PUBLISHED DOCUMENT

PD CEN/TR
15953:2009

Pyrotechnic articles — Other pyrotechnic articles, category P1 and P2 — Overview of harmonized standards that will be developed by CEN/TC 212/WG 5

ICS 71.100.30

BSI
British Standards

National foreword

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The UK participation in its preparation was entrusted to Technical Committee CII/47, Pyrotechnic articles.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 December 2009

ISBN 978 0 580 67606 2

Amendments/corrigenda issued since publication

Date	Comments

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 15953

October 2009

ICS 71.100.30

English Version

Pyrotechnic articles - Other pyrotechnic articles, category P1 and P2 - Overview of harmonized standards that will be developed by CEN/TC 212/WG 5

Articles pyrotechniques - Autres articles pyrotechniques de catégories P1 et P2 - Vue d'ensemble des normes harmonisées qui seront élaborées par le CEN/TC 212/WG 5

Pyrotechnische Gegenstände - Sonstige pyrotechnische Gegenstände, Kategorien P1 und P2 - Überblick über harmonisierte Normen, die von CEN/TC 212/WG 5 erarbeitet werden

This Technical Report was approved by CEN on 17 August 2009. It has been drawn up by the Technical Committee CEN/TC 212.

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Ref. No. CEN/TR 15953:2009: E

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Foreword

This document (CEN/TR 15953:2009) has been prepared by Technical Committee CEN/TC 212 “Pyrotechnic articles”, the secretariat of which is held by NEN.

This document (CEN/TR 15953:2009) has been prepared by Working Group 5 “Other pyrotechnic articles” of Technical Committee CEN/TC 212 “Pyrotechnic articles”, the convenor and secretary of which are French. Experts from eleven countries have participated in its elaboration: Belgium, Czech Republic, Denmark, France, Germany, Italy, Romania, Spain, Switzerland, The Netherlands and United Kingdom.

It has been approved by votes of all the members of CEN/TC 212 “Pyrotechnic articles” on August 2009.

Introduction

Directive 2007/23/EC of May 23rd 2007 on the placing on the market of pyrotechnic articles, has been published on June 14th 2007 in the Official Journal of the European Community. (Ref. Mandate M 416).

In its Annex 1, Directive 2007/23/EC gives the essential safety requirements (ESR) pyrotechnic articles shall comply with. In order to facilitate the process of demonstrating compliance with these ESR, harmonized standards for the design, manufacture and testing of pyrotechnic articles must be developed.

CEN has been mandated by the European Commission (EC) to develop these harmonized standards: Mandate M 416 describes the work that CEN shall perform.

CEN has entrusted coordination of this work to CEN/TC 212 'Pyrotechnic articles' with the following scope:

"Standardization of fireworks, theatrical pyrotechnic articles, pyrotechnic articles for vehicles and other pyrotechnic articles, particularly from the point of view of their safe use".

During its meeting in Delft on October 16th and 17th 2007, CEN/TC 212 has decided to share the corresponding work to be done between several Working Groups. Resolutions have been voted to establish five Working Groups, one of which is Working Group 5 (CEN/TC 212 / WG 5) in charge of standardization of "Other Pyrotechnic Articles".

Because no European standards exist at present for "Other Pyrotechnic Articles", preliminary work needs to be performed before a list of standards to be developed by WG 5 can be drawn up. It has been accepted by CEN/TC 212 and proposed to the European Community a one-year period will be allocated to WG5 to prepare a CEN Technical Report in which its future work program will be described and an overview of the harmonized standards it will develop will be given including the reasons why WG 5 has proposed to develop these standards.

Five work sessions have taken place, respectively in NEN – Delft – Netherlands on February 7th 2008, in BAM – Berlin – Germany on May 22nd 2008, in NEN – Delft – Netherlands on September 9th 2008, in AFNOR – Paris – France on November 13th 2008 and in UNI – Milano – Italy on February 2 2009.

The present document is the final draft of the Technical Report for "Other Pyrotechnic Articles". It has been written in close coordination with the other working groups of CEN/TC 212/WG 1 "Fireworks, Categories 1, 2 and 3", WG 2 "Fireworks, Category 4", WG 3 "Theatrical Pyrotechnic articles" and WG 4 "Pyrotechnic articles for vehicles".

1 Scope

This Technical Report gives an overview of harmonized standards which will be proposed to be developed by CEN/TC 212 WG 5, "Other Pyrotechnic Articles". Under this expression, it must be understood, are all pyrotechnic articles which are not designed and intended for entertainment purposes ("fireworks"), for indoor or outdoor stage use, including film and television productions or similar use ("theatrical pyrotechnic articles"), and for automotive industry ("pyrotechnic articles for vehicles").

It also gives the interpretation WG5 experts have made of some terms, definitions and requirements of Directive 2007/23/EC in order to assure future harmonized standards will encompass all varieties of "other pyrotechnic articles", which are presently placed on the European market, in a consistent way and take the benefit of all the practical experience and usages of those articles in the Member States.

2 Terminology

2.1 Definition of "Other pyrotechnic articles"

In its Article 2, Directive 2007/23/EC gives a definition of a "*pyrotechnic article*" as "*any article containing explosive substances or an explosive mixture of substances designed to produce heat, light, sound, gas or smoke or a combination of such effects through self-sustained exothermic chemical reactions".*

Although heat, light, sound, gas or smoke or combination of such effects are more frequently obtained through combustive or deflagrating reactions, this definition does not exclude substances or mixture of substances which exhibit a detonative behaviour.

WG5 experts have considered that no other interpretation of the definition of pyrotechnic articles given by Directive 2007/23/EC is required.

See Annex A for further information.

2.2 Other terms

Collections of articles: individual item/ article, type, group/family, generic type.

The future harmonized standards for "other pyrotechnic articles" will identify the design parameters and performance characteristics to be taken into consideration for the corresponding articles to meet the essential safety requirements of Directive 2007/23/EC. Where appropriate, for each design parameter or performance characteristic they will state requirements and criteria which shall be complied with.

According to the large variety of other pyrotechnic articles and significant differences they exhibit in design, functioning and conditions of use, it is clearly noticeable these articles will not have all in common the same design parameters and performance characteristics. However, collections of articles sharing the same design parameters and performance characteristics exist. Then WG 5 experts have considered it was necessary to identify these collections of articles and draw up their list.

The future harmonized standards will state requirements and criteria for each identified homogeneous collection, which does not mean there may not exist requirements or criteria applicable to several collections as well as to all pyrotechnic articles whatever their design or behaviour in normal use.

The following terms and definitions will be used hereafter and in the harmonized standard(s) to be developed by Working Group5:

— **Type:** sample representative of the production envisaged.

NOTE 1 This definition corresponds to the use of the term 'type' in Annex II §2(c) of Directive 2007/23/EC for the purposes of type-examination.

— **Generic type:** set of articles with a common, very general, design feature and/or with a common characteristic effect.

— **Subtype:** set of articles within a **generic type** with specific design features.

— **Individual item:** article within a **generic type** or **subtype** for which every possible feature and characteristic has been fixed.

NOTE 2 Each feature and characteristic will be specified in the **technical name** or a technical data sheet, as appropriate.

— Technical name: general description of an individual item.

— Trade name: description of an individual item from a particular supplier.

— Family: set of individual items that will be considered together for the purposes of testing and approval.

NOTE 3 This last definition is fully compliant with Directive 2007/23/EC which states in "Whereas (18)": "Groups of pyrotechnic articles that are similar in design, function or behaviour should be assessed by the notified bodies as product families".

The figure hereafter shows how WG 5 experts intend to organize "other pyrotechnic articles" in "individual items" (samples of which will be "types"), "families" and "generic types", starting from the precise design level to the general design level. Example is given for "smoke generators".

This will be very useful and efficient to clarify and solve the complexity of their work resulting from the large variety of design of these "other pyrotechnic articles". Even for a given kind of pyrotechnic article, developed for the same type of use, strong variations in design may exist between manufacturers.

At the bottom, "individual items" correspond to the various individual smoke generators in a manufacturer's product range, under the brand name "Securix™", submitted to conformity assessment procedures by the means of "types".

In the middle are set up "families" of individual items (e.g. family of "Securix™ Smoke generators") which may be considered together for the purposes of testing and certification in compliance with Directive 2007/23/EC.

At the top, the highest level of generalization of the characteristics of types corresponds to "Smoke generators", independently from who is the manufacturer and what is the typical design within a product range. WG5 experts think all types of smoke generators can be put together in a unique collection of groups because it is highly possible that the essential safety requirements of Directive 2007/23/EC will only imply design and performance requirements which will be common to every type of smoke generators and none at a lower level (e.g. that of a family). Then WG 5 harmonized standards will only deal with these "generic types".

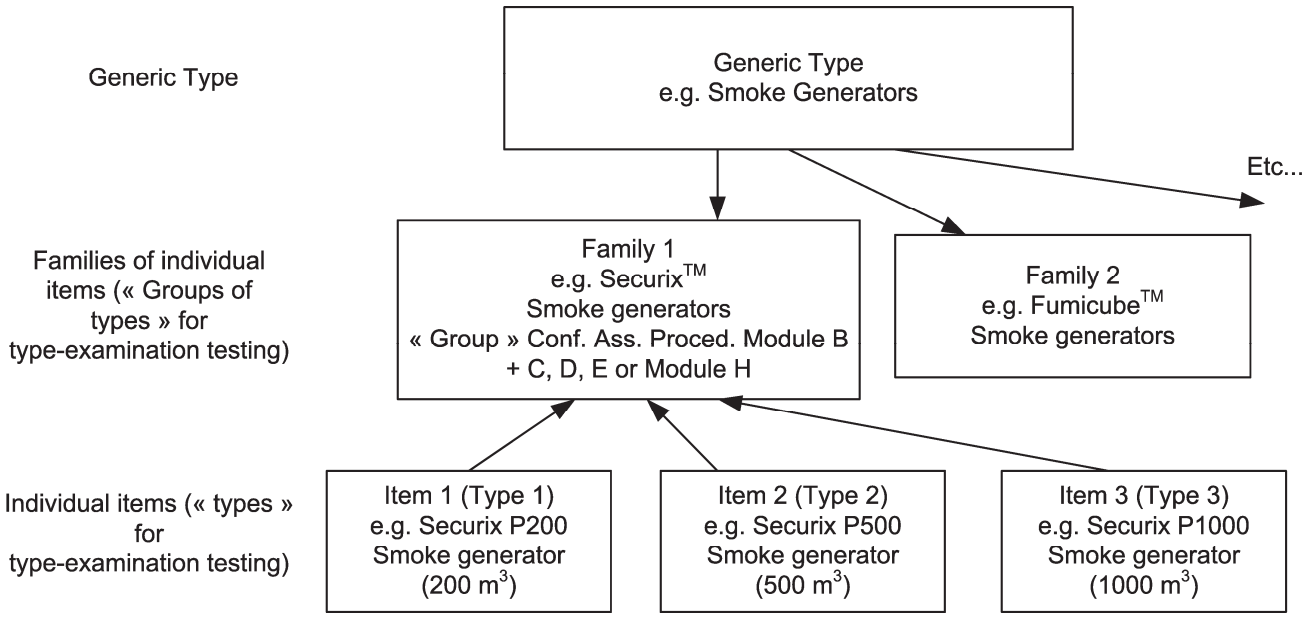

Figure 1 – Generic type, family and item

For some applications it may be useful to take account of “field of use” (See Annex B). However, WG 5 experts have decided to develop future harmonized standards on generic types, not on the field of use.

2.3 Use of blasting agents and military explosives

In its Annex I § (4) (a) and (b), Directive 2007/23/EC of 23 May 2007 “on the placing on the market of pyrotechnic articles” states pyrotechnic articles must contain neither commercial blasting agents, except for black powder or flash composition, nor military explosives.

As some T1 and T2 articles and C4 Fireworks, P1 and P2 articles already contain small amounts of explosives (e.g. nitrocellulose with high nitrogen content, single base or double base propellants one component of which is nitroglycerine) and must not be excluded from the European market as far as they comply with all the other essential safety requirements, except this § (4) (a) (b) of Directive 2007/23/EC / Annex I. Hence they must be included within the scope of preparing Standards for “other pyrotechnic articles” and to prepare suitable guidance.

CEN/TC 212 will prepare a specific resolution on that topic.

3 Interfaces between Working Groups

3.1 Interfaces between WG 5 and WG 1

WG1 has proposed to transfer:

— electric igniters used for fireworks ignition to WG 5

— friction-ignited flash bangers to WG 3 or WG 5

— whistlers to WG 3 or WG 5

“Electric igniters used for fireworks ignition”: WG 5 accepts this proposal without restriction.

"Friction-ignited flash bangers" and "whistlers": WG 5 experts consider these products may enter into its scope of work: for instance, they can be used as bird-scaring articles. They can also be used as "theatrical pyrotechnic articles" for indoor or outdoor stage use, including film and television productions or similar use. Is a common harmonized standard appropriate? Answer to this question will be given as early as possible during the development phase of the corresponding harmonized standards: WG 3 and WG 5 experts will compare their respective construction and performance requirements and propose their common view of the problem.

At present, WG 5 experts propose to create a corresponding generic type, called "Sound / Noise Emitters", which will include these two articles as well as other electrically or percussion actuated ones (See 4.3).

3.2 Interfaces between WG 5 and WG 2

Components of firework articles are often sold by manufacturers to other manufacturers in some European countries. Is Directive 2007/23/EC applicable in that case? Do "Category 4 firework articles" include components of fireworks such as stars, crackers, volcanoes, tourbillions, quick match, black match, cord igniters, fuses or delays… from the point of view of Directive 2007/23/EC?

WG 5 experts consider the answer is positive, but with the following approach: components of fireworks must be taken in consideration – if necessary and pertinent – by WG5 as "other pyrotechnic articles.

WG 2 and WG 5 experts have met the following agreement:

— WG 5 will treat components of fireworks when they are used in other fields than fireworks (for example, electric igniters, quick match, black match, cord igniters, pressed fuses, stars...).

— When these components are strictly relevant to the fireworks market, they will enter into the scope of work of WG 2 (for example, crackers, volcanoes, tourbillions).

3.3 Interfaces between WG 5 and WG 3

"Friction-ignited flash bangers" and "whistlers: See sub clause § 3.1 of this document.

Interpretation of "low hazard": Definitions of T1 and P1 articles of Directive 2007/23/EC refer to "low hazard" as a criterion to determine whether a "theatrical" or "other" pyrotechnic article is T1 or T2, P1 or P2. Because "low hazard" is a very imprecise term and pyrotechnic articles already placed on the consumers market may intrinsically present medium or high hazard from the point of view of some market surveillance organizations, WG 3 and WG 5 have joined their efforts to give a common operative interpretation of "low hazard" for their respective products (See 5.1 of this document).

3.4 Interfaces between WG5 and WG4

WG 4 experts consider igniters used as components in airbag inflators and other automotive pyrotechnic devices must enter in the field of "pyrotechnic articles for vehicles" since they are specially designed for automotive applications. In that case, WG 4 will create the corresponding standard and they will not be taken in account by WG 5.

Such igniters may be used without modification or adaptation in other applications than automotive. WG 4 and WG 5 experts agree on the following approach:

— Every automotive igniter will have a specific reference for its use in pyrotechnic devices for vehicles. This reference will correspond to specific automotive specifications and qualification tests will aim to confirm their compliance to these specifications. Type-certification will be made according to the applicable WG 4 standard. The data sheet of the product will indicate "to be only used for automotive applications".

— For other applications, even with an identical design, the automotive igniters will preferably have a different reference, as they are supposed to comply with different specifications and be possibly submitted to a different qualification process. Because WG 5 and WG 4 shall prepare separate standards for electric igniters, a comparison of these two standards will be made to determine what standard – the most restrictive – will be applicable when electric igniters developed for automotive industry are used outside this industry.

— In every case, igniters which will have been submitted to type-examination according to the more restrictive harmonized standard will not need to be tested again.

4 List of Other Pyrotechnic Articles and definitions

4.1 Preliminary inventory and definitions

An extraction of articles liable to enter in categories P1-P2 has been made from the lists of pyrotechnic articles given in Annexes I and II of Directive 2004/57/EC of 23 April 2004. But WG 5 experts have considered these two lists were not exhaustive enough. They have also considered some UN definitions needed to be improved whenever it was necessary for the purpose of their future development work of harmonized standards.

Then, WG 5 experts have tried to inventory more adapted collections of articles and have drawn up a new list of possible “other pyrotechnic articles”, with corresponding definitions. This list is given in Annex C.

This inventory has been based on the knowledge of WG 5 experts who attended the different meetings of this working group. Examples have been given by each of them to illustrate the above definitions. These examples are not cited in the present Technical Report, but they remain available as working documents which will possibly be used by Project Leaders during the development phase of harmonised standards.

To assure exhaustiveness of their inventory, WG 5 experts have also made a review of substances and articles which have been attributed a UN Number – and which are not obviously “ammunition”, “articles for use by the police or armed forces” or “articles and substances falling merely and undoubtedly under Directive 93/15/EEC” – has also been made to identify those which may be considered as “pyrotechnic articles” provided some conditions are met to be determined and proposed by WG 5 experts, then fixed by the corresponding harmonized standards.

4.2 Criteria used to determine “generic types”

This inventory shows articles which correspond to very different situations:

— some are associated to rather precise product architectures or designs, others are very general, others are located at mid distance between these “very general” and “rather precise” articles;

— others may appear to be collections of several generic types;

— others belong to specific fields of use.

Development of harmonized standards for “other pyrotechnic articles” requires a preliminary determination of “generic types”. WG5 experts have decided to give priority to “generic types” based on general construction or performance characteristics without reference to their possible field of use. Exceptions would be treated later if and only if a professional sector requires them and justifies the specific character of its requirements (See 4.4).

WG 5 experts have decided to generalize the construction and performance characteristics as much as possible, after having taken notice that:

— from the point of view of public safety, it may not be relevant to distinguish such effects as heat, light, fog and smoke, but on the contrary it may be important to keep pressure or gas flow separate when building “generic types”;

— “generic types” must be strictly determined only by the technical design and performance characteristics which are relevant from the point of view of the essential safety requirements of Directive 2007/23/EC; this will lead to determine requirements on a limited number of construction and performance characteristics;

— as a consequence of this limited number of construction and performance characteristics, possible candidates can be grouped under a sole generic type as far as specific requirements resulting from their different general design will be limited to a few short chapters in the corresponding harmonized standards.

WG 5 experts have then decided to determine these generic types using two alternative criteria:

— common architecture whatever the effect as far as it leads to similar consequences in terms of public safety: e.g. “other generators” including heat, light, fog and smoke generators (but not gas generators), the architecture of which consists of “a casing, with an ignition device and a combustive pyrotechnic grain, and may include a safe and arm device, filters, heat exchangers, drying charges, etc.”

— or common generic function to be fulfilled whatever the differences of design and the field of use: e.g. “igniters and primers” including electrically, optically or mechanically actuated items, the function of which is to “to start deflagration in an explosive train”.

4.3 Generic types: list, definitions and examples

Doing this, WG 5 experts have determined 16 generic types on which will be placed design and performance requirements in the future harmonized standards for “other pyrotechnic articles”.

These “generic types” are the following:

Flash cartridges

Other cartridges

Components for pyrotechnic trains

Pyrotechnic cords and fuses

Pressed fuses

Flares

Noise emitters

Fuzes

Gas generators (including power cartridges)

Smoke / Fog generators

Igniters (including primers)

Pyrotechnic matches

Pyromechanical devices

Semi finished pyrotechnic products

Rockets and their motors

Heaters

For corresponding definitions, comments and description of principal effects, see Annex D.

4.4 ESR

As said before, WG 5 experts have decided to give priority to "generic types" based on general construction or performance characteristics without reference to their possible field of use. The construction and performance requirements will be determined for these general characteristics in the WG 5 harmonized standards.

However, a generic function to be fulfilled in a common field of use by a given "generic type" may lead to the necessity of specific complementary requirements. This will be treated in a specific paragraph of the harmonized standard of this "generic type" (See 6.2).

In that harmonised standard, a specific paragraph will also be necessary to describe what must be done in the case a new field of use lead to the same situation.

However this rule may suffer exceptions if a given field of use implies specific requirements which are too distant from other uses of similar products to be encompassed in the same harmonized standards (e.g. "distress signals submitted to SOLAS regulations" but, in that case, specific standards have already been developed).

Such exceptions would be treated later if and only if a professional sector requires them and justify the specific character of its requirements.

5 Criteria to determine whether an article belongs to Category P1 or P2

5.1 Interpretation of "low hazard"

Directive 2007/23/EC gives the following definitions of P1 and P2 articles:

> *Category P1: pyrotechnic articles other than fireworks and theatrical pyrotechnic articles which present a low hazard;*
>
> *Category P2: pyrotechnic articles other than fireworks and theatrical pyrotechnic articles which are intended for handling or use only by persons with specialist knowledge.*

These definitions raise the following questions:

— What means "low hazard"?

— What about products which present more than a "low hazard" and are intended for handling or use by persons without specialist knowledge? (See Annex E).

Then WG5 experts agree that articles, under certain conditions to be detailed in the corresponding standard, may be P1 if user's instructions can be easily understood by every person and applied without ambiguity.

They propose to state their interpretation of "low hazard" as follows:

1) Criteria for P1 will be based on the article's hazard and/or pyrotechnic content and weight.

2) Articles, under certain conditions to be detailed in the corresponding standards (e.g. use of a specific tool, capacity to assure safety distances), may be P1 if user's instructions can be easily understood by every person and applied without ambiguity.

CEN/TC 212 has approved this interpretation at its plenary meeting on November 14th 2008 in Paris (See Resolution Nr 37/2008).

6 Harmonized Standards

6.1 Existing documents

The only documents concerning “other pyrotechnic articles” which have been found by WG 5 experts deal with “fastening cartridges” (See Ref. [3]). A link will be necessary with CEN/TC/213 which has the mandate to develop harmonized standards for the tools used for wall sealing and similar appliances.

6.2 List and Titles of Harmonized Standards to be developed

WG 5 experts propose to limit the list of harmonized standards to be developed for other pyrotechnic articles to:

— a specific standard for “ignition devices” (Cf. specific Essential Safety Requirements in Directive 2007/23/EC – See Annex I - § (5) C).

— a specific standard for other generic types, composed of five parts in the same manner as done by WG 1:

  — Part 1: Terminology

  — Part 2: Requirements (construction and performance requirements to comply with ESR)

  — Part 3: Categorization (P1 or P2?)

  — Part 4: Test Methods

  — Part 5: Labelling and user’s documentation

6.3 Justification of the list of harmonized standards

The reason why a specific standard will be developed for “ignition devices” comes from the fact that Directive 2007/23/EC, in its Annex I - § (5) C), sets specific Essential Safety Requirements for such articles or components of articles.

“Ignition devices” will include the following “generic types”:

Igniters (including primers)

Pyrotechnic cords and fuses

Pressed fuses

Fuzes

Components for pyrotechnic trains

The reason why all the other eleven “generic types” can be encompassed in a sole set of standards comes from the review of some examples of these “generic types” WG5 experts have made during their meetings. This review included a first attempt to determine, for each example, what could be the characteristics to be examined and the tests to be performed to check compliance with the Essential Safety Requirements of Directive 2007/23/EC.

WG 5 experts have concluded that corresponding construction and performance requirements would probably be sufficiently close – if not identical – to allow their insertion in a sole set of complementary standards.

However if, during the development phase, it appears necessary to elaborate complementary standards or if it is difficult to develop this unique set of standards, a new proposal will be made to CEN/TC 212 in due time.

6.4 Structure and Table of Contents

Possible “Table of Contents” for the WG 5 “Other pyrotechnic articles” harmonized standards:

Part 1: Terminology

1. Scope
2. Normative references
3. Terminology
   - 3.1. Generic types
   - 3.2. Technical terms

Part 2: Requirements

1. Scope
2. Normative references.
3. Construction requirements
   - 3.1. General
   - 3.2. Specific per principal effect[1)]
   - 3.3. Specific per field of use[1)]
4. Performance requirements
   - 4.1. General
   - 4.2. Specific per principal effect[1)]
   - 4.3. Specific per field of use[1)]
5. Temperature limits (if appropriate)
6. Other features related to ESR[2)]
   - 6.1. Method of ignition
   - 6.2. ‘Use by’ date

Part 3: Categorization

1. Scope
2. Normative references
3. Conditions determining whether an article is P1 or P2
4. Safety distances (if appropriate)

Part 4: Test methods

1 Scope

---

1) If necessary.

2) Paragraphs § 7.1 and § 7.2 correspond to specific essential safety requirements of Directive 2007/23/EC for “other pyrotechnic articles” (See its Annex I B (2) and B (4)).Type certification tests and batch tests.

2 Normative references

3 Recommendations for tests

3.1 Recommended test methods[3)]

3.2 Accuracy and statistical approach[4)]

3.3 Approval of alternative test methods

Part 5: Labelling and user's documentation

1 Scope

2 Normative references

3 Labelling and user's documentation

3.1 General

3.2 Specific per principal effect[1)]

3.3 Specific per field of use[1)]

3.4 Safety Data Sheets[5)]

WG 5 experts recommend distinguishing clearly "requirements" and "guidelines" (if any) in the future harmonized standards. They also invite to clearly show the link between the parameters to be submitted to requirements, these requirements and the corresponding check (or inspection) and test methods on one hand and the essential safety requirements they aim to comply with on the other hand.

7 Projects to be initiated within WG 5 (List and Mandates)

Following their proposal to develop two standards (one of which divided in five parts) in paragraph 6.2, WG 2 experts propose to initiate six projects with the following mandates:

PROJECT Nr 1:

Title: Development of a specific standard for "ignition devices".

Mandate:

"Ignition devices" will include the following "generic types":

— *Igniters (including primers)*

— *Pyrotechnic cords and fuses*

— *Presses fuses*

— *Fuzes*

— *Components for pyrotechnic trains*

3) See specific additional standards (if necessary).

4) Type certification tests and batch tests.

5) Hazard description and related data.

Development of a harmonized standard for ignition devices, particulary from the point of view of their safe use.

This project will take in account the specific Essential Safety Requirements stated by Directive 2007/23/EC in its Annex I - § (5) C for "ignition devices".

Because "ignition devices" are used as components in a wide range of pyrotechnic articles, this project will keep contact with WG 2, WG 3 and WG 4, as well as the other WG 5 projects.

PROJECT Nr 2:

Title: Development of Part 1 "Terminology" of the harmonised standard for "other pyrotechnic articles (except ignition devices)".

Mandate:

Development of Part 1 of the harmonized standard for "other pyrotechnic articles (except ignition devices)" to fix definitions of the main technical terms which will be used in the four other standards dealing with "other pyrotechnic articles (except ignition devices)".

Because the same terms may be used by other Working Groups, this project will keep contact with WG 1, WG 2, WG 3 and WG 4, as well as Project Nr 1 of WG 5.

Because the same terms may be used by other Working Groups, this project will keep contact with WG 1, WG 2, WG 3 and WG 4, as well as Project Nr 1 of WG 5.

This project will act as an advisor for the other WG 5 projects as far as terminology is concerned.

PROJECT Nr 3:

Title: Development of Part 2 "Requirements" of the harmonised standard for "other pyrotechnic articles (except ignition devices)".

Mandate:

Development of Part 2 of the harmonized standard for "other pyrotechnic articles (except ignition devices)" to fix construction and performance requirements for "other pyrotechnic articles (except ignition devices)" to comply with ESR of Directive 2007/23/EC.

This project will start by drawing up a table which will give the necessary links between "Essential Safety Requirements", "Construction or performance requirements", "Corresponding parameters to be measured" and "Test methods".

This project will justify this table by checking its coherence with the analyses made in the Type Description Sheets which has already been elaborated and proposed to WG 5 experts. New examples may be used as complements to support this demonstration.

This project will keep close and frequent links with Project Nr 5 "Test Methods".

PROJECT Nr 4:

Title: Development of Part 3 "Categorization" of the harmonised standard for "other pyrotechnic articles (except ignition devices)".

Mandate:

Development of Part 3 of the harmonized standard for "other pyrotechnic articles (except ignition devices)" to fix criteria to determine whether an "other pyrotechnic article (except ignition devices)" is P1 or P2.

According to the interpretation of "low hazard" which has been approved by a resolution of CEN/TC 212, this project will determine the corresponding specific conditions for category P1.

This project will justify these criteria and specific conditions by checking their coherence with the analyses made in the Type Description Sheets which has already been elaborated and proposed to WG 5 experts. New examples may be used as complements to support this demonstration.

PROJECT Nr 5:

Title: Development of Part 4 "Test Methods" of the harmonised standard for "other pyrotechnic articles (except ignition devices)".

Mandate:

Development of Part 4 of the harmonized standard for "other pyrotechnic articles (except ignition devices)" to select, describe and fix preferred test methods to check compliance of the construction and performance characteristics of "other pyrotechnic articles (except ignition devices)" with the ESR of Directive 2007/23/EC.

Criteria which will be used to select these test methods will take into account technical efficiency, easiness, reliability and economical aspects.

This project will also fix criteria for alternative test methods, to take in account the foreseeable evolution of measurement techniques or the possible development of more cost-effective test methods.

This project will keep close and frequent links with Project Nr 3 "Requirements".

PROJECT Nr 6:

Title: Development of Part 5 "Labelling and user's documentation" of the harmonised standard for "other pyrotechnic articles (except ignition devices)".

Mandate:

Development of Part 5 of the harmonized standard for "other pyrotechnic articles (except ignition devices)" to fix labelling requirements for "other pyrotechnic articles (except ignition devices)" in compliance with the Directive 2007/23/EC.

This project will also determine requirements for the documentation to be delivered to users (with (P2) or without (P1) specialist knowledge).

A special attention will be paid to the case of specific conditions (e.g. use of a specific tool, capacity to assure safety distances, etc.) which must be met for an article to be P1 together with the necessary easy and unambiguous understanding and application of user's instructions by every person.

This project will keep close and frequent links with Project Nr 4 "Categorization".

8 Future Work Program (Objectives, Tasks, Time targets)

The following work plan has been determined:

The above dates are indicative and will be confirmed when the work items will be registered in CEN Work Programme.

Description of action	Deadline
Circulation of New Work Item Proposal	June 2009
Preparation of the working draft that will be send to the CEN/TC 212 members for internal enquiry ***(stage: 20.60).*** The project leader will prepare and send the working draft to the secretary of CEBN/TC 212 / WG 5 who will send it to secretary of CEN/TC 212.	March 2010
Circulation of the working draft to the members of CEN/TC 212. The secretary will send this working draft for comments to the members of CEN/TC 212 (***stage 20.60).***	March 2010
Collecting the comments of the CEN/TC 212 members during the internal enquiry and send these comments to the members of CEN/TC 212 and the secretary of WG 5.	April 2010
Sending the comments of the internal enquiry to the members of the WG 5	April 2010
Discuss the comments of the internal enquiry in the WG 5 meetings	May 2010, September 2010, November 2010
Adapt the text of the working draft and prepare the document that can be sent to the members of CEN/TC 212 for approval for CEN enquiry. This will consist of the following steps:	
Prepare new documents for the meetings of WG 5 in May 2010, September 2010 and November 2010 by processing the comments and if applicable, additional information. Send these documents to the secretary of WG 5	3 weeks before the WG meeting
Prepare the draft version that will be send to the members of CEN/TC 212 for approval for sending it for CEN enquiry. The project leader will prepare and send the working draft to the secretary of the WG 5 who will send it to secretary of the CEN / TC 212	November 2010
Prepare draft resolution for sending the draft version for CEN enquiry. Send this draft resolution to the members of CEN/TC 212	December 2010
Collect the votes and send the Result of voting to the members of CEN/TC 212	January 2011
Send the draft version to CEN for CEN enquiry ***(stage 30.99)***	January 2011

Description of action	Deadline
CEN will send the prEN version (draft version) to the members of CEN/TC 212 for comments	April 2011
The results of the enquiry will be send to the members of CEN/TC 212 and CEN/TC 212 WG 5	September 2011
The comments will be discussed by WG 5	September 2011 and November 2011
A final draft version will be prepared and send to the members of CEN/TC 212 for approval to launch for Formal Vote The project leader will prepare and send the working draft to the secretary of WG 2 who will send it to secretary of the CEN / TC 212	November 2011
Approval of CEN/TC 212 to launch the final draft version for Formal Vote. Document will be send to CEN CMC for Formal Vote . ***(stage 45.99)***	December 2011
CEN CMC will send the Formal Vote version to the members of CEN/TC 212 for Formal Vote (final approval)	March 2012
CEN will send the results of the Formal Vote to the members of CEN/TC 212	May 2012
Approval of the (editorial) comments by the secretary of CEN/TC 212	June 2012
Publication of the standard	August 2012
Harmonization of the standard	October 2012

Annex A
(informative)

Definition of Other Pyrotechnic Articles – Complementary Information

WG 5 experts have tried to propose an answer to the following question:

"Where Directive 2007/23/EC stops and where Directive 93/15/EEC starts?"

Directive 2004/57/EC has been appealed for that purpose and it has been concluded what differentiates Directive 93/15/EEC and Directive 2007/23/EC does not depend on a gradation in safety and/or security levels, but is more linked to the "compatibility group" to which an article belongs: Directive 2007/23/EC deals essentially with products belonging to Groups G and S, but not all (See Directive 2004/57).

As a reminder, compatibility groups G and S include respectively:

G: Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one which contains white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel or hypergolic liquids).

S: Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prevent fire-fighting or other emergency response efforts in the immediate vicinity of the package.

WG5 experts consider pyrotechnic articles may not be limited to the list given in Annexes I and II of Directive 2004/57/EC and then to compatibility groups S and G:

1) This results from the fact substances showing a detonating behaviour are not prohibited in pyrotechnic articles. Special pyrotechnic applications make already use of small amounts of high explosives. Lists given in Annexes I and II of Directive 2004/57/EC are mainly limited to non detonative articles, then are incomplete from the point of view of the definition of pyrotechnic articles in Directive 2007/23/EC.

2) Some explosives may be "pyrotechnic articles" and not "substances" under certain conditions to be determined in the future harmonized standards (cf. analogy with stars used for fireworks).

3) Some articles may fall sometimes under Directive 93/15/EEC, sometimes under Directive 2007/23/EC according to their size, weight, package, etc. and then their compatibility group, and to their field of use. If a rocket motor which is designed for a missile is falling under Directive 93/15/EEC, the same is not true for a small rocket motor designed for distress signals or small-scale models which are built by aerospace fan clubs. In that particular case, what characteristics or behaviour differentiate the solid propellant used in those small rocket motors from pyrotechnic compositions, it being pointed out that these compositions may be developed and manufactured using the same propellant technology.

Then articles which may normally fall under compatibility groups C, D, E, F or N (See Ref. [1]) would be considered as "pyrotechnic articles". In those cases, harmonized standards should determine limits for some design or performance characteristics, for example, but not necessarily: net explosive content, amplitude of effects, capacity to transmit detonation, etc.

WG 5 experts have concluded:

— Products which Directive 2004/57 considers as “pyrotechnic articles” in its Annex I lead to a starting list.

— Products which Directive 2004/57 considers as “articles in respect of which a determination is required as to whether those articles are pyrotechnic articles or explosives” in its Annex II must be taken in account and criteria must be given in the future harmonized standards to assure this determination.

— Consequently, products belonging to Compatibility Groups G and S – but not all (See Annex II of Directive 2004/57) – are “pyrotechnic articles” and fall under Directive 2007/23.

— The two lists of Annexes I and II of Directive 2004/57 are supposed to be periodically updated, but it is necessary to check whether new UN Numbers have been given to pyrotechnic articles which were not identified in 2004 and have appeared on the international market since that date.

— A review of substances and articles which have been attributed a UN Number – and which are not obviously “ammunition”, “articles for use by the police or armed forces” or “articles and substances falling merely and undoubtedly under Directive 93/15/EEC” – must be made to identify those which may be considered as “pyrotechnic articles” provided some conditions are met to be determined and proposed by WG5 experts, then fixed by the corresponding harmonized standards.

— In the case of “new pyrotechnic articles” which cannot be linked to an existing UN Number or a P1/P2 generic type (See 6.4), a flowchart describing the procedure to be applied to develop a corresponding harmonized standard (if required) can be proposed to EC. In every case, Notified Bodies will be involved in the decision process.

However, if UN Numbers and compatibility groups are a good tool to draw up preliminary lists of “other pyrotechnic articles” (See 4.1), they will no longer be referred to in the final list of “generic types”. This results from the fact they are mainly linked to classify hazards and risks for transport activities, without any link to the essential safety requirements of Directive 2007/23/EC.

There is no specific reference to Class 9 products in Directive 2007/23/EC. In the same way, there is no explicit reference to Class 1 substances or products.

WG5 experts consider some Class 9 products fall within the scope of Directive 2007/23/EC, seeing they are “pyrotechnic articles” (e.g. UN Number 3268 “Airbag inflators, airbag modules and seat-belt pretensioners”).

Annex B
(informative)

Field of Use

For the purpose of development of harmonized standards for "other pyrotechnic articles", WG 5 experts propose to use the term "Field of use" with the following understanding:

"Field of use" means a generic function to be fulfilled in a common technical field of use by all the articles belonging to it: e.g. mole killing articles.

A "Field of use" may include several different "generic types", as well as a "generic type" may include products corresponding to different "fields of use".

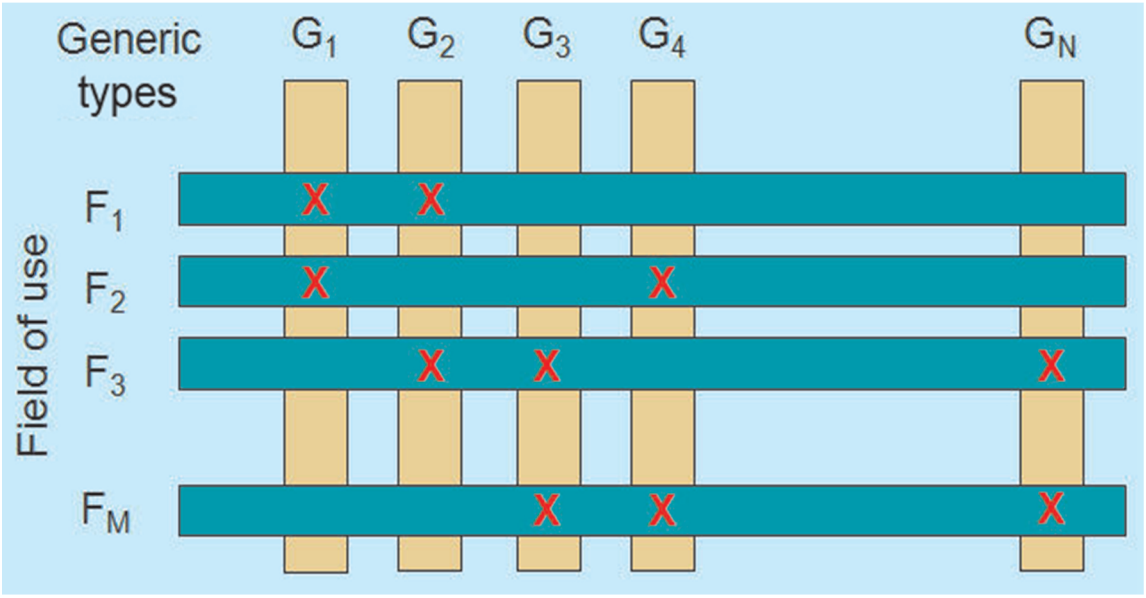

Figure B.1 – Generic type and field of use

EXAMPLES

— "Meteorological control products" (= Field of use) include anti-hail rockets, rain-triggering cartridges, airborne flares and possibly other "generic types".

— "Mole killing devices" (= Field of use) include products similar to lighters and ground flares, as well as igniters or firecrackers associated with an electronic firing unit.

— Smoke generators include various "fields of use": "Distress signals", "Phytosanitary aerosol generators", "Air extraction testing generators", "Fire suppression articles", "Robbery prevention generators", etc.

Annex C
(informative)

List of "Other Pyrotechnic Articles" and definitions

Collections of articles	Definitions / Functioning
Electric Igniters	Articles, actuated electrically, used to start deflagration in an explosive train. Electric current is used to heat a resistive element (e.g. bridge wire). The sensitive pyrotechnic material in contact with the resistive element is ignited by Joule effect. The article ignites a pyrotechnic chain by the deflagration that is generated.
Mechanical Igniters (e.g. percussion, friction)	Articles, actuated mechanically, used to start deflagration in an explosive train. Mechanical signal (e.g. percussion, friction) is used to ignite a pyrotechnic material sensitive to the mechanical signal. The article ignites a pyrotechnic chain by the deflagration that is generated.
Optical Igniters	Articles, actuated optically, used to start deflagration in an explosive train. Optical condensed light, transmitted through an optical fibre, is used to ignite by radiative heat transfer a pyrotechnic mixture. The article ignites a pyrotechnic chain by the deflagration that is generated.
Primers	Articles consisting of a priming charge for ignition and an auxiliary charge of deflagrating explosive to ignite the propelling charge in a cartridge case. Primers are designed to generate deflagration from the appropriate signal (electric current, percussion) to ignite a propelling charge.
Cord igniters	Fuse consisting of a core of pyrotechnic composition surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge. Device consisting of a core of pyrotechnic composition surrounded by a flexible woven fabric, usually in green. This device is usually used as the first part of ignition trains of fireworks and as means of fusing of cartridges loaded with pyrotechnic composition.
Fuze	Device used a pyrotechnic article which incorporates mechanical, electrical, chemical or hydrostatic components to initiate a pyrotechnic train.
Pressed fuses (see WG1, WG2 and WG3 for Fireworks)	Device consisting of pyrotechnic composition pressed in a rigid case. Pyrotechnic composition burns progressively along the device length with an internal flame and is used to transmit fire from the outside of a pyrotechnic device (external ignition) to contained charges (busting charge) after a determined time. In fireworks, pressed fuses are intended to provide a mean of fire transmission between the outside and the inside. Pressed fuses are normally ignited by the main ignition system or the lifting charge starting its combustion at the same time the firework is lifted. When combustion reach the end of the pressed fuse fire is transmitted to inside of the pyrotechnic article in which it is fixed activating pyrotechnic composition and producing the desired effect, usually bursting type effect. Combustion time between the two edges of the pressed fuse set the timing between lifting and bursting of devices.

"to be continued"

Collections of articles	Definitions / Functioning
Quick match (Fuse)	Black match: Fuse consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition It burns progressively along its end with an external flame and is used to transmit ignition from a device to a charge. Device consisting of pyrotechnic composition, usually black powder, stuck on cotton or other textile yarns with no protective cover or wrapping resulting in a fuse with the pyrotechnic composition exposed to external factors (i.e. fire, water, humidity, sparks, etc.). It burns progressively along its length with external flame. It has tendency to surface ignition by the sparks produced by its combustion products. Quick match: Fuse consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition wrapped loosely in a paper or plasticized paper pipe; It burns progressively along its length with an external flame and a combustion rate of several meters per second. It is used in ignition trains for fireworks and for the transmission of fire in the setting up of fireworks displays. Quick match is made by a core of black match type fuse cord wrapped loosely in paper or plastic pipe leaving free space between the fuse and the pipe. Hot gasses and sparks produced by the black match type fuse combustion are propelled through the gap between fuse and wrapping transmitting ignition along the quick match. This device is used in ignition trains and in the setting up of fireworks displays as a mean of quick fire transmission between fireworks articles.
Flash cartridges	Articles consisting of a casing, a primer and flash powder, all assembled in one piece ready for firing.
Signal cartridges (e.g. pistol, pen)	A cup (very short mortar for projection) containing both an effect composition and a means of ignition/projection, having a special adaptor (bayonet connector, thread, or similar) through which the cup can be connected to a non-pyrotechnic launching device. The launching device provides the necessary impulse for ignition in a reliable and safe way. The article is reliably fixed to a launching device and upon ignition a light, sound, or smoke effect is ejected from the cup.
Hand signal	Hand-held article containing a pyrotechnic effect-composition and having at least one means of ignition. The article has at least one handle which allows for a safe holding of the article during functioning. It generates a signal effect (light, aural, smoke, odour, or combinations of these).
Smoke signals	Article consisting of a pyrotechnic composition and a means of ignition, either inside a container or as pressed item. Ignition can be electrical, mechanical (impact or friction), or by flame. Generation of aerosols, sublimated substances, or smoke as a product of the reacting pyrotechnic composition.

"to be continued"

Collections of articles	Definitions / Functioning
Railways and road signals (e.g. flares, bangers)	Railway bangers: Articles containing pyrotechnic composition designed to produce a loud report when crushed by the wheels of a train engine. Articles consisting of a casing and an adaptor to secure them to the rail, with a crush-sensitive ignition device and a highly deflagrating composition. Railway flares / Road flares: Articles containing pyrotechnic substances which are designed for use to signal or warn. Articles containing compressed or compacted pyrotechnic substances in a rigid casing – generally a tube – where they are designed to exhibit cigarette-like burning with emission of a coloured (red) light.
P1 Marine signals	Fall under SOLAS regulations.
Aerial flares	Article to be thrown in the air or fixed to an aircraft and containing a pyrotechnic effect composition ignited by at least one means of ignition. Emission of light or hot products for a defined period of time.
Ground flares	Article to be placed on the ground and containing a pyrotechnic effect composition ignited by at least one means of ignition. Emission of light from the ground for a defined period of time.
Smoke generators	Article consisting of a pyrotechnic composition and an ignition system, both inside a container or as pressed item. Ignition can be electrical, mechanical (impact or friction), or by flame. Generation of aerosols, sublimated substances, or smoke as a product of the reacting pyrotechnic composition and to be used for camouflage, obscuration, or for visualisation of air-flow, or in order to disperse chemical agents.
Fog generators	Article containing a heat generating pyrotechnic composition, and designed to evaporate a substance to form finely dispersed droplets (fog) of the substance. The substance to form the fog is separate from the contained pyrotechnics. It generates fog for screening or obscuration, to be used inside or outside to protect rooms or buildings/facilities against intruders or assaults, or in order to disperse chemical agents.
Gas generators (except vehicles)	Articles generating a controlled flow of gases as long as the pyrotechnic grain burns to inflate structures, pressurize tanks, generate pure gases (e.g. breathable oxygen), etc. Articles consisting of a casing, with an ignition device and a combustive pyrotechnic grain. They may include a safe and arm device, filters to clean combustion gases from particles or noxious species, heat exchangers, drying charges, etc.
Power cartridges	Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, linear or rotary motion or activate diaphragms, valves or switches or project fastening devices or extinguishing agents.
Fixing charges Other terms: Fastening cartridges, Cartridges for concussion devices	Cartridges containing a pyrotechnic substance aimed at driving fasteners (e.g. nails) in solid materials for fixing purposes, by use of gas generated pressure. Cartridge actuated by percussion, containing a solid propellant delivering mainly gases, with a body closed by folding, without any projectile… Specialized equipment is needed to use this cartridge.

"to be continued"

Collections of articles	Definitions / Functioning
Line-throwers and similar devices	Rocket Motor or gas generating device for the purpose of propelling a line. A gas generating cartridge, usually a Rocket motor, used to propel a projectile with line attached. A specialized launching device is required.
Rocket motors for small-scale models	Propellant cartridge for powering model rockets. A Rocket motor, designed to be fitted to a model Rocket body. A specialized model Rocket body is required.
Meteorological control products: anti-hail rockets, rain-triggering cartridges	Anti-hail flares: Articles containing pyrotechnic substances which are designed for use to prevent from proliferation of hailstones. Articles containing compressed or compacted pyrotechnic substances in a rigid casing – generally a tube – where they are designed to exhibit cigarette-like burning with emission of gaseous products to disperse hygroscopic salts. Anti-hail rockets: Rockets equipped with a payload containing pyrotechnic substances which are designed for use to prevent from proliferation of hailstones. Articles consisting of a rocket motor and a payload with means of initiation and possibly containing two or more effective protective features. Payload is composed of a bursting charge which is used to disperse hygroscopic salts. Rocket motors consist of a charge of explosive, generally a solid propellant, contained in a cylinder fitted with one nozzle.
Pest killing or repulsive devices	Match-type mole-killing device: Kind of big match to be ignited by friction, coated with a pyrotechnic composition which burns to form a solid and porous slag which reacts with moisture to emit a mole-toxic gas. Articles actuated by friction, consisting of a stick which is coated by a slow-burning pyrotechnic composition and which is used to handle it or fix it when composition burns. Flare-type mole-killing device: Articles containing pyrotechnic substances which are designed for use to generate mole toxic or repelling gases, during combustion and then by reaction of a porous slag with moisture. Articles containing compressed or compacted pyrotechnic substances in a rigid casing – generally a tube – where they are designed to exhibit cigarette-like burning with emission of gaseous products. Ignition is simply obtained by use of a match or a lighter. Cracker-type mole-killing device: Squib to be placed inside mole galleries and actuated by a specific firing tool placed above the molehill. Squib = igniter with a boosting charge, designed to amplify the pyrotechnic output of the igniter. Pyrotechnic output is determined to kill the mole by injuring it as well as by a loud report. The firing tool includes a safe and arm electronic device and a mechanical trigger to start ignition when hit or moved by a mole.
Avalanche control products (except explosives)	No example found
Bird scaring devices /Sound signals.	Noise producing device for the purpose of scaring vermin. Either a free standing device with slow burning fuse, or a pyrotechnic cartridge designed to be fired from a gun and intended to produce a loud noise for the purpose of frightening vermin from airports, agricultural property, forestry plantations etc.

"to be continued"

Collections of articles	Definitions / Functioning
Actuators	Article containing a pyrotechnic composition and a means of ignition, producing mechanical effect by means of gas production. The article generates the following mechanical effects: activate (press, hit, push), unlock/open, separate, lock/close, weld/join, fasten/penetrate, pull.
Fast-lock devices	Article containing a pyrotechnic composition (small amounts of high-explosives are possible) and a means of ignition, producing the desired mechanical effect (e.g. by rupturing a component of the article). The article generates the following mechanical effects: unlock/open, separate/disjoin.
Security devices (e.g. suitcases, except 93/15)	Noise, Light or Smoke generator for the purpose of personal or property protection. A flare, smoke generator or noise producer fitted with a means of ignition which is intended be fitted to an object or area to be protected and designed to function when the area or object is compromised illegally.
Thermite products	Bag or Cartridge containing pyrotechnic substance designed to effect a weld by the production of heat and molten metal. Mixture of aluminum and iron oxide that reacts with evolution of great heat and the production of molten iron for the purpose of welding railway tracks etc.
Fire-extinction devices	(1) Fast burning gas generator used to disperse a solid or liquid chemical agent on a fire to quench the flame by oxygen or temperature reduction. or (2) Smoke and/or gas generator emitting under-oxygenated combustion products which react with ambient atmosphere to provoke flame extinction. In the first case, chemical agents are placed in a separate container connected to the exhaust outlet of the gas generator. In the second case, active chemical agents are mixed with the pyrotechnic composition of the generator or formed by reaction of this pyrotechnic composition.
Engine starters	Gas generators or power cartridges used to start turbines.

Annex D
(informative)

List of Generic Types and definitions

Generic Type	Definition	Sub types (non limitative)	Definition / Examples	Comments
Igniters	Articles containing explosive substance(s) used to initiate combustion or deflagration	Primers	Igniters consisting of a cap containing an explosive compound for ignition, with or without an auxiliary charge of deflagrating explosive, designed to ignite the propelling charge in a cartridge case	They may be actuated by chemical, electrical, optical or mechanical means
		Other igniters	All other igniters (with or without a boosting charge, designed to amplify the pyrotechnic output of the igniter)	
Components for pyrotechnic trains	Articles containing a pyrotechnic composition designed to transmit combustion, detonation or deflagration within a pyrotechnic train.			Include Bursting charges and lift charges for fireworks and other pyrotechnic articles
Pyrotechnic Cords and fuses	Article consisting of black powder or another pyrotechnic composition either coated on a supporting medium, or with a protective covering, or both			Include "shock tubes" when their linear speed is less than a limit to be determined.
Pressed Fuse	Article consisting of a casing with a core of deflagrating explosive. Designed to transmit ignition over a time period			Include delays (or delay fuses)
Semi finished pyrotechnic products	Compact objects made of pressed, cast, rolled, extruded etc. pyrotechnic composition used as component of other explosive articles			Include firework stars and propellant grains for rocket motors

"to be continued"

Generic Type	Definition	Sub types (non limitative)	Definition / Examples	Comments
Fuzes	Devices which incorporate mechanical, electrical, chemical or hydrostatic components to initiate a train			
Flash Cartridges	Articles consisting of a casing, a means of ignition and flash powder, all assembled in one piece ready for firing.			Includes all flash emitters
Other Cartridges	Articles comprising a cup containing means of ignition, projecting charge and effect to be projected. Designed to be fired by hand from a device having the means of holding the cartridge and providing the stimulus to function the means of ignition	Signal Cartridges	Cartridges projecting a light, sound, or smoke effect for the purpose of signalling.	Include Gas flare ignition, Meteorology triggering, Bird scaring cartridges…
		Cartridges projecting for technical purposes	Cartridges projecting an effect specially designed for a specific technical use.	
Pyrotechnic matches	Articles comprising exposed, preformed pyrotechnic composition which may be coated on an inert support		Examples: lighters, mole-killing matches, perfume diffusers, etc.	Include "Lighters" (= Articles used to ignite safety fuse). May be actuated by friction, percussion, heat or electrical power.
Flares	Articles consisting of casing filled with radiation producing composition with or without means of ignition	Flares hand held	Flares designed to be hand held	Except SOLAS, Smoke, Sound and Chemicals-diffusing flares. Include all flares which emits radiation (visible or not)
		Flares surface	Article designed to be placed on the ground.	
		Flares aerial	Article designed to be fixed to or launched from an aircraft	
Sound / Noise emitters	Articles (except cartridges) designed to emit sounds or noises.			Include bangers, crackers, hummers, whistles, bird scaring products…

"to be continued"

Generic Type	Definition	Sub types (non limitative)	Definition / Examples	Comments
Gas generators	Articles consisting of a casing, with an ignition device and a pyrotechnic charge designed to generate gases	Power devices	Gas generators filled with pyrotechnic composition designed to generate gases or a pressure impulse in a short time	Include all devices designed to produce inflation, pressurize tanks, generate pure gases (e.g. breathable oxygen), project substances, activate pyromechanical devices, etc. It will be necessary to fix a burning time boundary between "gas generators" and "power devices".
		Other gas generators	Gas generators filled with a combustive pyrotechnic grain designed to generate a controlled flow of gases	
Smoke / Fog generators	Articles consisting of a casing, with or without means of ignition, filled with pyrotechnic composition designed to generate smoke or fog.	Hand held smoke generators	Smoke generators designed to be hand held	Include generators designed to diffuse perfumes, disinfectants, phytosanitary molecules, rain-triggering substances, pest-killing substances, etc.
		Smoke / fog generators aerial	Smoke / Fog generators designed to be attached to an airborne object	
		Smoke / fog generators surface	Smoke / Fog generators designed to be placed on the ground or float on water	
Pyromechanical devices	Articles consisting of mechanical mobile parts which are driven by a charge of pyrotechnic composition or detonating explosive, without pyrotechnic effect outside or only with a limited effect outside.		Examples: Actuators (pushers, retractors...), fast-lock devices, switches, valves, pyrotechnic bolts and nuts, explosive rivets, release devices, knife-edge cutters, etc.	They generate linear or rotary motion or activate diaphragms and are used for opening, fastening, cutting, severing, release purposes, etc.
Rockets and their motors	Articles consisting of a charge of explosive, generally a solid propellant, either contained or not in a cylinder fitted with one or more nozzles.			
Heaters	Articles containing a charge of pyrotechnic composition designed to generate heat.			

Annex E
(informative)

Interpretation of "Low Hazard" - Examples

WG 5 members have worked on an interpretation of “low hazard” in the definition of P1 articles. They have considered the following argument and examples:

— “Low hazard” must not be determined from the behaviour of the article considered alone in free space, but in real configuration and conditions of use.

— For instance, fixing cartridges are only used with a firing tool and all pyrotechnic effects are kept inside this firing tool except in the direction of the projected nail, opposite to the user. Then the hazardous zone is strictly defined and the user can never be inside it. The practical result corresponds to a “low hazard” situation.

— Second example: some “road flares” exhibit an intense luminous effect, but – as far as the direction of effect is unambiguous and the handling part is clearly identified – there is no real danger for the user who holds it. This is also true when the “road flares” is placed on the ground in a support. The hazardous zone is clearly defined and the user can easily orientate the product in a way it generates no danger for him as well as for other persons. This can be considered as a “low risk” situation or can be considered as leading to the same consequences as a “low hazard” situation for the user which holds correctly the flare because of the orientation of effect. By comparison, a chain saw is much more dangerous.

— Third example: “railway bangers” are very insensitive to mechanical aggressions. They need to be crushed between a wheel and a rail to function. No projections, but a loud noise. Users are kept at a distance from the banger because of minimum safety distances imposed by the necessary distance to stop a train on a railway track. All these reasons lead to a “low risk” situation, which – from the point of view of the user – is much better than a pure “low hazard” situation or can be considered as leading to the same consequences at a distance as a “low hazard” situation.

Bibliography

[1] ADR (European **A**greement concerning the international carriage of **D**angerous goods by **R**oad) – § 2.2.1.1.6 "*Definition of compatibility groups of substances and articles"*

[2] CEN/TC 212 N0822, *On the use of blasting agents and military explosives*

[3] Norme NF E71-105 "Appareils de Scellement, d'Abattage et autres engins assimilés – Cartouches de service – Caractéristiques » (Devices for wall sealing, blasting and similar appliances – Cartridges – Technical Characteristics »

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