whistles.

Item	Characteristic	Barrage Criteria
5.2.1.1	Construction	- Up to 7 tubes per article - Wires tying tubes together or to a support are not permitted - Maximum 15° angle from the vertical - Tubes are constructed as per the criteria for roman candles, mines, fountains, flares or ground whistles
5.2.1.2	Charge Mass	<u>Article:</u> - Total pyrotechnic composition: no more than 300 g - Total flash composition permitted per article: no more than 5% of the total charge mass <u>Aerial whistle:</u> - No more than 3 g/whistle - Articles with more than one (1) aerial whistle may be subjected to a crush/violence test. <u>Aerial whistle with report at the end of the whistle:</u> - No more than 1 aerial whistle with report per tube - No more than 800 mg of flash composition/report or no more than 2 g black powder/report <u>Report:</u>

Item	Characteristic	Barrage Criteria
		- No more than 1 report/tube: no more than 800 mg flash composition/report or no more than 2 g black powder/report - If more than 1 report/article: no more than 130 mg flash composition/report or no more than 500 mg black powder/report - Total report composition for articles with multiple report tubes: no more than 5% flash composition or no more than 4 g black powder <u>Small effect:</u> - no more than 8 g total pyrotechnic composition/small effect
5.2.1.3	Function	Articles must not: - Enhance any hazard expected from individual components (C) - Tip over as a result of function (C)
5.2.1.4	Labels	- All general labelling requirements outlined in section 5.1 - Labels should be as per the category of articles used, i.e., Roman candles, mines, fountains, flares or ground whistles. Refer to these sections for an example of the labelling. - For angled articles, an arrow indicating the direction of the effect/fire/flame

5.2.2 Cakes

Cakes are fireworks devices consisting of 8 to 100 small-diameter cylindrical tubes that are chain-fused to fire in sequence after a single ignition. These items discharge projectiles such as stars, comets, mines, aerial whistles or small effects into the air. Roman candles, ground whistles and shells are not permitted in cake.

Item	Characteristic	Cake Criteria
5.2.2.1	Construction	- Between 8 and 100 tubes per article - Wires tying tubes together or to a support are not permitted - Maximum 15° angle from the vertical - Tube diameter: no more than 22 mm
5.2.2.2	Charge Mass	<u>Article:</u> - Total pyrotechnic composition: no more than 300 g - Total flash composition permitted per article: no more than 5% of the total charge mass <u>Aerial whistle:</u> - no more than 1 aerial whistle/tube - no more than 3 g/whistle - Articles with more than one (1) aerial whistle may be subjected to a crush/violence test. <u>Aerial whistle with report at the end of the whistle:</u> - no more than 1 aerial whistle with report per tube

Item	Characteristic	Cake Criteria
		- no more than 800 mg of flash composition/report or no more than 2 g black powder/report <u>Report:</u> - no more than 1 report/tube (no more than 800 mg flash composition/report or no more than 2 g black powder/report) - If more than 1 report/article: no more than 130 mg flash composition/report or no more than 500 mg black powder/report - Total report composition for articles with multiple report tubes: no more than 5% flash composition or no more than 4 g black powder <u>Small effect:</u> - no more than 8 g total pyrotechnic composition/small effect
5.2.2.3	Function	Articles must not: Enhance any hazard expected from individual components
5.2.2.4	Labels	- All general labelling requirements outlined in section 5.1 - The warning on the cake should indicate which types of effects are projected from the article (e.g., if the cake projects whistles and comets, the warning should say "Shoots Flaming Balls and Whistles / Lance des boules enflammées et des sifflets.") - For angled articles, an arrow indicating the direction of the effect/fire/flame

5.2.3 Flares

Ground-level firework that consists of a thin-walled cylindrical tube into which a pyrotechnic composition is pressed or cast. While burning, the pyrotechnic composition produces a hot bright-coloured flame. The tube may burn away with the composition.

Item	Characteristic	Flare Criteria
5.2.3.1	Charge Mass	Total pyrotechnic composition: no more than 150 g
5.2.3.2	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS FLAMES. For use by adults. For outdoor use only. Do not hold in hand. Place upright on level ground (for flares with base) or stick firmly upright in ground (for flares without bases). Light fuse and stand clear. - MISE EN GARDE : ÉMET DES FLAMME. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit à plat (pour les fusées comportant une base) ou bien enfoncer en position verticale dans le sol (pour les fusées sans base). Allumer la mèche et se tenir à l'écart.

5.2.4 Fountains

Ground piece fireworks that are filled with pyrotechnic composition and usually have a choke or restricted orifice. When ignited, it projects a jet or broad spray of fire and sparks. Fountains may contain microstars.

Item	Characteristic	Fountain Criteria
5.2.4.1	Charge Mass	- Cone shape: no more than 50 g - Cylindrical shape: no more than 75 g
5.2.4.2	Function	Article with a base and cone fountains must not topple over when tilted to 12° (C)
5.2.4.3	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS SHOWER OF SPARKS. Height of effects is: X m. Spectators must be at a distance of at least 2X m. Choose a wide, clear site away from all obstacles. For use by adults. For outdoor use only. Do not hold in hand. Place on level surface or partially bury (no spikes) or stick firmly upright in ground (with spikes). Light fuse and stand clear. - MISE EN GARDE : ÉMET UNE PLUIE D'ÉTINCELLES. Hauteur des effets : X m. Les spectateurs doivent être au moins à une distance de 2X m. Choisir un emplacement bien dégagé, loin de tout obstacle. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer sur le sol à un endroit à plat ou enterrer partiellement (sans pieu) ou bien enfoncer en position verticale dans le sol (avec pieux). Allumer la mèche et se tenir à l'écart.

5.2.5 Ground Whistles

A ground-level device that produces a whistling sound other than a salute or report by the burning of a pyrotechnic composition. The composition is pressed into a tube and is recessed from the end.

Item	Characteristic	Ground Whistle Criteria
5.2.5.1	Charge Mass	Total pyrotechnic composition: no more than 15 g
5.2.5.2	Function	- The case must stop burning no more than 30 s after functioning has ceased. - Whistles must not be converted into a report after transporting, crushing or rolling 25 kg static pressure.
5.2.5.3	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS A LOUD WHISTLING NOISE. For use by adults. For outdoor use only. Do not hold in hand. Place upright on level ground and assure a vertical position. Light fuse and stand clear. - MISE EN GARDE : ÉMET UN SIFFLEMENTS STRIDENT. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit à plat et s'assurer qu'il reste à la verticale. Allumer la mèche et se tenir à l'écart.

5.2.6 Helicopters

A helicopter is a device containing an attached propeller or blade that spins and rises into the air and may produce a secondary effect while in flight.

Item	Characteristic	Helicopter Criteria
5.2.6.1	Charge Mass	Total pyrotechnic composition: no more than 20 g
5.2.6.2	Function	- Must ascend at least 15 meters (C) - Must have controlled effect dissipation within 5 meters to ensure complete burnout (C) - Must not deviate more than 15 degrees from vertical ascent (C)
5.2.6.3	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS SHOWERS OF SPARKS. For use by adults. For outdoor use only. Do not hold in hand. Place upright on level ground and ensure a vertical position. Light fuse and stand clear. - MISE EN GARDE : ÉMET UNE PLUIE D'ÉTINCELLES. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit à plat et s'assurer qu'il reste à la verticale. Allumer la mèche et se tenir à l'écart.

5.2.7 Mines

Mines are devices designed to project ignited stars and/or effects into the air (upwards). All effects must be ignited at the same time by the lift charge. Mines produce low-level visual effects, such as, but not exclusively, those from stars, tourbillons, firecrackers or whistles, and one or more reports. The effects may be preceded by a fountain and/or flare and/or burning stars.

Item	Characteristic	Mine Criteria
5.2.7.1	Charge Mass	<u>Article:</u> - Lift charge: no more than 10 g - Effect composition: no more than 40 g - Total flash composition permitted per article: no more than 5% of the total charge mass <u>Aerial whistle:</u> - No more than 3 g/whistle, no more than 10 g total whistle composition per article <u>Black powder firecrackers:</u> - No more than 5 g/firecracker, no more than 10 g total firecracker composition per article <u>Report:</u> - If no more than 1 report/article: no more than 800 mg flash composition/report or no more than 2 g black powder/report - If more than 1 report/article: no more than 130 mg flash composition/report or no more than 500 mg black powder/report - Total report composition in an article with multiple reports: no more than 5% flash composition/article or no more than 4 g black powder/article
5.2.7.2	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: ERUPTS THROWING STARS OR FLAMING BALLS. Height of effects is: X m. Spectators must be at least a distance of 2X m. Choose a wide, clear site away from all obstacles. For use by adults. For outdoor use only. Do not hold in hand. Place upright on level ground (with base) or bury one third of its length in sand (without base). Light fuse and stand clear. - MISE EN GARDE : ÉRUPTIONS D'ÉTOILES FILANTES OU DE BOULES DE FEU. Hauteur des effets : X m. Les spectateurs doivent être au moins à une distance de 2X m. Choisir un emplacement bien dégagé, loin de tout obstacle. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit à plat (avec base) ou enterrer au tiers dans du sable (sans base). Allumer la mèche et se tenir à l'écart.

5.2.8 Roman Candles

Roman candles are cylindrical tubes containing a series of pyrotechnic units consisting of alternating pyrotechnic composition, propellant charge and transmitting fuse.

Item	Characteristic	Roman Candle Criteria
5.2.8.1	Construction	- Inside diameter: no more than 22 mm

Item	Characteristic	Roman Candle Criteria
		- Number of shots: not less than 5 - Roman candles must not have a spike.
5.2.8.2	Charge Mass	<u>Article:</u> - Total pyrotechnic composition: no more than 40 g - Total flash composition permitted per article: no more than 5% of the total charge mass <u>Aerial whistle:</u> - No more than 3 g/whistle, no more than 10 g total whistle composition per article - Roman candles with more than one (1) aerial whistle may be subjected to a crush/violence test. <u>Report:</u> - No more than 1 report or tourbillon/article - No more than 800 mg flash composition/report or no more than 2 g black powder/report
5.2.8.3	Function	Articles must have a consistent time interval between the shots
5.2.8.4	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: SHOOTs FLAMING BALLS. Height of effects is: X m. Spectators must be at least a distance of 2X m. Choose a wide, clear site away from all obstacles. For use by adults. For outdoor use only. Do not hold in hand. Bury one half of its length in sand. Light fuse and stand clear. - MISE EN GARDE : LANCE DES BOULES DE FEU. Hauteur des effets : X m. Les spectateurs doivent être au moins à une distance de 2X m. Choisir un emplacement bien dégagé, loin de tout obstacle. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Enterrer à la moitié dans du sable. Allumer la mèche et se tenir à l'écart.

5.2.9 Shot Tubes (pre-loaded mortars)

Shot tubes eject an aerial whistle, comet, report, small effect or small shell.

Item	Characteristic	Shot Tube Criteria
5.2.9.1	Construction	Inside diameter: no more than 50 mm
5.2.9.2	Charge Mass	<u>Article:</u> - Lift charge: no more than 10 g - Total pyrotechnic composition (effects + lift charge): no more than 25 g

Item	Characteristic	Shot Tube Criteria
		- Total flash composition permitted per article: no more than 5% of the total charge mass <u>Aerial whistle:</u> - No more than 3 g/whistle <u>Aerial whistle with report at the end of the whistle:</u> - No more than 800 mg of flash composition/whistle <u>Comet</u> - No more than 1 comet/tube <u>Comet with report</u> - No more than 400 mg of flash composition <u>Report:</u> - If no more than 1 report/article: no more than 800 mg flash composition/report or no more than 2 g black powder/report - If more than 1 report/article: no more than 130 mg flash composition/report or no more than 500 mg black powder/report - Total report composition in an article with multiple reports: no more than 5% flash composition/article or no more than 4 g black powder/article <u>Small effect:</u> - Total pyrotechnic composition in a small effect: no more than 8 g <u>Small shell:</u> - Total pyrotechnic composition (lift charge + shell): no more than 25 g
5.2.9.3	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: SHOOTS A SHELL OR A WHISTLE. Height of effects is: X m. Spectators must be at least a distance of 2X m. Choose a wide, clear site away from all obstacles. For use by adults. For outdoor use only. Do not hold in hand. Place upright on firm, level ground or bury one half of its length in sand. Light fuse and stand clear. - MISE EN GARDE : LANCE UNE BOMBE OU UN SIFFLET. Hauteur des effets : X m. Les spectateurs doivent être au moins à une distance de 2X m. Choisir un emplacement bien dégagé, loin de tout obstacle. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit solide et à plat ou enterrer à la moitié dans du sable. Allumer la mèche et se tenir à l'écart.

5.2.10 Smoke Articles

Smoke articles are devices designed to emit smoke.

Item	Characteristic	Smoke Articles Criteria
5.2.10.1	Construction	Must not have plastic components in contact with the pyrotechnic composition
5.2.10.2	Charge Mass	Total pyrotechnic composition: no more than 100 g
5.2.10.3	Function	Articles must: - Burn smoothly and produce a uniformly fine effect with no slag or other molten particles that are large enough to have the potential to cause burn (C) - Be constructed so that they will neither burst nor produce external flame upon ignition (C)
5.2.10.4	Labels	All general labelling requirements outlined in section 5.1 The primary container: - WARNING: EMITS SMOKE. For use by adults. For outdoor use only. Do not hold in hand. Avoid breathing smoke. Place on ground. Light fuse and stand clear. The duration of the effect is: X. Spectators must be at a distance of at least 5 m. - MISE EN GARDE: ÉMET DE LA FUMÉE. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer sur le sol. Allumer la mèche et se tenir à l'écart. La durée de l'effet est de : X. Les spectateurs doivent être à une distance d'au moins 5 m.

5.2.11 Strobe Pots

Strobe pots are small tubes or end plugs pressed, cast or loaded with strobe composition. They generate a blinking effect where bright flashes of light are produced at fairly regular intervals with relatively complete darkness between flashes.

Item	Characteristic	Strobe Pot Criteria
5.2.11.1	Charge Mass	Total pyrotechnic composition: no more than 40 g
5.2.11.2	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS FLAMES. For use by adults. For outdoor use only. Do not hold in hand. Place upright on firm, level ground (with base) or bury in sand or soil (without base). Light fuse and stand clear. - MISE EN GARDE : ÉMET DES FLAMMES. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Placer verticalement sur le sol à un endroit solide et à plat (avec base) ou enfoncer dans le sable ou dans le sol (sans base). Allumer la mèche et se tenir à l'écart.

5.2.12 Wheels

A revolving firework device fixed by an axle to a post above ground. When ignited, the attached drivers produce thrust, which causes the wheel to spin, producing a pattern of sparks.

Item	Characteristic	Wheels Criteria
5.2.12.1	Construction	<u>Driver:</u> - A driver consists of a strong paper case with a nozzle or choke, charged with a fast-burning pyrotechnic composition. - Pinwheel: - Short length of paper-wrapped composition wound in a spiral around the edge of a circular piece of cardboard or plastic. The centre is secured to a post by a pin. <u>Saxon:</u> - A single driver with a hole in one end through which a nail is secured. The other end has a hole through the side with a fuse. When ignited, the driver rotates around the axis. - Wheel: - One or more drivers arranged on a sturdy support of wood, heavy cardboard, or other appropriate material. The centre has a hole for a nail. <u>Articles must not:</u> - Shoot stars but may eject sparks, microstars or flames - Come loose during functioning (C) - Contain reports (C) <u>Articles must:</u> - Have grommets or otherwise treated hole to assure smooth rotation

Item	Characteristic	Wheels Criteria
		- Be provided with a pin or nail of appropriate diameter; unless the wheel is in a sealed package, the nail shall be firmly affixed to the support - Have a fuse firmly affixed to the support and shall be well insulated to prevent cross-ignition
5.2.12.2	Charge Mass	<u>Article:</u> - Total pyrotechnic composition: no more than 240 g - Total whistle composition per article: no more than 10 g <u>Driver:</u> - No more than 60 g/driver - no more than 5 g whistle composition/driver
5.2.12.3	Function	Wheels must: - Revolve smoothly - Have a stoppage time no more than 5 s - Remain attached to their support - Project sparks no more than 5 m - Not ignite the post to which they are attached - Not contain stars but may contain microstars
5.2.12.4	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS SHOWER OF SPARKS. For use by adults. For outdoor use only. Do not hold in hand. Nail to a post, make sure wheel turns freely. Light fuse and stand clear. - MISE EN GARDE : ÉMET UNE PLUIE D'ÉTINCELLES. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Clouer à un poteau et s'assurer que la roue tourne librement. Allumer la mèche et se tenir à l'écart.

5.3 Sampling

5.3.1 Sampling of a Submission with One Article

If an individual article is submitted for authorization, the article will be evaluated on its merits. Acceptance or rejection of an article is based on the criteria outlined in section 5.3.3.1.

5.3.2 Sampling of a Submission with Multiple Articles or Categories

When multiple articles are submitted, the fireworks may be divided into categories based on their construction and their effect. Each category may be represented by a sample.

5.3.3 Acceptance Criteria

All the critical criteria – marked (C) – must be met. All the non-critical criteria should also be met. Failure to meet the (C) criteria outlined in these guidelines constitutes failure of the article. However, failure to meet non-critical requirements will not preclude authorization, if suitable corrective actions are submitted. Multiple major failures may preclude authorization.

5.3.3.1 For Each Article

Generally, for each article selected for testing, 24 units are required to evaluate its acceptability, as follows:

- i) All 24 units are examined for labelling and condition as received.
- ii) 12 units are fired: 12/12 must pass on the characteristics marked **(C)** and 10/12 must pass all other characteristics.
- iii) 6 units are subjected to abuse testing (1-metre drop): 3/6 must pass characteristics marked **(C)** and 3/6 must pass all other characteristics.
- iv) 2 units are disassembled for physical measurements and chemical analysis. The results must conform to the manufacturer's declaration and ERD requirements.
- v) 2 units are subjected to thermal stability tests and must not exhibit any sign of self-heating at 75 °C.
- vi) 2 units are used as spares.

5.3.4 Authorization of a Submission

In the case of a submission for which an applicant has elected to have one or more articles authorized on an individual basis, the authorization procedure for each article will be as described in section 5.3.3.1.

In the case of a submission that includes one or more categories of articles, authorization of the categories of articles will be based on the following:

- i. Each category of articles will be treated individually, e.g., if one category from a submission successfully passes testing at the CERL, and another category from the same submission fails testing, only the category that has failed will be denied authorization.
- ii. For a category of articles to be authorized, all articles selected for testing from that category must pass the tests as per the requirements of section 5.3.3.

6 Criteria for Display Fireworks (Type F.2)

Applications will be evaluated against the following general and specific criteria to determine that the display firework can be safely manufactured, handled, stored, transported, used and destroyed.

6.1 General Criteria

ITEM	CHARACTERISTIC	GENERAL CRITERIA
6.1.1	Shipping Packaging	Packaging must comply with the <i>Transportation of Dangerous Goods Act</i> and <i>Regulations</i> and the standards referred to therein.
6.1.2	Marking of Shipping Packaging	Markings on the case used for transport must include: - UN classification - Proper UN shipping name - UN number - Dangerous goods safety marks - Type F.2 - Product name - Name and address of the holder of the authorization - Packaging registration number
6.1.3	Condition of Shipping Packaging	Loose composition is not permitted in packaging (C) .
6.1.4	Labelling of Articles	Marking on the label affixed to the article: - Type F.2 - Product name - Name and address of the holder of the authorization - Instructions for use and safety warnings in both English and French (refer to section 6.2 for specific cautionary wording) - For tube items, an arrow indicating the direction of exit of effect/fire/flame - For angled articles, an arrow indicating the direction of the effect/fire/flame - Date of its manufacture and the shift during which it was manufactured, if any, or its lot number It is important to ensure all the information required to use the firework safely is readily accessible to the user. If the firework is too small and it is not possible to print all the information on the explosive or a label affixed to the fireworks, information may be contained in a barcode or matrix code that is printed on the explosive, or on a label affixed to it, and can be read by a device that is available to the general public. If a barcode or matrix code is not used, the information may be printed on the packaging of the fireworks or on a label affixed to the packaging.

6.1.5	Labels on Ejected articles	Aerial shells and separately fused ejected components must carry the label " <i>Explosives - Danger – Explosifs</i> ". This label must remain attached to the tube or shell after firing (C) .
6.1.6	Construction of Articles	Articles must not: - Contain metal, such as staples or wire, or hard plastic, which could be a possible missile hazard when fired or in the event of a malfunction (C) - Be a missile hazard when functioned or malfunctioned (C) - Contain loose pyrotechnic powder present in an unintended part of the article (C) - Have a parachute or a flare attached to the shell (C) - Have a stick (i.e., stick rockets) (C) - Be damaged through normal shipping and handling Articles must: - Be closed so that pyrotechnics cannot fall out of the article (C) - Have a main fuse that is clearly marked and firmly secured (C) - Be equipped with a fuse covered in a manner that prevents accidental or unintentional ignition (C) - Have the end fuse covered by a removable cap of a distinguishing colour
6.1.7	Fusing	- The part of the fuse to be ignited should be a safety fuse and should have a fuse cover that will protect the fuse from accidental ignition. - If there is a receptacle for an electric match it should be covered to protect the black match from accidental ignition. - The fuse burning time from the ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.
6.1.8	Function	Articles must: - Function as described on the label - Function in a safe, reliable, reproducible and predictable manner (C) Articles must not: - Bulge, shatter, rupture or burn through the case and/or closures unless designed to do so (C) - Have unconsumed pyrotechnics composition after functioning (C) - Endanger or cause to set fire to operators, spectators or the environment outside the 30-m radius firing zone or outside the spectator distance (as described in the Display Fireworks Manual) whichever distance is less (C) - Have an impulsive noise level higher than 140 dB(A) within a

		distance of 25 m and at a height of 1.5 m (C) - Have a continuous noise level higher than 122 dB(A) within a distance of 25 m and at a height of 1.5 m (C)
6.1.9	Lift Charge and Heights of Effects	The lift charge must be sufficient to propel the effect to a height that it: - Poses no danger to the public (C) - Allows burning pyrotechnics to be completely consumed in the air, i.e., all stars must be completely consumed at a minimum of 10 m before returning to the ground and sound shells must function at a minimum of 20 m above the ground (C) - Allows inert debris to extinguish itself at a minimum of 10 m before returning to the ground (C)
6.1.10	Charge Mass and Gross mass	The charge mass and gross mass measured during testing must be consistent and within tolerances as declared in the technical declaration submitted by the applicant.
6.1.11	Stability	All units subject to stability testing (75°C for 48 h) must pass. (C)
6.1.12	Chemical Analysis	All chemical ingredients as declared in the application must be present. The following discrepancies are not permitted: - Detection of more than 0.5% of a component not present in the declaration - Non-detection of a component present in the declaration - Detection of over 200% for components specified as under 25% in the declaration (C) - Detection of over 150% for other components specified as 25% or over in the declaration (C) - Detection of under 50% for components specified as over 10% in the declaration (C) - Detection of a chemical or combination of chemicals listed in section 4.7.2.4 (C)

6.2 Specific Criteria

6.2.1 Aerial and Nautical Shells

Cylindrical or spherical projectile containing fireworks stars or other effects. Designed to be fired from a mortar.

Item	Characteristic	Aerial and Nautical Effect Criteria
6.2.1.1	Construction	All shells (other than report shells): no more than 305 mm (12 inches) Report shells: - no more than 155 mm (6 inches) - no more than 1 report per shell Multibreak shells: - No more than 3 breaks, for all calibres - Final break may be a report - Shells larger than 155 mm (6 inches) should be equipped with a string to lower them into the mortar. - Minimum difference between the shell and mortar diameters (mortar sizes are given as inside diameter for Schedule 40 steel pipe): 5 mm - Maximum difference between the shell and mortar diameters (mortar sizes are given as inside diameter for Schedule 40 steel pipe): - For shells no more than 76 mm (3 inches): 8 mm - For shells between 102 and 155 mm (4 and 6 inches): 12 mm - For shells greater than 155 mm (6 inches): 15 mm - The fuse to be lit by flame must overhang at least 150 mm from the top of the mortar.
6.2.1.2	Charge Mass	- Burst charge must be large enough to produce the effect described by the manufacturer - Report shells must not have over 85 g of flash composition
6.2.1.3	Labels	- All general labelling requirements outlined in section 6.1 - The size of the mortar to be used - For nautical shells, a firing table (angle vs. distance) must be supplied. - All nautical shells must have a clear, highly visible indication on the articles that they are nautical shells to differentiate from types of

Item	Characteristic	Aerial and Nautical Effect Criteria
		aerial shells.

6.2.2 Cakes

Cakes are fireworks devices consisting of small-diameter cylindrical tubes that are chain-fused to fire in sequence after a single ignition. These items discharge projectiles such as stars, comets, mines, aerial whistles or small effects into the air. Nautical cakes are specifically designed for firing effects over water.

Item	Characteristic	Cake Criteria
6.2.2.1	Function	- Items must not tip over during functioning (C). - Items must not come apart during functioning (C).
6.2.2.2	Labels	- All general labelling requirements outlined in section 6.1 - For angled articles, an arrow indicating the direction of the effect/fire/flame Nautical cakes: - a firing table (angle vs. distance) must be supplied. - must have a clear, highly visible indication on the packaging that they are nautical cakes to differentiate from types of cakes.

6.2.3 Firecrackers

A firecracker is a small explosive device primarily designed to produce a large amount of noise, especially in the form of a loud bang.

Item	Characteristic	Firecracker Criteria
6.2.3.1	Construction	- no more than 5 cm in length - no more than 6.5 mm in diameter
6.2.3.2	Charge Mass	- Black powder: no more than 500 mg - Flash composition: no more than 130 mg
6.2.3.3	Function	- Debris permitted within a 3 m radius - Firecracker cluster must not explode simultaneously. (C)
6.2.3.4	Labels	All general labelling requirements outlined in section 6.1

6.2.4 Flares

Ground-level firework that consists of a thin-walled cylindrical tube into which a pyrotechnic composition is pressed or cast. While burning, the pyrotechnic composition produces a hot bright-coloured flame. The tube may burn away with the composition.

Item	Characteristic	Flares Criteria
6.2.4.1	Function	Must burn continuously with a steady flame
6.2.4.2	Labels	All general labelling requirements outlined in section 6.1

6.2.5 Flying Saucer

A fireworks wheel that spins horizontally and flies vertically. When ignited, the attached drivers produce thrust, which causes the wheel to spin and lift, producing a pattern of sparks. (aerial wheel, girandola)

Item	Characteristic	Aerial Wheels Criteria
6.2.5.1	Construction	Drivers must: - Be securely attached to prevent any change in the direction of thrust produced by the jet (C) - Not come loose or separate from the article (C) - Supports must be sufficiently strong and not come apart in flight (C).
6.2.5.2	Function	- Spinning and lifting drivers must not allow unintended communication between them - The aerial wheel must spin on the ground before rising - The angle of the trajectory must be no more than 30° from the vertical (C) - When functioned, the height of the article must comply with the instructions on the labels (C)
6.2.5.3	Labels	- All general labelling requirements outlined in section 6.1 - Additional warning "Erratic flight, take precautions for spectators. / Trajectoire aérienne imprévisible, assurez la protection des spectateurs."

6.2.6 Fountains

Ground piece fireworks that are filled with pyrotechnic composition and usually having a choke or restricted orifice. When ignited, it projects a jet or broad spray of fire and sparks.

Item	Characteristic	Fountains Criteria
6.2.6.1	Performance	- Article must burn continuously with a steady flame. - Height of sparks must be no more than 20 m.
6.2.6.2	Labels	- All general labelling requirements outlined in section 6.1

6.2.7 Mines

Mines are devices designed to project ignited stars and/or effects into the air (upwards). All effects must be ignited at the same time by the lift charge. Mines produce low-level visual effects, such as, but not exclusively, those from stars, tourbillons, firecrackers or whistles, and one or more reports. The effects may be preceded by a fountain and/or flare and/or burning stars.

Item	Characteristic	Mines Criteria
6.2.7.1	Function	All effects must be ejected at the same time. (C)
6.2.7.2	Labels	- All general labelling requirements outlined in section 6.1 - An arrow indicating the direction of exit of effect/flame/fire

6.2.8 Roman Candles

Roman candles are cylindrical tubes containing a series of pyrotechnic units consisting of alternating pyrotechnic composition, propellant charge and transmitting fuse.

Item	Characteristic	Roman Candles Criteria
6.2.8.1	Construction	Delay compositions or other barriers must be present to prevent the rapid unplanned passage of fire down the tube but must minimize migration of expelling charge.
6.2.8.2	Function	- All stars, shells, comets, etc. must function (C) - There must be no passage of fire down the tube - Articles must have a consistent time interval between the shots
6.2.8.3	Labels	- All general labelling requirements outlined in section 6.1 - Additional warning "This article must not be held in the hand. /Cet article ne doit pas être tenu dans la main."

6.2.9 Waterfalls

Waterfall fountain effects are placed along a wire (or string) to create a wall of sparks when ignited.

Item	Characteristic	Waterfalls Criteria
6.2.9.1	Construction	The framework of the wire of a waterfall must be strong enough and sufficiently secured to remain in position during functioning.
6.2.9.2	Labels	The individual pieces for the waterfall need not be labelled, provided that instructions be supplied with the articles.

6.2.10 Wheels

A revolving firework device fixed by an axle to a post above ground. When ignited, the attached drivers produce thrust, which causes the wheel to spin, producing a pattern of sparks.

Item	Characteristic	Wheels Criteria
6.2.10.1	Construction	The nail supplied with the wheel must be sufficiently strong and long to hold the wheel in place (C) .
6.2.10.2	Function	- Wheel must revolve smoothly, without stopping or hesitating (C). - Frame must not break, warp or catch fire (C). - Drivers must ignite within 1 s (C). - Drivers must remain attached to their support or fall within 7 m of a vertical support when the wheel's nail is 3 m above ground (C).
6.2.10.3	Labels	- All general labelling requirements outlined in section 6.1 - For whistles, the additional warning "Emits a loud whistling noise. / Émet un sifflement strident."

6.3 Sampling

6.3.1 Sampling of a Submission

The number of separate articles in a submission is used to determine the number of articles chosen to represent a submission. A separate article is defined as one of a different effect, construction or colour. Different calibres using the same construction do not constitute separate articles.

Manufacturers with no past failures warrant reduced sampling; known manufacturers with some past failures warrant normal sampling; unknown manufacturers warrant increased sampling.

Table 6.3.2 - Number of articles to be sampled

Number of articles submitted for authorization	Number of articles to be sampled			Acceptance
	Manufacturer with no past failures	Known Manufacturer with some past failures	Unknown Manufacturer	Maximum number of failures
2 to 8	2	2	3	0
9 to 15	2	3	5	0
16 to 25	3	5	8	0
26 to 50	5	8	13	0
51 to 90	5	13	20	0
91 to 150	8	20	32	1
151 to 280	13	32	50	1
281 to 500	20	50	80	2
501 to 1200	32	80	125	3

6.3.2 Acceptance Criteria

All the critical criteria – marked (C) – must be met. All the non-critical criteria should also be met. Failure to meet the (C) criteria outlined in these guidelines constitutes failure of the article. However, failure to meet non-critical requirements will not preclude authorization, if suitable corrective actions are submitted. Multiple non-critical failures may preclude authorization.

The number of articles that may fail without causing rejection of the submission is set out in table 6.3.2.

Generally, for each article selected for testing, 12 units are required to evaluate its acceptability, as follows:

- i) All 12 units are examined for labelling and condition as received.
- ii) 6 units are fired: 6/6 must pass characteristics marked **(C)** and 5/6 must pass other characteristics.

- iii) 2 units are subjected to thermal stability tests and must not exhibit any sign of self-heating at 75 °C.
 - 2 units are disassembled for construction, physical measurements and chemical analysis:
 - a) Construction: 2/2 must meet characteristics marked **(C)** and 1/2 must meet other characteristics.
 - b) Physical and chemical measurements: these must conform to the declaration.
- v) 2 units are used as spares.

7 Criteria for Special Effect Pyrotechnics (Type F.3)

Applications will be evaluated against the following general and specific criteria to determine that the special effect pyrotechnic can be safely manufactured, handled, stored, transported, used and destroyed.

7.1 General Criteria

ITEM	CHARACTERISTIC	GENERAL CRITERIA
7.1.1	Shipping Packaging	Packaging must comply with the <i>Transportation of Dangerous Goods Act</i> and <i>Regulations</i> and the standards referred to therein.
7.1.2	Marking of Shipping Packaging	Markings on the case used for transport: - UN classification - Proper UN shipping name - UN number - Dangerous goods safety marks - Type F.3 - Product name - Name and address of the holder of the authorization - Packaging registration number
7.1.2.1	Condition of Shipping Packaging	Loose composition is not permitted in packaging (C) .
7.1.2.2	Labelling of Articles	Labels affixed to the article: - Type F.3 - Product name - Name and address of the holder of the authorization - Instructions for use and safety warnings in both English and French (refer to section 7.2 for specific cautionary wording) - For tube items, an arrow indicating the direction of exit of effect/fire/flame - For angled articles, an arrow indicating the direction of the effect/fire/flame - Date of its manufacture and the shift during which it was manufactured, if any, or its lot number - An indication of whether the article is recommended for indoor use - Duration of the effect - Height or diameter of the effect - Product expiration date It is important to ensure all the information required to use the firework safely is readily accessible to the user. If the firework is too small and it is not possible to print all the information on the explosive or a label affixed to the fireworks, information may be contained in a barcode or matrix code that is printed on the

		explosive, or on a label affixed to it, and can be read by a device that is available to the general public. If a barcode or matrix code is not used, the information may be printed on the packaging of the fireworks or on a label affixed to the packaging.
7.1.2.3	Labels on Ejected Articles	Ejected components must carry the label “ <i>Explosives - Danger – Explosifs</i> ”. This label must remain attached to the tube or shell after firing (C) .
7.1.2.4	Construction of Articles	Articles must not: - Contain metal, such as staples or wire, or hard plastic, which could be a possible missile hazard when fired or if a malfunction happens (C) - Be a missile hazard when functioned or malfunctioned (C) - Contain loose pyrotechnic powder present in an unintended part of the article (C) - Be damaged through normal shipping and handling
7.1.2.5	Ignition	- The presence for the means of ignition, if present, shall be clearly visible and in accordance with the manufacturer’s declaration (C) - Attachment of igniter or electrical contacts: for pyrotechnic special effects with integral means of ignition, the attachment of the means of ignition to the article shall be secure (C) - Protection of electrical contacts: the electrical contacts shall be covered or joined (shunted) in a short circuit or protected by an insulated connecting device (C)
7.1.2.6	Function	Articles must: - Function as described in the safety instructions. - Function in a safe, reliable, reproducible and predictable manner (C) Articles must not: - Bulge, shatter, rupture or burn through the case and/or closures unless designed to do so (C) - Have unconsumed pyrotechnics composition after functioning (C) - Have an impulsive noise level higher than 140 dB(A) within a distance of 25 m and at a height of 1.5 m - Have a continuous noise level higher than 122 dB(A) within a distance of 25 m and at a height of 1.5 m - Burn for more than 5 seconds after functioning unless indicated on the safety labels of the article (C) - Project burning effects or debris onto the ground more than 2 m unless declared to do so by the manufacturer and that

		this fallout distance is taken into consideration for the separation distance to spectators as stated on the label safety information or the instructions for use; this separation distance shall be at least twice the radius distance of the fallout. (C). Note: As a reference, the minimum separation distance to spectators is 5 m. Articles with bases: - Base must not come loose during functioning (C)
7.1.2.7	Height, Diameter and Duration of Effect	The height, diameter and duration of effect(s) must not exceed declared value (C).
7.1.2.8	Charge Mass and Gross mass	The charge mass and gross mass measured during testing must be consistent and within tolerances as declared in the technical declaration submitted in the application.
7.1.2.9	Stability	All units subject to stability testing (75°C for 48 h) must pass (C) .
7.1.2.10	Chemical Analysis	All chemical ingredients as declared in the application must be present. The following discrepancies are not permitted: - Detection of more than 0.5% of a component not present in the declaration - Non-detection of a component present in the declaration - Detection of over 200% for components specified as under 25% in the declaration (C) - Detection of over 150% for other components specified as 25% or over in the declaration (C) - Detection of under 50% for components specified as over 10% in the declaration (C) - Detection of a chemical or combination of chemicals listed in section 4.7.2.4 (C)

7.2 Specific Criteria

7.2.1 Airbursts

Airbursts produce a burst of color and is typically suspended from overhead rigging, producing an effect similar to an outdoor aerial firework without burning debris.

Item	Characteristic	Airbursts Criteria
7.2.1.1	Packaging	- Airbursts must be packed in securely closed inner packages that include, but are not limited to fiber boxes, and fiber or plastic tubes. - Inner packaging must have a minimum wall thickness of 1.5 millimeters
7.2.1.2	Charge Mass	- Total pyrotechnic composition: No more than 32.5 g per airburst, 6 g if report

Item	Characteristic	Airbursts Criteria
		- Burst charge must not be more than 2.5 g

7.2.2 Cannon Simulators (concussion, maroons)

Cannon simulators produce a loud report with or without a flash of light and smoke.

Item	Characteristic	Cannon Simulator Criteria
7.2.2.1	Charge Mass	Total pyrotechnic composition: no more than 6 g
7.2.2.2	Construction	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.

7.2.3 Flash Trays (Split Mines)

Flash trays have a longitudinal slit cut from end to end that produce a fan shaped flash with a spray of stars or sparks.

Item	Characteristic	Flash Tray Criteria
7.2.3.1	Charge Mass	Total pyrotechnic composition: no more than 100 g
7.2.3.2	Construction	The longitudinal slit must be sealed with a removable cap or cover to prevent leakage during transportation.

7.2.4 Flame Projectors

Flame projectors produce a column or ball of fire in various colours.

Item	Characteristic	Flame Projector Criteria
7.2.4.1	Charge Mass	Total pyrotechnic composition: no more than 200 g
7.2.4.2	Construction	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.

7.2.5 Flares

Flares are thin-walled cylindrical tubes into which a pyrotechnic composition is pressed or cast. While burning, the pyrotechnic composition produces a hot bright-coloured flame. The tube may burn away with the composition.

Item	Characteristic	Flame Projector Criteria
7.2.5.1	Charge Mass	Total pyrotechnic composition: no more than 1000 g

7.2.6 Flash Cotton and Flash Paper

Flash paper is sheets of paper or cloth made from nitrocellulose, which burn almost instantly with a bright flash, leaving no ash.

Item	Characteristic	Flash Cotton and Flash Paper Criteria
7.2.6.1	Gross mass	1 dry sheet of flash paper: no more than 2.5 g

7.2.7 Flash Pots

Flash pots emit a bright flash and smoke.

Item	Characteristic	Flash Pot Criteria
7.2.7.1	Charge Mass	Total pyrotechnic composition: no more than 30 g
7.2.7.2	Construction	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.

7.2.8 Gerbs (fountains, cascade, falls)

Gerbs are filled with pyrotechnic composition and usually having a choke or restricted orifice. When ignited, it projects a jet or broad spray of fire and sparks.

Item	Characteristic	Gerbs Criteria
7.2.8.1	Charge Mass	- Total pyrotechnic composition: no more than 1000 g - No more than 75 g for gerbs containing nitrocellulose

7.2.9 Line Rockets

Line rockets travel along a wire producing a shower of sparks.

Item	Characteristic	Line Rockets Criteria
7.2.9.1	Charge Mass	Total pyrotechnic composition: No more than 20 g

7.2.10 Mines

Mines are devices designed to project ignited stars and/or effects into the air (upwards). All effects must be ignited at the same time by the lift charge. Mines produce low-level visual effects, such as, but not exclusively, those from stars, tourbillons, firecrackers or whistles, and one or more reports. The effects may be preceded by a fountain and/or flare and/or burning stars.

Item	Characteristic	Mines Criteria
7.2.10.1	Charge Mass	- Total pyrotechnic composition: no more than 150 g - No more than 20 g in lift charge

7.2.11 Mortar Hits

Mortar hits project effects such as a bright flash, heavy smoke and / or a ball of fire.

Item	Characteristic	Mines Criteria
7.2.11.1	Charge Mass	- Total pyrotechnic composition: no more than 150 g - No more than 50 g in lift charge

7.2.12 Multi-ingredient Kits

A two-component bottled kit consisting of an “A” bottle and a “B” bottle where one bottle contains an oxidizer and the other a fuel. When mixed together, the AB mixture becomes a pyrotechnic composition that produces various effects such as airbursts, concussion, flash, and spark effects.

Item	Characteristic	Multi-Ingredient Kits Criteria
7.2.12.1	Charge Mass	Total pyrotechnic composition: no more than 30 g when mixed

7.2.13 Saxons (Wheels)

A revolving pyrotechnic device fixed by an axle to a post above ground. When ignited, the attached drivers produce thrust, which causes the wheel to spin, producing a pattern of sparks. [Wheels].

Item	Characteristic	Saxons Criteria
7.2.13.1	Charge Mass	- Total pyrotechnic composition: no more than 240 g per saxon - No more than 5 g/whistle - No more 5 g whistle composition per saxon - Reports not permitted

7.2.14 Shot Tubes

Pyrotechnic shot tubes eject a small effect or small shell.

Item	Characteristic	Shot Tube Criteria
7.2.14.1	Charge Mass	- Total pyrotechnic composition: No more than 60 g - No more than 20 g in lift charge - No more than 15 g in burst charge and cannot exceed 25 percent of the composition

7.2.15 Smoke Articles

Smoke articles are devices designed to emit smoke.

Item	Characteristic	Smoke Articles Criteria
7.2.15.1	Charge Mass	Total pyrotechnic composition: no more than 100 g
7.2.15.2	Composition	Compositions that incorporate chlorates in their formulations must contain two (2) percent or greater of an acid neutralizer (bicarbonates or carbonates).

7.2.16 Spark Producing Devices (bullet hits, robotics)

A micro mine that produces a burst of sparks to simulate an electrical short.

Item	Characteristic	Spark Producing Devices Criteria
7.2.16.1	Charge Mass	Total pyrotechnic composition: no more than 6 g

7.2.17 Strobe pots

Strobe pots are small tubes or end plugs pressed, cast or loaded with strobe composition. They generate a blinking effect where bright flashes of light are produced at regular intervals with relatively complete darkness between flashes.

Item	Characteristic	Strobe Criteria
7.2.17.1	Charge Mass	Total pyrotechnic composition: no more than 1000 g

7.3 Special effect pyrotechnics authorized to be used by the Pyrotechnician

In accordance with the Regulations, a person who holds a fireworks operator certificate - Pyrotechnician may use type F.3 special effect pyrotechnics if the product has been identified as suitable to be used by this class of pyrotechnician. Suitable categories and limitations are detailed in the table below.

Category	NEQ limitation	Other limitations
Airbursts	3 g	
Bullet hits	1.5 g	
Cannon Simulators	2.5 g	
Comets	7 g	15 feet in height
Flame projector	100 g of propellant	
Flares	10 g	3 second in duration
Flash pots	2.5 g	
Gerbs	10 g	
Microdets	0.15 g	Non fragmenting
Mines	7 g	15 feet in height
Multi-ingredient kits		
Robotics	0.6 g	
Smoke articles	2.5 g	

SPDs (Spark Producing Devices)	2.5 g	
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If the applicant would like to have their product identified as suitable for use by a holder of a fireworks operator certificate – Pyrotechnician, they can select the option, P - Suitable Unsupervised Pyro, in the restrictions section during the application process online.

7.4 Sampling

7.4.1 Sampling of a Submission with One Article

If an individual article is submitted for authorization, the article will be evaluated on its merits. Acceptance or rejection of an article is based on the criteria outlined in section 7.4.3.

7.4.2 Sampling of a Submission with Multiple Articles or Categories

When multiple articles are submitted, the fireworks may be divided into categories based on their construction and their effect. Each category may be represented by a sample.

7.4.3 Acceptance Criteria

All the critical criteria – marked (C) – must be met. All the non-critical criteria should also be met. Failure to meet the (C) criteria outlined in these guidelines constitutes failure of the article. However, failure to meet non-critical requirements will not preclude authorization, if suitable corrective actions are submitted. Multiple non-critical failures may preclude authorization.

Generally, for each article selected for testing, 24 units are required to evaluate its acceptability, as follows:

- i) All 24 units are examined for labelling and condition as received.
- ii) 12 units are fired: 12/12 must pass on the characteristics marked **(C)** and 10/12 must pass all other characteristics.
- iii) 6 units are subjected to abuse testing (1-metre drop): 3/6 must pass characteristics marked **(C)** and 3/6 must pass all other characteristics.
- iv) 2 units are disassembled for physical measurements and chemical analysis. The results must conform to the manufacturer's declaration and ERD requirements.
- v) 2 units are subjected to thermal stability tests and must not exhibit any sign of self-heating at 75 °C.
- vi) 2 units are used as spares.

7.4.4 Authorization of a Submission

In the case of a submission for which an applicant has elected to have one or more articles authorized on an individual basis, the authorization procedure for each article will be as described in section 7.4.3.

In the case of a submission that includes one or more categories of articles, authorization of the categories of articles will be based on the following:

- i) Each category of articles will be treated individually, e.g., if one category from a submission successfully passes testing at the CERL, and another category from the same submission fails testing, only the category that has failed will be denied authorization.
- ii) For a category of articles to be authorized, all articles selected for testing from that category must pass the tests as per the requirements of section 7.4.3.

8 Criteria for Firework Accessories (Type F.4)

Applications will be evaluated against the following general and specific criteria to determine that the fireworks accessory can be safely manufactured, handled, stored, transported, used and destroyed.

8.1 General Criteria

Item	Characteristic	General Criteria
8.1.1.1	Shipping Packaging	Packaging must comply with the <i>Transportation of Dangerous Goods Act and Regulations</i> and the standards referred to therein.
8.1.1.2	Marking of Shipping Packaging	Markings on the case used for transport: - UN classification - Proper UN shipping name - UN number - Dangerous goods safety marks - Type F.4 - Product name - Name and address of the holder of the authorization - Packaging registration number
8.1.1.3	Condition of Shipping Packaging	Loose composition is not permitted in packaging (C) .

Item	Characteristic	General Criteria
8.1.1.4	Labelling of Articles	Marking on the label affixed to the article: - Type F.4 - Product name - Name and address of the holder of the authorization - Instructions for use and safety warnings in both English and French (refer to section 8.2 for specific cautionary wording) - Date of its manufacture and the shift during which it was manufactured, if any, or its lot number It is important to ensure all the information required to use the firework safely is readily accessible to the user. If the firework is too small and it is not possible to print all the information on the explosive or a label affixed to the fireworks, information may be contained in a barcode or matrix code that is printed on the explosive, or on a label affixed to it, and can be read by a device that is available to the general public. If a barcode or matrix code is not used, the information may be printed on the packaging of the fireworks or on a label affixed to the packaging.
8.1.1.5	Construction of Articles	Articles must not: - Contain metal, such as staples or wire, or hard plastic, which could be a possible missile hazard when fired or if a malfunction happens (C) - Have pyrotechnic powder falling out of the casing (C) - Contain loose pyrotechnic powder in an unintended part of the article (C) - Show signs of breaking or cracking in the casing or composition - Be damaged through normal shipping and handling

Item	Characteristic	General Criteria
8.1.1.6	Function	Articles must: - Function as described on the label - Function in a safe, reliable, reproducible and predictable manner (C) Articles must not: - Bulge, shatter, rupture or burn through the case and/or closures unless designed to do so (C) - Burn after function is complete (C) - Have unconsumed pyrotechnic composition after functioning (C) - Have a noise level higher than 140 dB (A) within a 5-m radius (C) - Burning debris and effects must not land on the ground more than 5 m from the article (C)
8.1.1.7	Charge Mass and Gross mass	The charge mass and gross mass measured during testing must be consistent and within tolerances as declared in the technical declaration submitted in the application.
8.1.1.8	Stability	All units subject to stability testing (75°C for 48 h) must pass (C) .
8.1.1.9	Chemical Analysis	All chemical ingredients as declared in the application must be present. The following discrepancies are not permitted: - Detection of more than 0.5% of a component not present in the declaration - Non-detection of a component present in the declaration - Detection of over 200% for components specified as under 25% in the declaration (C) - Detection of over 150% for other components specified as 25% or over in the declaration (C) - Detection of under 50% for components specified as over 10% in the declaration (C) - Detection of a chemical or combination of chemicals listed in section 4.7.2.4 (C)

8.2 Specific Criteria

8.2.1 Electric Matches

Electric matches use an electric current to ignite a small pyrotechnic charge that ignites fireworks or special effect pyrotechnics.

Item	Characteristic	Electric Matches Criteria
8.2.1.1	Function	- 0/10 units must fire under the following conditions: 0.2 A of electric current for 30 s (C). - 10/10 units must fire upon application of the all-fire current declared by the manufacturer (C). - Matchheads shall deflagrate and not detonate.
8.2.1.2	Labels	- All general labelling requirements outlined in section 8.1 - All-fire current - No-fire current - Resistance, including that of the leg wires

8.2.2 Portfires

Portfires are long tubes that burn with a small flame and are used to ignite fireworks by hand.

Item	Characteristic	Portfires Criteria
8.2.2.1	Construction	The construction must allow the attachment of an extension that remains cool while in use.
8.2.2.2	Function	Ignition time: - By flame: no more than 10 s (C) - By friction: no more than 3 trials (C) Burn time: - Permitted variance from specified burn time: ± 10 s
8.2.2.3	Labels	- All general labelling requirements outlined in section 8.1 - The burn time of the portfire

8.2.3 Quickmatch

A piece of black match that is encased in a paper and/or plastic sheath designed to burn quickly.

Item	Characteristic	Quickmatch Criteria
8.2.3.1	Labels	All general labelling requirements outlined in section 8.1

8.3 Sampling

8.3.1 Sampling of a Submission with One Article

If an individual article is submitted for authorization, the article will be evaluated on its merits. Acceptance or rejection of an article is based on the criteria outlined in section 8.3.3.

8.3.2 Sampling of a Submission with Multiple Articles or Categories

When multiple articles are submitted, the articles may be divided into categories based on their construction and their effect. Each category may be represented by a sample.

8.3.3 Acceptance Criteria

All the critical criteria – marked (C) – must be met. All the non-critical criteria should also be met. Failure to meet the (C) criteria outlined in these guidelines constitutes failure of the article. However, failure to meet non-critical requirements will not preclude authorization, if suitable corrective actions are submitted. Multiple non-critical failures may preclude authorization.

Generally, for each article selected for testing, 24 units are required to evaluate its acceptability, as follows:

- i) All 24 units are examined for labelling and condition as received;
- ii) 12 units are fired: 12/12 must pass on the characteristics marked **(C)** and 10/12 must pass all other characteristics.
- iii) 6 units are subjected to abuse testing (1-metre drop): 3/6 must pass characteristics marked **(C)** and 3/6 must pass all other characteristics.
- iv) 2 units are disassembled for physical measurements and chemical analysis. The results must conform to the manufacturer's declaration and ERD requirements.
- v) 2 units are subjected to thermal stability tests and must not exhibit any sign of self-heating at 75 °C.
- vi) 2 units are used as spares.

8.3.4 Authorization of a Submission

In the case of a submission for which an applicant has elected to have one or more articles authorized on an individual basis, the authorization procedure for each article will be as described in section 8.3.3.

In the case of a submission that includes one or more categories of articles, authorization of the categories of articles will be based on the following:

- i) Each category of articles will be treated individually, e.g., if one category from a submission successfully passes testing at the CERL, and another category from the same submission fails testing, only the category that has failed will be denied authorization.
- ii) For a category of articles to be authorized, all articles selected for testing from that category must pass the tests as per the requirements of section 7.4.3.

9 Criteria for Novelty Devices (Type F.5)

Applications will be evaluated against the following general and specific criteria to determine that the novelty device can be safely manufactured, handled, stored, transported, used and destroyed.

9.1 General Criteria

Item	Characteristic	General Criteria
9.1.1.1	Shipping Packaging	Packaging must comply with the <i>Transportation of Dangerous Goods Act and Regulations</i> and the standards referred to therein.
9.1.1.2	Marking of Shipping Packaging	Markings on the case used for transport: - UN classification - Proper UN shipping name - UN number - Dangerous goods safety marks - Type F.5 - Product name - Name and address of the holder of the authorization - Packaging registration number
9.1.1.3	Condition of Shipping Packaging	Loose composition is not permitted in packaging (C) .
9.1.1.4	Labelling of Articles	Marking on the label affixed to the article: - Type F.5 - Product name - Name and address of the holder of the authorization - Instructions for use and safety warnings in both English and French (refer to section 9.2 for specific cautionary wording) - Maximum height of the effect - Date of its manufacture and the shift during which it was manufactured, if any, or its lot number It is important to ensure all the information required to use the firework safely is readily accessible to the user. If the firework is too small and it is not possible to print all the information on the explosive or a label affixed to the fireworks, information may be contained in a barcode or matrix code that is printed on the explosive, or on a label affixed to it, and can be read by a device that is available to the general public. If a barcode or matrix code is not used, the information may be printed on the packaging of the fireworks or on a label affixed to the packaging.

Item	Characteristic	General Criteria
9.1.1.5	Construction of Articles	Articles must not: - Contain metal, such as staples or wire, or hard plastic, which could be a possible missile hazard when fired or if a malfunction happens (C) - Have pyrotechnic falling out of the casing (C) - Contain loose pyrotechnic powder in an unintended part of the article (C) - Show signs of breaking or cracking in the casing or composition - Be constructed so that any rolled paper tubes allow the composition to migrate under the inner layer of paper - Be damaged through normal shipping and handling
9.1.1.6	Fusing	Fusing must provide a reliable ignition (C)
9.1.1.7	Function	Articles must: - Function as described on the label - Function in a safe, reliable, reproducible and predictable manner (C) Articles must not: - Eject effects with unpredictable trajectories landing more than 5 m away (C) - Topple over before the last effect has functioned (C) - Have a delay between visible or audible effects of more than 5 s (C) - Bulge, shatter, rupture or burn through the case and/or closures unless designed to do so (C) - Burn after function is complete (C) - Have unconsumed pyrotechnic composition after functioning (C) - Have a noise level higher than 140 dB (A) at the point of use (C)
9.1.1.8	Charge Mass and Gross mass	The charge mass and gross mass measured during testing must be consistent and within tolerances as declared in the technical drawings submitted in the application.
9.1.1.9	Stability	All units subject to stability testing (75°C for 48 h) must pass (C) .
9.1.1.10	Chemical Analysis	All chemical ingredients as declared in the application must be present. The following discrepancies are not permitted: - Detection of more than 0.5% of a component not present in the declaration

Item	Characteristic	General Criteria
		- Non-detection of a component present in the declaration - Detection of over 200% for components specified as under 25% in the declaration (C) - Detection of over 150% for other components specified as 25% or over in the declaration (C) - Detection of under 50% for components specified as over 10% in the declaration (C) - Detection of a chemical or combination of chemicals listed in section 4.7.2.4 (C)

9.2 Specific Criteria

9.2.1 Ground Spinners

Non-metallic tube containing gas and sparks-producing pyrotechnic composition, with or without noise-producing pyrotechnic composition. Rotation on the ground and emission of sparks and/or flames with or without aural effect.

Item	Characteristic	Ground Spinner Criteria
9.2.1.1	Construction	The fuse shall be firmly affixed to the support and shall be well insulated to prevent cross-ignition.
9.2.1.2	Charge Mass	- Total pyrotechnic composition: no more than 8 g - Total whistle composition permitted in an article: no more than 3 g
9.2.1.3	Function	Articles may only eject sparks, microstars or flames. Articles must: - Revolve smoothly - Have a stoppage time no more than 5 s - Have a final position no more than 5 m from the ignition point - Have a distance of projection no more than 1 m

Item	Characteristic	Ground Spinner Criteria
9.2.1.4	Labels	- All general labelling requirements outlined in section 5.1 - WARNING: EMITS SHOWER OF SPARKS. Users must be at least 16 years old or supervised by a person who is at least 18 years old. Use on a flat surface. For outdoor use only. Do not hold in hand. Light fuse and stand clear. - MISE EN GARDE : ÉMET UNE PLUIE D'ÉTINCELLES. Utiliser sur une surface plane. Utilisation par des adultes. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Allumer la mèche et se tenir à l'écart.

9.2.2 Hand-Held Fountains

Very low-hazard firework device that burns at low temperature and not violently. Its composition will not include poisonous ingredients. The combustion products are gaseous and will generate low odour and low smoke. They are designed to be used in close proximity.

Item	Characteristic	Hand-Held Fountain Criteria
9.2.2.1	Construction	- Inside diameter: no more than 10 mm - Length of composition: no more than 150 mm
9.2.2.2	Charge Mass	Total pyrotechnic composition: no more than 15 g
9.2.2.3	Function	Articles must: - Burn smoothly - Have an ignition time no more than 10 s (when ignited with a match flame) - Have a total burning time no more than 5 min - Not produce large pieces of composition falling from the article when functioning; only sparks are allowed (C) Articles must meet the 'pinhole test' requirements (C): - No ignition or burning (scorching and some pinholes are allowed) through a single page of newspaper when the article is in a horizontal position 450 mm above the paper - Diameter of pinholes: no more than 2 mm - Number of pinholes allowed for 20-article sample: no more than 20 - Number of pinholes allowed per article: no more than 5

Item	Characteristic	Hand-Held Fountain Criteria
9.2.2.4	Labels	- All general labelling requirements outlined in section 5.1 The primary container: - WARNING: EMITS FLAMES OR SHOWERS OF STARS. Users must be at least 16 years old or supervised by a person who is at least 18 years old. Do not touch glowing article. Light only one article at a time. Keep away from the body. Keep burning end and sparks away from clothing or other flammable materials. - MISE EN GARDE : ÉMET DES FLAMME OU UNE PLUIE D'ÉTOILES. Utilisation par des adultes. Les utilisateurs doivent avoir au moins 16 ans ou être sous la supervision d'une personne ayant 18 ans ou plus. Ne pas toucher l'article incandescent. N'allumer qu'un article à la fois. Garder l'extrémité brûlante et les étincelles aussi loin du corps que possible. Garder aussi loin que possible des vêtements ou de toute autre matière inflammable.

9.2.3 Party Poppers

Party poppers are actuated by pulling a string or trigger which produces a noise effect and releases paper streamers or confetti.

Item	Characteristic	Party Popper Criteria
9.2.3.1	Construction	Up to 72 units per inner packaging
9.2.3.2	Charge Mass	- Total pyrotechnic composition: no more than 16mg - Only formulations of barium, potassium and/or sodium chlorate with red phosphorus are permitted.
9.2.3.3	Function	Article must not eject burning debris and effects (C)
9.2.3.4	Labels	Labels affixed on the primary container, which is the smallest container sold to the public: - All general labelling requirements outlined in section 9.1 - WARNING: Users must be at least 16 years old or supervised by a person who is at least 18 years old. Do not aim at eyes or face. Hold in hand with arm extended away from the body. - MISE EN GARDE: Les utilisateurs doivent avoir au moins 16 ans ou être sous la supervision d'une personne ayant 16 ans ou plus. Ne visez pas les yeux ou le visage. Tenir dans la main avec le bras éloigné du corps.

9.2.4 Snakes

Snakes are ground piece fireworks that consist of a solid pellet. When the pellet is ignited, it swells forming what resembles a snake.

Item	Characteristic	Snakes Criteria
9.2.4.1	Construction	Cracked pellets or loose composition are not allowed
9.2.4.2	Charge Mass	- Total pyrotechnic composition: no more than 5 g (C) - Flash composition is not allowed (C)
9.2.4.3	Function	- Articles must have an ignition time no more than 10 s (when ignited with a match flame)
9.2.4.4	Labels	Labels affixed on the primary container, which is the smallest container sold to the public: - All general labelling requirements outlined in section 9.1 - WARNING: PRODUCES A SNAKE. Users must be at least 16 years old or supervised by a person who is at least 18 years old. For outdoor use only. Do not hold in hand. Do not put in mouth. Place on level ground. - MISE EN GARDE: FORME UN SERPENT. Les utilisateurs doivent avoir au moins 16 ans ou être sous la supervision d'une personne ayant 18 ans ou plus. N'utiliser qu'à l'extérieur. Ne pas tenir dans la main. Ne pas mettre dans la bouche. Placer sur le sol à un endroit à plat.

9.2.5 Sparklers

Rigid metal wire partially coated (along one end) with slow burning pyrotechnic composition with or without an ignition tip. Sparklers are designed to be hand-held.

Item	Characteristic	Sparkler Criteria
9.2.5.1	Construction	- Total length of the sparkler: 100 mm to no more than 950 mm - Length of the rod to serve as a handle: not less than 1/3 of the total length of the sparkler - Sparklers must not have cracked composition (C) - Sparklers must not have composition falling off (C)
9.2.5.2	Charge Mass	<u>Nitrate base:</u> - Total pyrotechnic composition: no more than 30 g (C) <u>Perchlorate base:</u> - Total pyrotechnic composition: no more than 5 g (C)

Item	Characteristic	Sparkler Criteria
9.2.5.3	Function	Articles must: - Burn smoothly - Have an average ignition time for 20-article sample no more than 10 s (when ignited with a match flame) - Have a total burning time no more than 5 min - Not produce large pieces of composition falling from the article when functioning; only sparks are allowed (C) - Not sag, from the point at which burning ceased, more than 30° from horizontal Articles must meet the pinhole test requirements (C): - No ignition or burning (scorching and some pinholes are allowed) through a single page of newspaper when the article is in a horizontal position 450 mm above the paper - Diameter of pinholes: no more than 2 mm - Number of pinholes allowed for 20-article sample: no more than 20 - Number of pinholes allowed per article: no more than 5
9.2.5.4	Labels	Labels affixed on the primary container, which is the smallest container sold to the public: - All general labelling requirements outlined in section 9.1 - WARNING: EMITS SHOWERS OF SPARKS. Users must be at least 16 years old or supervised by a person who is at least 18 years old. Not recommended for indoor use. Do not touch glowing sparkler. Light only one sparkler at a time. Hold in hand with arm extended away from the body. Keep burning end and sparks away from clothing or other flammable materials. - MISE EN GARDE : ÉMET UNE PLUIE D'ÉTINCELLES. Les utilisateurs doivent avoir au moins 16 ans ou être sous la supervision d'une personne ayant 16 ans ou plus. Non recommandé pour utilisation à l'intérieur. Ne pas toucher la tige incandescence. N'allumer qu'un cerce magique à la fois. Tenir dans la main le bras éloigné du corps. Tenir le bout incandescent et les étincelles à l'écart des vêtements ou de toute autre matière inflammable.

9.2.6 Throwdowns

Throwdowns are small devices that create a small popping sound when thrown against a hard surface.

Item	Characteristic	Throwdowns Criteria
9.2.6.1	Construction	- Inner packages must contain sawdust or similar impact absorbing material - Number of devices per inner packaging: 50
9.2.6.2	Charge Mass	- Total pyrotechnic composition: no more than 1 mg (C) - Only formulations of silver fulminate are permitted
9.2.6.3	Function	Article must not eject burning debris and effects beyond the article (C)
9.2.6.4	Labels	Labels affixed on the primary container, which is the smallest container sold to the public: - All general labelling requirements outlined in section 9.1 - WARNING: Users must be at least 16 years old or closely supervised by a person who is at least 18 years old. Do not put in mouth. Throw on hard ground. For outdoor use only. - MISE EN GARDE: Les utilisateurs doivent avoir au moins 16 ans ou être sous la supervision d'une personne ayant 16 ans ou plus. Ne pas mettre dans la bouche. Lance sur un sol dur. Pour usage extérieur seulement.

9.2.7 Toy Pistol Caps

Toy pistol caps are small charges of explosive contained in a cup or confined between two sheets of paper.

Item	Characteristic	Toy Pistol Caps Criteria
9.2.7.1	Construction	<u>Articles:</u> - The dimensions and construction of the toy pistol caps are dictated by the device in which they are functioned. - Caps must be easy to remove from the primary package. - Caps must not have dirty or deformed surfaces. - Caps must not have holes. - There may be no loose composition (C). - There may be no loose or missing discs (C). <u>Plastic discs</u> must: - Be covered with paper so that composition cannot fall out (C) - Not have any excess composition on the outside (C) - Not have any gouge, hole, leftover lump of plastic or other defect - Not have deformed rims <u>Paper rolls</u> must not: - Have holes, tears or wrinkles (C) - Show leaching of chlorate into the paper surrounding the dot (C)

Item	Characteristic	Toy Pistol Caps Criteria
9.2.7.2	Charge Mass	<u>Consumer package:</u> - no more than 0.04 g/ml, uniformly distributed (C) - no more than 1000 caps/primary container¹ (C) <u>Ring or strips:</u> - no more than 6.5 g/1000 caps (C) <u>Roll caps:</u> - no more than 5.0 g/1000 caps (C)
9.2.7.3	Function	Toy pistol caps must not: - Be designed like flares, i.e., burning instead of production of a snapping sound, detected by a flame, flash or sound level more than 10 dB (A) within the preset operating range of the test equipment - Allow cap-to-cap communication (50-cap sample) (C) - Have a logarithmic average (50-sample) noise level higher than 153 dB (A) within a 45-cm radius - Contain sulfur(C)
9.2.7.4	Labels	Labels affixed on the primary container, which is the smallest container sold to the public: - All general labelling requirements outlined in section 9.1 - Marked with lot number traceable to the production unit. - WARNING: Do not fire within 30 cm of the ear. Misuse may cause damage to hearing. Do not fire indoors. Store in a cool dry place. - MISE EN GARDE: Ne pas faire exploser à moins 30 cm des oreilles. Un mauvais usage peut causer des dommages à l'ouïe. Ne pas faire exploser à l'intérieur. Entreposer dans un endroit frais et sec.
9.2.7.5	Packaging	Multiple-unit primary packages shall be designed in such a manner that if the contents of one unit are ignited, the effects will not communicate to the contents of an adjacent unit.

9.3 Sampling

9.3.1 Acceptance Criteria

All the critical criteria – marked (C) – must be met. All the non-critical criteria should also be met. Failure to meet the (C) criteria outlined in these guidelines constitutes failure of the article. However, failure to meet non-critical requirements will not preclude authorization, if suitable corrective actions are submitted. Multiple non-critical failures may preclude authorization.

9.3.2 Sample quantities

The quantities required for sampling:

- | | |
|--------------------------------|----------|
| ▪ Ground Spinners | 24 units |
| ▪ Party Poppers | 48 units |
| ▪ Snakes | 24 units |
| ▪ Sparklers/Handheld fountains | 50 units |
| ▪ Toy Pistol Caps | 400 caps |

The number of units requested for testing is subject to change.

10 Market Surveillance

Auditing and testing are processes used to confirm the continuing acceptability of an authorized explosive.

10.1 Auditing

Manufacturers located in Canada may be audited to determine what manufacturing controls are used to ensure that an explosive consistently meets design specifications. Foreign manufacturers may either be audited or subject to market surveillance testing.

10.2 Testing

Samples may be picked from the field or requested from the holder of authorization at any time and subjected to testing. The cost of such testing is paid by the Government of Canada.

The testing must show that the product is the same as the technical declaration provided in support of its authorization.

Failure to meet the technical declaration may result in the cancellation of the authorization.

10.3 Results of Market Surveillance Auditing or Testing

A laboratory report from NRCan will be provided to the holder of authorization outlining the results of the audit or the tests that were performed.

If an article is recommended for continuing authorization based on the results of an audit or testing, it will remain authorized in Canada and continue to be published on the list of authorized explosives.

If an article is not recommended for continuing authorization based on the results of an audit or testing, its authorization may be cancelled.

The CIE must cancel the authorization of an explosive if periodic testing or new information reveals that the explosive can no longer be safely manufactured, handled, stored, transported, used or destroyed (as per section 39 of the Regulations). If the inconsistencies noted during the testing are considered critical (for example, the article toppled over during functioning, forbidden chemicals such as arsenic or lead were detected, the labels are misleading and could lead to injuries, etc.), the authorization of the article will be cancelled. The article will therefore be removed from the list of authorized explosives (as per section 42 of the Regulations) and a product recall will be done in accordance with section 40 of the Regulations.

11 Authorization for a Specified Period

Fireworks may be authorized for a specified period, if the firework is used at a special event, tour or international competition involving fireworks.

The following information is required:

- 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 product name;
- the transport classification issued by the country of origin;
- the places and dates of the special event, tour or international competition at which the explosive will be used;
- the controls that will be put in place to ensure that the explosive is used only for the special event, tour or international competition for which it is authorized;
- the precautions that will be taken to minimize the likelihood of harm to people and property; and,
- the method to be used to destroy any of the explosive that is not used before the authorization expires.

Fireworks that are authorized for a specified period may only be used on the dates and the locations that have been specified in the notice of authorization. If they are not used, they can be shipped back to the country of origin using an export permit issued by NRCan, otherwise they will need to be destroyed.