

# Joint Action 2014 GPSD

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## Final Technical Report FIREWORKS 2

Covering the period: 15 May 2015 - 14 July 2017



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## **Disclaimer**

This report arises from the Joint Market Surveillance Action on GPSD Products - JA2014, which received funding from the European Union in the framework of the 'Programme of Community Action in the field of Consumer Policy (2014-2020)'.

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## Abbreviations

ADR	The European Agreement concerning the International Carriage of Dangerous Goods by Road
ANEC	The European consumer voice in standardization
BENELUX	The Benelux Union: Belgium, Netherlands, Luxembourg
BEUC	The European Consumer Organisation
BG	Bulgaria
CA	Consumer Agency - Iceland
CE	European Conformity (Conformité Européene) mark for products sold in the EEA have been assessed to meet high safety, health, and environmental protection requirements
CEN	European Committee for Standardisation
Chafea	Consumers, Health and Food Executive Agency
DG TAXUD	Directorate-General for Taxation and Customs Union
DSB	Norwegian Directorate for Civil Protection
EAN	International Article Number
EC	European Commission
EEA	European Economic Area
EFTA	European Free Trade Association
EN	European Standard
EU	European Union
EUFIAS	European Fireworks Association
EuroSafe	The European Association for Injury Prevention and Safety Promotion
FPSE	Federal Public Service Economy, SMEs, Self-Employed and Energy - Belgium
GPSD	General Product Safety Directive
IC	Iceland
ICSMS	The Information and Communication System on Market Surveillance
ILenT	The Human Environment & Transport Inspectorate
ILNAS	The Luxembourg Institute of Standardisation, Accreditation, Safety and Quality of Products and Services
JA2011	Joint Market Surveillance Action 2011, GA no. 2011 8201 coordinated by PROSAFE
JA2014	Joint Market Surveillance Action 2014, GA no. 666174, coordinated by PROSAFE with an implementation time-frame of May 2015 up to July 2017
LU	Luxembourg
MDC	Ministry of Development and Competitiveness, General Secretariat for Consumer Affairs - Greece
MSA/s	Market Surveillance Authority(ies)
MS/s	Member State(s)
NEC	Net Explosive Content
PROSAFE	Product Safety Forum of Europe
RAPEX	The Rapid Alert System for non-food dangerous products
RoSPA	The Royal Society for the Prevention of Accidents
SAMTS	State Agency for Metrological and Technical Surveillance
STI	Slovak Trade Inspection
TC	Technical Committee
UK	United Kingdom
UOKIK	Office of Competition and Consumer Protection - Poland

## Executive Summary

This report details the activities undertaken and the results achieved in the product activity entitled 'FIREWORKS 2', which formed part of the 'Multi-annual programme of action for health (2014-2020)'. The programme was supported financially by the European Union under Grant Agreement No. 666174 and coordinated by PROSAFE.

Thirty-five market surveillance authorities from 27 different countries within the European Economic Area took part in the overall joint market surveillance action - JA2014. They included: Austria, Belgium, 2 authorities from Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, 4 authorities from Germany, Greece, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, 2 authorities from The Netherlands, two authorities from Norway, Poland, two authorities from Portugal, Romania, Slovakia, two authorities from Slovenia, Sweden and the United Kingdom.

With regard to the product specific activity entitled 'Fireworks 2' within JA2014, nine countries took part in this market surveillance action, viz.: Belgium, Bulgaria, Greece, Iceland, Luxembourg, Norway, Poland, Slovakia, and The Netherlands.

External stakeholders were invited to attend the first Project Group meeting. The contributions from ANEC, BEUC, CEN Technical Committee 212 - Pyrotechnic Articles, European Child Safety Alliance, Eurosafe, European Fireworks Association, French Consumer Safety Commission, and Royal Society for the Prevention of Accidents, UK were particularly useful. It was found that the cross sharing of experience and expertise between the market surveillance authorities involved in the project and the other stakeholders was particularly valuable.

The legislation that pertained to the project was:

Directive 2007/23/EC on the placing on the market of pyrotechnic articles;

Directive 2013/29/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pyrotechnic articles (recast), and

Directive 2014/58/EU pursuant to Directive 2007/23/EC setting up a system for the traceability of pyrotechnic articles.

During the course of the project the European Standard concerning Fireworks - EN 15947: 2010 was under review by CEN. This resulted in Parts 1-5 of prEN 15947: 2014 - Pyrotechnic articles - Fireworks, Categories 1, 2, and 3 being published during the summer 2014, and Parts 1-5 of EN 15947: 2015 - Pyrotechnic articles - Fireworks, Categories 1, 2, and 3 being published during the winter 2015.

Changes were introduced by the publication of prEN 15947: 2014 and EN 15947: 2015 included the re-designation of the type of firework. This included the creation of new types of firework 'battery requiring external support'; 'combination requiring external support' and 'compound firework'.

The project principally focused on collecting the following types of fireworks during the market surveillance exercises:

- Category 1 - Hand held sparklers;
- Category 2/3 - Bangers and Double Bangers;
- Category 2/3 - Batteries and Combinations;
- Category 2/3 - Flash bangers;
- Category 2/3 - Jumping ground spinners;
- Category 2/3 - Roman Candles;
- Category 2/3 - Rockets;
- Category 2/3 - Compound fireworks.

A total of 424 products were collected from the market by the 9 market surveillance authorities, with, on average, circa 47 samples being sampled by each authority. The samples were collected in two market surveillance exercises, one during the winter 2015/16, the other during the winter 2016/17.

Following an invitation to tender to all the test laboratories listed at the NANDO website for Directive 2007/23/EC - Pyrotechnic articles, four test laboratories submitted tenders. The tenders were evaluated using a marking scheme agreed by the Project Group. Two laboratories were appointed to undertake the testing of the samples collected from the market.

A total of 274 products were found to be non-compliant. A risk assessment was undertaken on these products by the market surveillance authority that had collected the products. As a result of the risk assessment it was found that the bulk of the products did not present a serious risk to consumers. There were, however, five products which presented a serious risk to consumers and which were being placed on the market in more than one EU Member State. These products were the subject of an 'Article 12' RAPEX notification.

A library containing 62 risk assessments relating to 'non-compliant' fireworks was assembled from data provided by the participating Member States. They relate to 8 different 'types' of firework. Following a review of these assessments a paper was prepared summarizing the different hazards presented by each 'type' of firework, the severity of injury associated with each hazard and the probability that the hazard would occur. The level of risk associated with each hazard was assessed based on that information. Where practicable, sensitivity analysis was undertaken in order to determine whether the level of risk would change if the severity of the injury was increased/decreased and/or the probability of injury was increased/decreased. The paper summarizing the level of risks associated with the different type of firework has been placed on the PROSAFE 'Dropbox' system.

## Conclusions

The Project was very successful in that the nine participating Member States achieved the objective of collecting a wide range of products from the market, sent them for testing, evaluated the results by conducting risk assessments on non-compliant products and, where appropriate, taking the appropriate regulatory action.

During the course of the Joint Action a total of 424 different products were collected from the market (431 if differently coloured labels on the same brand of rocket are included). Eleven samples of each product were collected, ten were sent to the laboratory for testing and one was retained by the Member State concerned in order to review its markings and labels. 58% of the products were found to be non-compliant, i.e. that one or more of the samples failed to comply with one or more of the 'major' or 'critical' non-conformities identified at EN 15947-5: 2015 - Clause 10.4 - Table 6.

A total of 363 separate non-conformities were identified. For the bulk of samples 1, 2 or 3 of the samples from the 10 tested were non-conforming, but in the case of 54 of the samples 7, 8, 9 or 10 samples were found to be non-conforming. The trade needs to note this and to take steps to improve its specification of the fireworks it orders from manufacturers so as to reduce the number of non-compliant products. Anecdotal evidence would suggest that, in many cases, fireworks are being purchased by economic operators on an 'as seen' basis, rather than as in other consumer product sectors, the importers clearly specifying the requirements for the various items that constitute the finished product.

JA2014 - Fireworks 2 collected considerably more products than in the case of JA2011 - Fireworks, where a total of 138 products were collected from the market. As a consequence, the Project Group were able to gain a more comprehensive picture of the extent of non-compliances than during the conduct of JA2011.

## Caution!

*The test results included in this Report are based on products that were sampled from the markets in the participating countries by experienced market surveillance inspectors that were looking for potentially non-compliant and unsafe products. As in any routine market surveillance activity, the results represent the targeted efforts that authorities undertake to identify unsafe products. They do not give a statistically valid picture of the market situation. In this Action, the term ‘targeted’ refers to the fact that specific types of firework were selected for inclusion in the market surveillance exercises, rather than fireworks in general as we believed that these types of firework were likely to be particularly hazardous to consumers.*

*The samples were tested at an accredited laboratory. The testing focused on those safety requirements that are specified in EN 15947: 2010 or EN 15947: 2015 that are considered to present ‘major’ or ‘critical’ non-conformity. Each of the market surveillance authorities also reviewed the ‘markings and labels’ on the product to see whether they were in conformity with the pyrotechnics directive and/or EN 15947. This aspect of the market surveillance activity is also important as a failure to mark or label the product correctly is considered to present a ‘major’ non-conformity.*



## Introduction

This is the Final Technical Report relating to the market surveillance activity FIREWORKS 2. It formed part of the Joint Market Surveillance Action on GPSD Products - JA2014. The Joint Action received funding from the European Union in the framework of the 'Multi-annual programme of action for health (2014-2020)'.

Section 1 of the report introduces the project and provides some background information relating to the activity. Section 2 discusses the work that was undertaken during the first, preparatory, stage of the project. Section 3 provides a summary of the number and types of products that were collected during the two market surveillance activities and the results obtained following the testing of these products.

Section 4 outlines the follow-up activities that were undertaken by the participating Member States in relation to non-compliant products.

Section 5 discusses the key area of risk assessment and provides details of the risk assessments undertaken by Member States on certain non-compliant products.

Section 6 discusses the links that the Project Group established with a range of external stakeholders. These included the customs service in certain Member States, European Commission and the European Fireworks Association. Finally, Section 7 summarises the lessons learnt from the conduct of this project and the conclusion that can be drawn from the conduct of the activity.

Statistics shown in this report need to be used and interpreted with caution. The scope of such projects is not to determine the percentage level of safe products within the respective parts of the Single Market, but rather to ensure that any dangerous products are completely removed as quickly as possible, through effective collaboration between the market surveillance authorities and the economic operators.

As in any market surveillance activity, the results represent the targeted efforts that authorities undertake to identify unsafe products. In this connection, the products that were sampled from the market were from those 'types'<sup>1</sup> of firework that the Project Group considered to present the greatest risk to consumers. The market surveillance officers recognised that in this particular project it was not possible to identify products at the premises of the economic operator that were likely to be non-compliant without recourse to laboratory testing on the items concerned. The results do not give a statistically valid picture of the market situation. Having said that, it is hoped that both market surveillance authorities and the external stakeholders find this report useful and informative.

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<sup>1</sup> The various 'types' of firework that can be placed on the market are defined at EN 15947-2: 2010 & at EN 15947-2: 2015.

# 1. Background Information

The Joint Action 2014 (JA2014) is an umbrella project co-funded by the European Union the Grant Agreement No. 666174. The project participants are market surveillance authorities from the European Member States that cooperate under PROSAFE's coordination. One of the work packages of this action (no. 9) focuses on Fireworks.

## 1.1 Title of the Activity

The name of the activity is "Fireworks 2".

The activity focussed on the dangers to consumers that are presented by a range of different types of firework.

## 1.2 Participating Member States

The activity was undertaken by PROSAFE and 9 market surveillance authorities from nine Member States: Belgium, Bulgaria, Greece, Iceland, Luxembourg, Norway, Poland, Slovakia, and The Netherlands.

## 1.3 Overview of participants in the Activity

The Activity Leader was Arno van Dop from The Human Environment and Transport Inspectorate, The Netherlands. A PROSAFE coordinator, Robert Chantry-Price, supported the Activity Leader.

A Project Group was established by PROSAFE to oversee the conduct of the activity. The membership of the Group included the following representatives from the participating Member States:

- Belgium - Federal Public Service Economy, SMEs, Self-Employed and Energy (FPSE);
- Bulgaria - State Agency for Metrological and Technical Surveillance (SAMTS);
- Greece - Ministry of Development and Competitiveness, General Secretariat for Consumer Affairs (MDC);
- Iceland - Consumer Agency (CA);
- Luxembourg - The Luxembourg Institute of Standardisation, Accreditation, Safety and Quality of Products and Services (ILNAS);
- Norway - Norwegian Directorate for Civil Protection (DSB);
- Poland - Office of Competition and Consumer Protection (UOKIK);
- Slovakia - Slovak Trade Inspection (STI);
- The Netherlands - The Human Environment & Transport Inspectorate (ILenT).

## 1.4 Main Objectives

The primary objective of this activity was to detect potentially dangerous products on the market. The product specific activities allowed the:

- Sharing of best practices, and
- The exchange of experiences in relation to this market surveillance activity on FIREWORKS.

During the preparatory phase, the Project Group focused on:

- Determining the activities to be undertaken during the course of the project;
- Establishing the project plan;
- Establishing which 'types' of firework presented the highest risk to consumers;

- Establishing which non-conformities, as described at Table 4 at EN 15947: 2010 - Pyrotechnical Articles - Fireworks - Categories 1, 2 and 3 - Part 5 - Requirements for Construction and Performance, are likely to present a significant hazard to consumers;
- Issuing an invitation to test laboratories to tender for the testing of samples;
- The appointment of 2 test laboratories to undertake the testing of fireworks collected during the course of the market surveillance exercises.

In the intermediate phase, the Project Group focused on:

- The collection of samples from the market;
- The testing of the samples collected from the market;
- Conducting an initial risk assessment as to whether the non-compliant products presented a serious risk to consumers.

During the final phase, the Project Group:

- Undertook a final risk assessment on the non-compliant products to ascertain whether they presented a serious risk to consumers;
- Disseminated the results on the testing of products;
- Formulated a number of best practices in relation to the risk assessment of non-compliant products;
- Collected information on the measures taken by market surveillance authorities in relation to non-compliant products.

## 1.5 Number of samples tested

A total of 424 individual products were sent for testing. A total of 274 products were collected during the winter 2015/16 market surveillance exercise. A further 150 products were collected during the winter 2016/17.

For each product 11 samples were collected. Ten (10) were sent to the test laboratory for testing, one (1) was retained by the market surveillance authority. This was in order to review the markings and labels on the product for conformity to the requirements of the Pyrotechnics Directive and/or EN 15947- 3: Pyrotechnic Articles - Fireworks, Categories F1/1, F2/2 and F3/3 - Minimum Labelling Requirements.

## 1.6 The main activities

The project included the following activities:

- Deciding on the 'types' of firework to be sampled during the course of the market surveillance exercises.
- A review of the European standard EN 15947 concerning Pyrotechnic articles - Fireworks - Categories 1, 2 and 3<sup>2</sup>. The relevant standards included:  
EN 15947: 2010 - Pyrotechnic Articles - Fireworks - Categories 1, 2 and 3 - Part 2 - Categories and types of firework describes the characteristics of 32 different types of firework. The Project Group

<sup>2</sup> EN 15947 consists of 5 parts, viz.

EN 15947-1. Pyrotechnic articles. Fireworks, Categories F1, F2 and F3. Terminology

EN 15947-2. Pyrotechnic articles. Fireworks, Categories F1, F2, and F3. Categories and types of firework

EN 15947-3. Pyrotechnic articles. Fireworks, Categories F1, F2, and F3. Minimum labelling requirements

EN 15947-4. Pyrotechnic articles. Fireworks, Categories F1, F2 and F3. Test methods

EN 15947-5. Pyrotechnic articles. Fireworks, Categories F1, F2, and F3. Requirements for construction and performance

reviewed the various categories and types of firework and decided on which categories and types of firework should be included in the market surveillance activities.

During the course of the Project prEN 15947 - 2: 2014 was published. This details all the types of firework referenced at EN 15947- 2: 2010, together with 3 additional types of firework.

In early 2016 EN 15947 - 2: 2015 was published. It contained no new types of firework.

- Deciding on sampling criteria
- Sampling products
- Testing products at an accredited laboratory
- Undertaking a Risk Assessment on non-compliant products
- Following-up on non-compliant products and exchange information on the follow-up activities.

## 1.7 Timeline of the Activity

The phasing of the activity was:

Phase 1 - Month 3- Month 8 - The preparatory phase.

During this phase, the 'kick off', a first Project Group meeting was held. It consisted of an 'open meeting' to which representatives of the participating Member States and the stakeholders were invited and a 'closed' meeting for the participating Member States. The 'open' meeting was held at PROSAFE's offices in Brussels on 7 July 2015. The 'closed' meeting was held in the same location on the same day.

The external stakeholders that were invited to attend the 'open' meeting included representatives from:

DG Justice and DG Growth as well as from ANEC, BEUC, CEN - Technical Committee TC 212 - Pyrotechnic articles; The European Child Safety Alliance; EuroSafe; The European Fireworks Association; The French Consumer Safety Commission; The Royal Society for the Prevention of Accidents, UK.

The second Project Group meeting was a 'closed' meeting and held during this phase. It was held at PROSAFE's offices in Brussels on 15 September 2015.

Phase 2 - Month 9 - Month 16 - The second phase

The third Project Group meeting took the form of a 'closed' meeting for the participating Member States and was held at The School of Mining and Energy Engineering, Technical University of Madrid, Madrid on 8 and 9 March 2016. During the course of the meeting the results from the testing of products collected during the course of the winter market surveillance exercise 2015/16 were discussed, together with a number of 'provisional' risk assessments on a range of non-compliant products.

The fourth Project Group meeting was also a 'closed' meeting for the participating Member States and certain Customs Authorities. It was held at PROSAFE's offices on 15 June 2016. The principal item of business was a discussion with customs staff from a number of the countries participating in JA2014 - Fireworks 2. It concerned how market surveillance and customs staff could work together more closely to prevent non-compliant fireworks entering the EEA. Inter alia, discussions centred on how training and the exchange of knowledge could help to achieve this objective. The Group also discussed a number of activities that could help promote closer working between PROSAFE/market surveillance staff & Customs staff/DG TAXUD. These included the exchange of best practice between the two sets of organisations and undertaking follow up activities to promote closer working relationships between market surveillance and customs staff in the participating Member States.

Other issues discussed at the meeting included:

A review of the follow up work undertaken by the participating Member States in relation to non-compliant products sampled during the winter 2015/16 market surveillance exercise;

A review of the risk assessments undertaken by certain Member States on non-compliant products collected during the 2015/16 market surveillance exercise:

The conduct of the winter 2016/17 market surveillance exercise. This exercise would include the acquisition of some samples from economic operators that operate on-line.

### Phase 3 - Month 17 - Month 26 - The final phase

The fifth and final Project Group meeting was a 'closed' meeting and held at PROSAFE's offices on 29 March 2017. It was principally devoted to:

Reviewing the results from the testing of samples collected during the winter 2016/17 market surveillance exercise;

A review of the regulatory action being taken by the regulatory authorities concerning the non-compliant products collected from the market during the winter 2016/17;

A paper summarising a review of the 62 risk assessments undertaken on non-compliant products was prepared and published on the 'Drobox' filing structure that PROSAFE established for the consumer Joint Actions, including JA2014.

A draft of the Final Technical Report on the project was received and reviewed;

A discussion took place on the results of the tests conducted by the two laboratories on the products collected from the market place by the participants during the winter 2016/17. Representatives from the labs were respectively present for these discussions to report on the conduct of these tests.

The Activity Leader and the Activity Coordinator attended the Final Workshop of JA2014 in Brussels on 25 April 2017 and presented an oral report on the conduct of the Joint Action - Fireworks 2.

## 2. Setting up the Product Activity

### 2.1 The preparatory phase

This was the second occasion on which PROSAFE has conducted a multi-national market surveillance exercise into the compliance of fireworks with the relevant legislation and safety requirements. It followed on from the work undertaken during a previous Joint Action on Fireworks, which formed part of JA2011. That Project was undertaken under the provisions of Directive 2007/23/EC - on the placing on the market of pyrotechnic articles and EN 15947 Parts 1-5: 2010 - Pyrotechnic articles - Fireworks, Categories 1, 2 and 3.

Members were aware that in the intervening period the fireworks market had changed and developed in response to two new directives, viz.:

Directive 2013/29/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pyrotechnic articles (recast), and

Directive 2014/58/EU pursuant to Directive 2007/23/EC setting up a system for the traceability of pyrotechnic articles.

During this period, the European Standard on Fireworks - EN 15947: 2010 was under review by CEN. This resulted in Parts 1-5 of prEN 15947: 2014 - Pyrotechnic articles - Fireworks, Categories 1, 2, and 3 being published during the summer 2014. During the winter 2015 in Parts 1-5 of EN 15947: 2015 - Pyrotechnic articles - Fireworks, Categories 1, 2, and 3 were published.

Major changes introduced by prEN 15947: 2014 and EN 15947: 2015 included the redesignation of the type of firework:

- ‘batteries’ into two types ‘batteries’ and ‘batteries requiring external support’;
- ‘combinations’ into two types ‘combinations’ and ‘combinations requiring external support’, and
- the introduction of a new type of firework - ‘compound fireworks’.

An example of a ‘compound firework’ is shown in **Error! Reference source not found..** It consisted of a number of batteries which are securely fixed on the same base and connected together by a linking and a reserve fuse.



Figure 1 - Product 13SL - An example of a compound firework



The Project Group for JA2014 was particularly concerned about how to specify the safety requirements for the new type of fir ‘compound fireworks’. These are fireworks in which the ‘assembly, including several separately CE marked fireworks complying with EN 15947, are securely fixed on the same base, and connected together by linking the protruding and reserve fuses of each firework, or with separately CE marked pyrotechnic cords according to EN 162653, or a mixture of both, with one or two points of ignition, without external support’<sup>4</sup>. These concerns were resolved when prEN 15947: 2014 was published as it defined this ‘type’ of firework and outlined its safety requirements.

Although relatively few Category F2 or F3 ‘compound fireworks’ are available to consumers, Member States took the view that, if possible, examples of this new type of firework should be included within the market surveillance exercise.

The only sample of a ‘compound firework’ that was collected during the market surveillance exercises proved to be non-compliant as some of the pyrotechnic units failed to function properly. An illustration of this particular firework is at Figure 2.1. This particular sample was subsequently initiated using the reserve fuse, but nevertheless several launch tubes in the 4th battery failed to fire.

During the course of JA2011- Fireworks Member States had expressed concern that, in many cases, ‘batteries’ without external support were being placed on the market and that they could become unbalanced shortly after ignition. These fireworks were generally of Category 2, rather than Category 3. They had a base length less than their height. This could lead to their ‘wobbling’ as the shots were being fired resulting in the battery tipping over and, on occasion, being aimed at bystanders. It was decided that examples of this type of firework should be collected during the course of the market surveillance exercises.

During this phase, the Project Group reviewed the terms of reference of the Joint Action and concluded that it needed to determine, as soon as possible:

- Which ‘types’ of firework should be included in the market surveillance exercises;
- When the market surveillance exercise(s) should be conducted;
- The number of samples that should be collected from the premises of economic operators during the course of the market surveillance exercise(s). In this connection members considered whether samples should be collected from economic operators who are operating ‘on-line’;
- How to proceed with regard to the call for tender for the testing of items collected from the marketplace and how to select the test laboratory that would undertake the testing of the products;
- The number of samples of each product that should be collected from the premises of economic operators;
- The clauses detailed in EN 15947 to which the products should be tested by the test laboratories;
- The methodology to be used when undertaking risk assessments on non-compliant products, and
- How the regulatory action taken by participating Member States against non-compliant products might be harmonized so as to achieve parity of approach when taking regulatory action against economic operators.

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<sup>3</sup> EN 16265: 2015 - Pyrotechnic articles. Other pyrotechnic articles. Ignition devices.

<sup>4</sup> EN 15947: 2015-2: 2015 - Clause 6 - Table 2.

## 2.2 The timescale and the ‘types’ of firework to be collected

Members of the Project Group were aware that the collection of products from the market is only feasible in the run up to the New Year period, as this is the time during which economic operators have the maximum quantity of fireworks on their premises. Outside this period stocks would be low and mainly consisting of unsold products from the previous New Year period.

The late start to JA2014 - viz. mid May 2015, instead of January 2015, proved to be advantageous to the project as it enabled two market surveillance sweeps to be undertaken during the course of the project. The first one was undertaken in the run up to New Year 2016 and a second, smaller one, in the run up to New Year 2017.

Experience gained during the conduct of JA2011 - Fireworks had shown that certain types of firework are likely to be more hazardous to consumers than others. In deciding on which types of firework to collect from the market the Project Group recognized that it would be necessary to survey the safety of all three Categories of firework that are available to the public, viz.:

Category F1: fireworks which present a very low hazard and negligible noise level and which are intended for use in confined areas, including fireworks which are intended for use inside domestic buildings;

Category F2: fireworks which present a low hazard and low noise level and which are intended for outdoor use in confined areas;

Category F3: fireworks which present a medium hazard, which are intended for outdoor use in large open areas and whose noise level is not harmful to human health.

The Project Group agreed not to include in the market surveillance exercises the following types of firework:

Category F4 fireworks, i.e. those which present a high hazard, which are intended for use only by persons with specialist knowledge (commonly known as fireworks for professional use) and whose noise level is not harmful to human health;

Category T1 and T2 fireworks, i.e. theatrical pyrotechnic articles, and  
Category P1 and P2 fireworks, i.e. other pyrotechnic articles.

## 2.3 Appointment of the laboratories and the applicable standards

A notice inviting the test laboratories that were authorised to conduct tests in accordance with EN 15947-2: 2010 - Pyrotechnic articles - Fireworks - Categories 1, 2 and 3 was posted on the PROSAFE website on 20 July 2015 requesting that they contact the Project Coordinator by 31 July 2015 for further details of the invitation to express an interest in tendering for testing fireworks. On 4 August 2015 an invitation was sent to the test laboratories formally inviting them to tender for the testing of fireworks in connection with JA2014 - Fireworks 2. The final date for the receipt of tenders by PROSAFE was 6 September 2015.

(Note: In the period up to June 2015 the list of suitable test laboratories was designated under the provisions of Directive 2007/23/EC. Shortly after that date this list was taken down from the NANDO website and during the autumn 2015 a new list of laboratories started to be published under the provisions of Directive 2013/29/EU. As at 7 July 2015 only 2 laboratories were listed on the NANDO website relating to Directive 2013/29/EU, so the Project Group decided that the list of labs published under the provisions of Directive 2007/23/EC should be used as the basis for inviting test labs to tender for the testing of fireworks collected from the market during the course of the Joint Action. Furthermore, it was noted that the Grant Agreement, at Clause 4.3 on page 46/88, dated 13/05/2015, required that, for the amount of funding available for the testing of fireworks, a minimum of five bids would need to be received.)

By the closing date for the receipt of tenders only four tenders had been received.

No responses were received from the other laboratories that were notified under the provisions of Directive 2007/23/EC.

The Activity Leader and the Activity Coordinator reviewed the tenders and prepared a critical analysis showing the strengths and weaknesses of each submission. The tenders were assessed in accordance with



the marking scheme that was agreed at the 1st Project Group meeting. The desk review revealed that each of the labs had not given all the information required in order to evaluate their tender satisfactorily. The Activity Coordinator wrote immediately to each lab asking if they could supply the requisite additional information.

The responses to the Invitation to Tender were reviewed at the 2<sup>nd</sup> Project Group meeting on 15 September and two test laboratories were appointed. It was agreed that in order to minimise transport costs, one of the labs should test products collected from the market in Bulgaria, Greece, Poland and Slovenia and the other one should test products collected from the market in Belgium, Iceland, Luxembourg, Norway and The Netherlands.

Following satisfactory discussions with both labs, the contracts were signed between October - November 2015.

## **2.4 Additional issues relating to the market surveillance exercises**

At the 1<sup>st</sup> and 2<sup>nd</sup> Project Group meetings a number of issues relating to the project were discussed and agreed, viz.:

### **2.4.1 The 'types' of fireworks**

After reviewing the approach that was taken concerning this issue in JA2011 - Fireworks, it was agreed that the following types of firework should be included in the market surveillance exercises:

From Category F1/1 - Fountains;

From Categories F2/2 or F3/3 - Bangers & double bangers;	Batteries & combinations;
Compound fireworks;	Flash bangers;
Rockets;	Roman candles;
	Jumping ground spinners;
	Spinners.

In the event the bulk of the fireworks collected from the market during the course of the Joint Action were chosen from these 'types' of firework. On occasion, the inspectors visiting the premises of economic operators and collected 'types' of firework other than those listed above. In some cases, the 'type' of firework to which a product related was not correctly identified until it was tested by the laboratory. The fireworks that were outside the 'types' listed above were tested in accordance with the provisions of the Pyrotechnics Directive and EN 15947. The results of the tests on ALL the products collected during the market surveillance exercises are discussed at Section 4.

### **2.4.2 The timing**

It was agreed that the principal market surveillance sweep should be conducted in the run up to New Year 2015 and that a smaller market surveillance sweep should be undertaken in the run up to New Year 2016.

### **2.4.3 The number of products**

It was agreed that each participating Member State should aim to collect about 45 products from the market during the course of the project. Each product would consist of 11 samples from the same batch. Ten samples would be sent to the laboratory for testing. The remaining samples would be retained by the Member State in order to review its markings and labels against the provisions of the pyrotechnics Directive and EN 15947.

The Project Group agreed that, prior to taking a product from the premises of an economic operator, the inspector should check that it was 'CE' marked. Products that were not 'CE' marked, or which were marked as conforming to a national fireworks standard, would not be included in the market surveillance exercises.

The Commission requested that Member States should collect some samples via economic operators who are selling fireworks via the Internet. The initial reaction from the Project Group was that this was impracticable for the following reasons:

It would involve the delivery of the samples by post, or by a carrier who was not authorized to transport pyrotechnic articles. To order products via the Internet would be to encourage &/or to condone them breaking the law;

To order products via the Internet would involve some Member States giving their staff access to a debit or credit card in the name of the market surveillance authority, a facility that isn't currently available in certain Member States;

Most Member States are able to take products from the economic operators without payment. If a debit or credit card is used to obtain the samples, then this could present difficulties when trying to reclaim the cost of the product from the economic operator.

No products were collected from 'on-line' operators during the winter 2015 market surveillance exercise. However, this issue was discussed further at the 3<sup>rd</sup> Project Group meeting. A number of alternative methods of purchasing products via the Internet were considered, viz.:

1. Visiting the premises (shop, warehouse etc.) of the economic operator and collecting products that they were advertising 'on-line';
2. Making a written request to the economic operator for samples of products that they were advertising as being sold 'on-line';
3. Mystery shopper for fireworks on the Internet;
4. Buying samples on the Internet as a Market Surveillance Authority.

Member States recognised that they would only be able to collect products being sold 'on-line' that were being placed on the market within their own area of jurisdiction. They would not be able to source products via the Internet that were being placed on the market in other countries within the EEA.

After discussion, it was agreed that methods 1 and 2 listed above were practicable and should be used during the course of the market surveillance exercise to be conducted in the run up to New Year 2017.

A limited number of products were obtained from economic operators during the market surveillance exercise conducted during the winter 2016/17 using methods 1 and 2 described above.

#### **2.4.4 Clauses EN 15947 to which products should be tested**

The Project Group considered the clauses listed at EN 15947-5: 2010 - Table 4 against which the products collected during the course of the market surveillance exercises should be tested. They took the view that it would be appropriate to test each sample for all the 'critical' safety requirements and for nearly all the 'major' safety requirements listed at Clause 10.4 - Table 4 in EN 15947-5: 2010. Samples would not be tested for 'minor' and for a few of the 'major' requirements. The Project Group for JA2014 - Fireworks 2 reviewed this decision at its 1<sup>st</sup> Project Group meeting and agreed to continue this practice.

The table 1 below is reproduced from Table 2 at EN 15947 - 5: 2010 and lists the 'critical' and 'major' safety requirements against which each product would be tested.

The safety requirements for each 'type of firework' varies considerably from one 'type' to another. The Project Group used the test requirements for each 'type' of firework specified at Clause 10.4 and Annex A1 of EN 15947: 2010 when specifying the test requirements for each 'type' of firework. The various safety requirements for each 'type' of firework are listed at Table 2. The contracts with the two laboratories were drafted in accordance with this specification.

<i>Safety requirement</i>	<i>Clause as specified at EN 15947-5: 2010</i>	<i>Type of Non-Conformity</i>
Construction materials	(4.1)	Critical
Elements in batteries and combinations	(4.3)	Major
Protection of initial fuse and reserve fuse (if applicable)	(6.2)	Major
Attachment of means of ignition	(6.3)	Major
Ignition of initial fuse and reserve fuse (if applicable)	(6.4.1)	Major
Duration of initial fuse and reserve fuse (if applicable)	(6.4.1)	for category 1 and 2 items: < 2,0 s or > 10,0 s: Critical ≥ 2,0 s and < 3,0 s: Major > 8,0 s and ≤ 10,0 s: Major for category 3 items: < 3,0 s or > 15,0 s: Critical ≥ 3,0 s and < 5,0 s: Major > 13,0 s and ≤ 15,0 s: Major
Resistance to ignition of friction head by an abrasive surface	(6.4.1)	Major
Ignition time of indoor fountains, category 1	(6.4.2)	Major
Invisible burning of Roman candles	(6.4.2)	Major
Ignition time of sparklers	(6.4.2)	Major
Height of fuse above the ground for category 3 wheels	(6.4.2)	Major
Integrity	(7.1.2)	Major
Stabilisation of flight	(7.1.3)	Critical
Functioning	(7.2.2)	Major
Angle of ascent or flight	(7.2.3)	for aerial wheels, rockets > 30°: Major for double bangers >16°: Major for mini rockets and spinners > 30°: Major
Motion	(7.2.4)	Major
Stability during functioning	(7.2.5)	Critical
Height of explosion	(7.2.6)	Major
Sound pressure level	(7.2.7)	Major
Explosion and other failures	(7.2.8)	Critical
Burning or incandescent matter	(7.2.9)	Major
Projected debris	(7.2.11)	Major
Plastics body	(7.3.2)	Major

Table 1- The 'type of non-conformity' for each safety requirement<sup>5</sup>

<sup>5</sup> Extract from EN 15947-5 - Table 4.

Firework type	Clause																Firework type					
	4.1.1	4.1.2	4.3	6.2	6.3	6.4.1	6.4.2	7.1.2.1	7.1.2.2	7.1.3	7.2.2	7.2.3	7.2.4	7.2.5	7.2.6	7.2.7		7.2.8	7.2.9	7.2.11	7.3.2	
Bangers	X	X		X	X	X		X			X					X		X	X	X	X	Bangers
Batteries & combinations	X	X	X	X	X	X		X	X		X			X		X	X	X	X			Batteries & combination
Bengal flames	X			X	X	X		X	X		X			X		X	X	X	X			Bengal flames
Compound fireworks	X			X	X	X	X	X	X		X			X	X	X	X	X	X			Compound fireworks
Crackling granules	X	X		X	X	X		X			X					X		X	X		X	Crackling granules
Flash bangers	X	X		X	X	X		X			X					X		X	X		X	Flash bangers
Flash pellets	X			X	X	X		X			X					X	X	X	X			Flash pellets
Fountains	X	X		X	X	X	X	X			X			X		X	X	X	X			Fountains
Ground spinners	X			X	X	X		X			X					X	X	X	X			Ground spinners
Hand held sparklers	X			X	X	X	X	X			X					X	X	X	X			Hand held sparklers
Jumping ground spinners	X			X	X	X	X	X			X		X			X	X	X	X			Jumping ground spinners
Mini rockets	X	X		X	X	X		X		X	X	X			X	X		X	X			Mini rockets
Rockets	X	X		X	X	X		X		X	X	X			X	X		X	X			Rockets
Roman candles	X	X		X	X	X	X	X			X			X	X	X		X	X			Roman candles
Spinners	X	X		X	X	X	X	X			X	X		X		X	X	X	X			Spinners
Throwdowns	X	X		X				X	X		X					X		X	X			Throwdowns

Table 2 - Indicative overview of the applicable safety requirements per firework 'type'<sup>6</sup>

<sup>6</sup> Extract from EN 15947-5: 2010 - Table A1.

### **2.4.5 The Risk Assessment methodology**

The Project Group agreed to follow the methodology for Risk Assessment for Consumer Products detailed at Decision 2010/15/EU - Laying down guidelines for the management of the Community Rapid Information System 'RAPEX' established under Article 12 and of the notification procedure established under Article 11 of Directive 2001/95/EC (the General Product Safety Directive)<sup>7</sup>.

The Project Group also agreed that each participating Member State should contribute at least 3 risk assessments on non-compliant fireworks collected during the course of the project in order to establish a 'library' of risk assessments. In the event the Member States provided a total of 62 risk assessments. They were analysed by the Project Coordinator in order to provide for a range of hazard scenarios associated with each of the different 'type' of firework. Typical examples of the types of hazard associated with fireworks are: burns/scalds, eye injuries, hearing injuries etc. The level of risk associated with each type of firework varies according to the category of the firework, its type and the proximity of the bystander to the firework when it is ignited or explodes.

Typical risk assessments were prepared for the following 'types' of firework:

Bangers;	Batteries;	Flash bangers;
Fountains;	Ground Spinners;	Rockets;
Roman Candles;	Sparklers.	

Further information about the risk assessments prepared following an analysis the 62 risk assessments contributed by the Member States is given at Section 5.

### **2.4.6 Member States regulatory action against economic operators**

At the 3<sup>rd</sup> and 5<sup>th</sup> Project Group meetings the reports from the test labs on the non-compliant were products were reviewed. This was with a view to ensuring that, as far as is practicable, any regulatory action taken by the Member States against economic operators is proportional to the degree to which the product concerned was found to be non-compliant. The regulatory action taken ranged from a discussion with the economic operator concerned about how such non-compliance(s) may be prevented in the future, to a RAPEX notification which included a ban on the marketing of the product and its immediate withdrawal from the market.

### **2.4.7 Transport of fireworks to the test laboratory**

During the course of JA2011 - Fireworks problems were experienced with regard to the transport of fireworks from Member States to the test laboratories. This was notwithstanding the fact that the Member States had tried to ensure that the arrangements for the transport of their fireworks was in compliance with the European Agreement concerning the International Carriage of Dangerous Goods by Road (usually referred to as the ADR scheme)<sup>8</sup>.

The Project Group for JA2014 - Fireworks 2 reviewed the ADR scheme so as to ensure that the transport of products from the participating countries would be in line with any recent changes to the ADR requirements. It was agreed that Member States would either appoint an authorized ADR carrier to transport their samples to the test lab, or they would appoint a company to transport their samples that had been approved by the laboratory.

The ADR scheme requires that the Member State concerned:

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<sup>7</sup> Official Journal of the European Union, ISSN 1725-2555, L 22, Volume 53 26 January 2010, English edition - Legislation. pages L22/33 - L22/64

<sup>8</sup> European Agreement concerning the International Carriage of Dangerous Goods by Road - ADR - Applicable from 1 January 2015 - at <http://www.unece.org/trans/danger/publi/adr/adr2015/15contentse.html>

- Has each product's classification approved by the relevant Safety Authority or an equivalent European authority.
- Ensures that the goods are properly packaged. This includes the use of UN-certified packaging.
- Ensures that the packages are marked with UN number, proper shipping name and label.
- Ensures that a transport document with specific information is provided.
- Ensures that the driver of the vehicle and other appropriate personnel are trained in the requirements for the transport of dangerous goods, including the safety procedures. The training must be documented.
- Ensure that there is a portable fire extinguisher with a capacity of at least 2kg of powder available in the vehicle.
- Ensures that the goods are securely stowed and secured.
- Ensures that any portable lighting apparatus used shall not exhibit any metal surface liable to produce sparks.

Figure 2 shows the products collected by the Slovenian MSA in the run up to New Year 2017 being stored in the van that would transport them to the lab.

The arrangements that Member States made for the transport of their fireworks to the test lab worked satisfactorily, except in the case of the samples collected by Norway in 2015. The samples could not be transported outside the country so the testing took place in Norway at a lab selected by DSB.



Figure 2 - Fireworks collected during the 2016/17 by Slovenia

The fireworks in Figure 2 - Fireworks collected during the 2016/17 by Slovenia are packaged and labeled appropriately prior to being transported to one of the laboratories for testing.

## 3. The market surveillance activity and results

### 3.1 The market surveillance exercises

All nine participating Member States took part in the market surveillance exercise conducted during the winter 2015/16. Seven Member States collected products during the market surveillance exercise held during the winter 2016/17, viz.: Belgium, Bulgaria, Iceland, Luxembourg, Poland, Slovenia and The Netherlands.

The number of products collected during the market surveillance exercises by each country is listed at Table 3

Country	No of products collected during the market surveillance exercise in		
	Winter 2015/16	Winter 2016/17	Total
Belgium	36	23	59
Bulgaria	40	40	80
Greece	30	0	30
Iceland	25	17	42
Luxembourg	31	15	46
Norway	13	0	13
Poland	25	24	49
Slovenia	35	15	50
The Netherlands	39	16	55
<b>TOTAL</b>	<b>274</b>	<b>150</b>	<b>424</b>

Table 3 - Number of products collected by each participating Member State during the course of the project.

(Note: Each product included of 11 samples, 10 were sent to the test lab, 1 was retained by the Member State so as to review its markings/label.)

Details of the number and 'type' of products collected during the course of the market surveillance exercises is given at Table 4.

Type of firework	No of samples collected during market surveillance exercise in:		
	Winter 2015/16	Winter 2016/17	Total
Bangers*	19	7	26
Batteries*	86	69	155
Bengal Flames	4	1	5
Combinations*	3	1	4
Compound Fireworks*	0	1	1
Crackling Granules	3	3	6
Flash Bangers*	17	10	27
Flash Pellets	1	0	1
Fountains*	21	4	25
Ground Movers	0	1	1
Ground Spinners	8	0	8
Hand Held Sparklers	21	17	38
Jumping Ground Spinners*	4	0	4
Mini Rockets*	1	1	2
Party Poppers	0	1	1



Rockets *	48	21	69
Roman Candles*	28	4	32
Shot Tubes*	0	3	3
Spinners*	6	5	11
Throwdowns	4	1	5
<b>TOTAL</b>	<b>274</b>	<b>150</b>	<b>424</b>

*Table 4 - Number of products collected of each type of firework during each market surveillance exercise*

(Note: The ‘types’ of firework indicated by a “\*” were included in the contract with the test lab. The other ‘types’ of firework were collected by inspectors and sent to the lab for testing. They were tested by the two labs and have also been included in these statistics.)

### 3.2 The results obtained from the testing of samples

The results of the various tests on the samples by the laboratories were sent to the representative of the Member States that collected the product from the market, the Project Leader and the Project Coordinator. A summary of this information was presented for discussion at the next following Project Group meeting.

Each of the Member States also undertook a review of the markings and labels on the firework in accordance with the various requirements detailed in the Directive on Pyrotechnic Articles and EN 15947. The results of the market surveillance exercise conducted during the winter 2015/16 are summarized at Table 5 and those relating to the exercise conducted during the winter 2016/17 are given at Table 6. A table showing the cumulative results obtained from the testing of fireworks throughout the Joint Action is given at Table 7.

Following receipt of the reports from the test laboratory each Member State was in a position to decide on the appropriate regulatory action to take in relation to any non-compliant products. Further information on this issue is given at Section 4.

An analysis of the results of the tests on fireworks collected during the market surveillance exercises by category of firework is given at Tables 8, 9 and 10. This shows that, although the bulk of the products collected were in the F2 and the F2/F3 categories, a significant number of products were also collected from the market in the F1 and the F3 categories.



MEMBER STATE	NON-COMPLIANT TESTS ONLY	NON-COMPLIANT LABELS & MARKINGS ONLY	NON-COMPLIANT TESTS & MARKINGS	TOTAL NON-COMPLIANT	COMPLIANT	TOTAL NO OF PRODUCTS TESTED
BELGIUM	13	4	13	30	6	36
BULGARIA	22	0	0	22	18	40
GREECE	5	8	2	15	15	30
ICELAND	8	2	10	20	5	25
LUXEMBOURG	14	2	11	27	4	31
NORWAY	5	2	0	7	6	13
POLAND	13	0	2	15	10	25
SLOVENIA	15	0	1	16	19	35
THE NETHERLANDS	26	0	0	26	13	39
<b>TOTALS</b>	<b>121</b>	<b>18</b>	<b>39</b>	<b>178</b>	<b>96</b>	<b>274</b>
	44%	7%	14%	65%	35%	100%

Table 5 - Results following the testing of the products collected during the winter 2015/16 market surveillance exercise analysed by participating Member State.

MEMBER STATE	NON-COMPLIANT TESTS ONLY	NON-COMPLIANT LABELS & MARKINGS ONLY	NON-COMPLIANT TESTS & MARKINGS/ LABELS	TOTAL NON-COMPLIANT	COMPLIANT	TOTAL NO OF PRODUCTS TESTED
BELGIUM	17	0	0	17	6	23
BULGARIA	2	0	0	2	38	40
GREECE	0	0	0	0	0	0
ICELAND	6	3	3	12	5	17
LUXEMBOURG	4	4	5	13	2	15
NORWAY	0	0	0	0	0	0
POLAND	6	0	0	6	18	24
SLOVENIA	3	3	1	7	8	15
THE NETHERLANDS	12	0	0	12	4	16
<b>TOTALS</b>	<b>50</b>	<b>10</b>	<b>9</b>	<b>69</b>	<b>81</b>	<b>150</b>
	33%	7%	6%	46%	54%	100%

Table 6 - Results of the testing of the products collected during the winter 2016/17

MEMBER STATE	NON-COMPLIANT TESTS ONLY	NON-COMPLIANT LABELS & MARKINGS ONLY	NON-COMPLIANT TESTS & MARKINGS/ LABELS	TOTAL NON-COMPLIANT	COMPLIANT	TOTAL NO OF PRODUCTS TESTED
BELGIUM	30	4	13	47	12	59
BULGARIA	24	0	0	24	56	80
GREECE	5	8	2	15	15	30
ICELAND	14	5	13	32	10	42
LUXEMBOURG	18	6	16	40	6	46
NORWAY	5	2	0	7	6	13
POLAND	19	0	2	21	28	49
SLOVENIA	18	3	2	23	27	50
THE NETHERLANDS	38	0	0	38	17	55
<b>TOTALS</b>	<b>171</b>	<b>28</b>	<b>48</b>	<b>247</b>	<b>177</b>	<b>424</b>
	40%	7%	11%	58%	42%	100%

Table 7 - Cumulative table for the testing results of the products sampled in the winters 2015/16 and 2016/2017

CATEGORY	NUMBER OF PRODUCTS COLLECTED	NUMBER NON-COMPLIANT	NUMBER COMPLIANT
CATEGORY F1	34	8	26
CATEGORY F1/F2	19	15	4
CATEGORY F2	106	54	51
CATEGORY F2/F3	76	55	22
CATEGORY F3	39	28	11
<b>TOTAL</b>	<b>274 (100%)</b>	<b>160 (58%)</b>	<b>114 (42%)</b>

Table 8 - Test Results for products collected during the winter 2015/16 analysed by category of firework.

CATEGORY	NUMBER OF PRODUCTS COLLECTED	NUMBER NON-COMPLIANT	NUMBER COMPLIANT
CATEGORY F1	11	1	10
CATEGORY F1/F2	17	12	5
CATEGORY F2	67	18	49
CATEGORY F2/F3	48	35	13
CATEGORY F3	18	4	14
TOTAL	161*(100%)	70(43%)	91(57%)

\*In the case of the samples collected by Belgium and The Netherlands there were a number of products for which more than 1 set of 10 samples were collected. This increased the overall number of products collected from the market from 150 different products to a total of 161 products tested by the lab, all of which consisted of 10 samples.

Table 9 - Test Results for the products collected during the winter 2016/ 17 analysed by category of firework.

CATEGORY	NUMBER OF PRODUCTS COLLECTED	NUMBER NON-COMPLIANT	NUMBER COMPLIANT
CATEGORY F1	45	9	36
CATEGORY F1/F2	36	27	9
CATEGORY F2	173	72	100
CATEGORY F2/F3	120	86	35
CATEGORY F3	57	32	25
TOTAL	435*(100%)	230(53%)	205(47%)

\*In the case of the samples collected by Belgium and The Netherlands there were a number of products for which more than 1 set of 10 samples were collected for testing. This increased the overall number of products collected from the market from 150 different products to a total of 161 products tested by the lab, all of which consisted of 10 samples.

Table 10 - Cumulative results following the testing winter 2015/ 16 and 2016/ 17 analysed by category of firework.

No of samples with:

Products collected during the

TOTAL:

	Winter 2015/16	Winter 2016/17	
1 Non-compliance	110	55	165 (45%)
2 Non-compliances	44	18	62 (17%)
3 Non-compliances	32	11	43 (12%)
4 Non-compliances	9	5	14 (4%)
5 Non-compliances	15	2	17 (5%)
6 Non-compliances	7	1	8 (2%)
7 Non-compliances	6	3	9 (2%)
8 Non-compliances	4	2	6 (2%)
9 Non-compliances	8	1	9 (3%)
10 Non-compliances	22	8	30 (8%)
Total no of non-compliances:	257	106	363 (100%)

Table 11 - The number of non-compliant samples after testing from amongst the 10 samples collected from the market of a particular firework.

Tables 11 and 12 look at the non-compliances situation in more detail. It shows that the number of non-compliant samples in relation to each clause. For the vast majority of non-compliant products only 1, 2 or 3 of the 10 samples failed to comply with the safety requirements of the clause concerned. For relatively few products 4, 5, 6, 7 or 8 samples failed to comply and, as might be expected, in quite a number of cases 9 or 10 samples failed to comply with the requirements of the clause concerned.

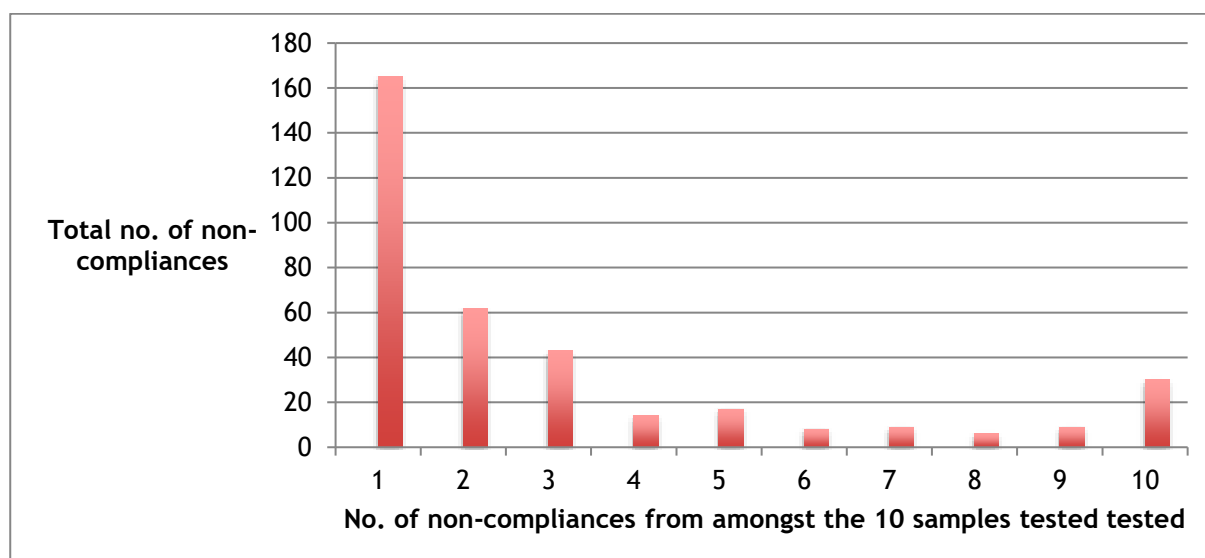


Table 12 - The total number of non-compliances after testing against the no of non-compliances

An analysis of the results from the 2015/16 market surveillance exercise is given in more detail at Tables 13, 14 and 15. They show that:

- The bulk of the non-compliances were in fireworks of Categories F2, F2/F3 or F3;
- The clauses that are highlighted in yellow (i.e. Clauses 4.1.2, 7.1.3, 7.2.5 and 7.2.8) relate to 'critical' non-conformities and show there is a very high degree of non-compliance in relation to clause 7.2.5 (stability during functioning) for batteries.

Reports from the test lab indicate that batteries for which the base measurement is smaller than its height tend to wobble during firing and, in many cases this causes them to topple over. This is particularly dangerous should the firework topple over in the direction in which any bystanders are standing. These batteries were non-compliant with regard to EN 15947-5 - Clause 7.2.5.

- That the high number of non-conformities in relation to Clause 6.4.1 - attachment of the means of ignition &/or the duration of the initial fuse amongst F2/F3 and F3 fireworks is a matter of concern.

Similar tables, but for the results obtained from the fireworks collected during the 2016/17 market surveillance exercises are given at Tables 16, 17 and 18.

- Again they show that the bulk of the non-compliances were in the categories F2, F2/F3 and F3.
- That non-conformities in relation to Clause 7.2.3 - the angle of ascent were high for rockets.
- That the Flash Bangers sampled proved to be non-compliant with regard to Clause 7.2.7 - Sound pressure level.

A reminder of the hazards to which the various clauses in EN 15947-5 relate is as follows:

Titles of clauses as per EN 15947 - 5

4.1.1 - Construction materials - General Requirements - Critical	7.1.3 - Stabilisation of flight - Critical
4.1.2 - Construction Requirements - Specific requirements - Critical	7.2.1 - Principal effects - Minor
6.1 - Permitted means of ignition - Major	7.2.2 - Functioning - Major
6.2 - Protection of initial fuse and reserve fuse/Protection of throwdowns - Major	7.2.3 - Angle of ascent or flight - Major
6.3 - Attachment of means of ignition - Major	7.2.4 - Motion - Major
6.4.1 - Ignition of initial fuse and reserve fuse - Major	7.2.5 - Stability during functioning - Critical
6.4.1 - Duration of initial fuse and reserve fuse - Critical or Major	7.2.6 - Height of explosion - Major
6.4.1 - Resistance to ignition of friction head by an abrasive surface - Major	7.2.7 - Sound pressure level - Major
6.4.2 - Ignition time of indoor fountains, category 1 - Major	7.2.8 - Explosion and other failures - Critical
6.4.2 - Invisible burning of Roman candles - Major	7.2.9 - Burning or incandescent matter - Major
6.4.2 - Ignition time of sparklers (6.4.2) Major	7.2.10 - Extinguishing of flames - Minor
7.1.2.1 - Integrity - General requirements - Major	7.2.11 - Projected debris - Major

(Note: The clauses highlighted in yellow relate to ‘critical’ hazards; the other clauses relate to ‘major’ hazards.)

	F1 - Bengal Flames	F1 - Crackling Granules	F1 - Flash Pellets	F1 - Fountains	F1/ F2 Fountains	F1 - Jumping Ground Spinners	F1 - Spinners	F1 - Sparklers	F1/F2 - Sparklers	F1 - Throwdowns	
§Non-compliant products/ No products tested	3/3	0/1	1/1	0/7	4/6	0/4	4/4	0/8	11/13	0/4	
*No of non-compliances re EN 15947-5 Clause No:											*No of non-compliances re EN 15947-5 Clause No:
4.1.2											4.1.2
4.2									2 x 1 n/c; 2 x 2 n/c; 2 x 10 n/c		4.2
6.1											6.1
6.2					1 x 10 n/c						6.2
6.3					3 x 1 n/c						6.3
6.4.1			1 x 1 n/c								6.4.1
6.4.2									2 x 1 n/c		6.4.2
7.1.2.1						1 x 1 n/c					7.1.2.1
7.1.3											7.1.3
7.2.1	2 x 1 n/c										7.2.1
7.2.2	1 x 7 n/c					1 x 1 n/c			3 x 1 n/c; 1 x 2 n/c; 1 x 6 n/c		7.2.2
7.2.3											7.2.3
7.2.4						2 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c					7.2.4
7.2.5											7.2.5
7.2.6											7.2.6
7.2.7						1 x 1 n/c					7.2.7
7.2.8						1 x 1 n/c					7.2.8
7.2.9					1 x 10 n/c	1 x 1 n/c			1 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c		7.2.9
7.2.11											7.2.11
NOTES											
§ Explanation of the notation - In this row '4/6' indicates that 4 of the 6 products tested were non-compliant in relation to at least one clause from the clauses in EN 15947-5 listed below											
* Explanation of the notation - In the table '2 x 3 n/c' indicates that in 2 of the products, from amongst the 10 samples tested of that product, 3 were non-compliant in relation to the clause specified.											

Table 13 - Analysis of the non-compliances found in fireworks of categories F1 and F1/F2 collected in winter 2015/16.

	F2 - Bangers	F2 - Batteries	F2 - Battery Bangers	F2 - Battery Fountains	F2 - Batteries - Ground Spinners	F2 - Crackling Granules	F2 - Combinations - Fountains/Mines	F2 - Combinations - Fountains/Roman Candles	F2 - Flash Bangers	F2 - Ground Spinners	F2 - Fountains	F2 - Mini Rockets	F2 - Roman Candles	F2 - Spinners		
§Non-compliant products/ No products tested	6/10	12/30	2/2	3/13	2/2	0/1	1/1	0/2	0/2	3/4	0/7	1/1	6/10	9/11	4/6	
*No of non-compliances re EN 15947-5 Clause No:												1 x 10 n/c				*No of non-compliances re EN 15947-5 Clause No:
4.1.2																4.1.2
4.2																4.2
6.1																6.1
6.2																6.2
6.3	1 x 1 n/c		1 x 1 n/c	1 x 1 n/c; 1 x 3 n/c			1 x 1 n/c					1 x 10 n/c				6.3
6.4.1			1 x 7 n/c	2 x 1 n/c		1 x 1 n/c							1 x 1 n/c; 1 x 8 n/c	1 x 2 n/c		6.4.1
6.4.2													1 x 2 n/c; 1 x 6 n/c			6.4.2
7.1.2.1																7.1.2.1
7.1.3																7.1.3
7.2.1									1 x 1 n/c; 1 x 3 n/c; 1 x 5 n/c						1 x 9 n/c	7.2.1
7.2.2	1 x 1 n/c	2 x 5 n/c	1 x 1 n/c; 1 x 9 n/c		1 x 7 n/c	1 x 10 n/c							1 x 1 n/c; 1 x 2 n/c	1 x 1 n/c; 1 x 5 n/c		7.2.2
7.2.3													2 x 1 n/c; 2 x 2 n/c; 1 x 6 n/c	2 x 3 n/c; 1 x 4 n/c		7.2.3
7.2.4					1 x 4 n/c											7.2.4
7.2.5		4 x 1 n/c; 1 x 2 n/c; 2 x 5 n/c												1 x 1 n/c		7.2.5
7.2.6													1 x 1 n/c; 2 x 2 n/c; 1 x 3 n/c	1 x 1 n/c; 1 x 4 n/c; 1 x 6 n/c; 1 x 7 n/c; 2 x 9 n/c		7.2.6
7.2.7	2 x 1 n/c; 1 x 10 n/c	6 x 1 n/c; 1 x 2 n/c; 2 x 6 n/c											1 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c	1 x 1 n/c		7.2.7
7.2.8		1 x 1 n/c			1 x 1 n/c											7.2.8
7.2.9			6 x 1 n/c; 2 x 2 n/c; 1 x 3 n/c; 2 x 5 n/c										1 x 1 n/c; 1 x 2 n/c			7.2.9
7.2.11	2 x 1 n/c; 1 x 3 n/c; 1 x 10 n/c	2 x 1 n/c											1 x 1 n/c; 1 x 2 n/c			7.2.11

§ Explanation of the notation - In this row '4/6' indicates that 4 of the 6 products tested were non-compliant in relation to at least one clause from the clauses in EN 15947-5 listed below

\* Explanation of the notation - In the table '2 x 3 n/c' indicates that in 2 of the products, from amongst the 10 samples tested of that product, 3 were non-compliant in relation to the clause specified.

Table 14 - Analysis of the non-compliances found in fireworks of category F2 collected during the winter 2015/16.

	F2/F3 - Bangers/ Flash Bangers	F2/F3 Batteries	F2/F3 - Rockets	F2/F3 - Roman Candles	F3 - Bangers	F3 - Flash Bangers	F3 - Ground Spinners	F3 - Rockets	F3 - Roman Candles
5 Non-compliant products/ No products tested	1/3	27/35	21/32	5/6	7/9	10/12	1/1	6/6	4/11
*No of non-compliances re EN 15947-5 Clause No:									*No of non-compliances re EN 15947-5 Clause No:
	<b>4.1.2</b>								<b>4.1.2</b>
4.2									4.2
6.1									6.1
6.2	3 x 10 n/c	3 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c							6.2
6.3	1 x 1 n/c	2 x 2 n/c; 1 x 3 n/c; 1 x 4 n/c; 1 x 6 n/c							6.3
6.4.1	6 x 1 n/c; 2 x 2 n/c; 2 x 3 n/c; 1 x 4 n/c; 1 x 9 n/c; 1 x 10 n/c	1 x 1 n/c	2 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c; 1 x 9 n/c	1 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c; 1 x 10 n/c	1 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c; 1 x 9 n/c	1 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c; 1 x 10 n/c	2 x 1 n/c; 1 x 2 n/c; 1 x 3 n/c	1 x 3 n/c	6.4.1
6.4.2									6.4.2
7.1.2.1									7.1.2.1
7.1.3									7.1.3
7.2.1									7.2.1
7.2.2	1 x 1 n/c	1 x 1 n/c	1 x 1 n/c						7.2.2
7.2.3									7.2.3
7.2.4									7.2.4
7.2.5	1 x 2 n/c; 4 x 3 n/c; 3 x 4 n/c; 5 x 5 n/c; 1 x 6 n/c; 1 x 8 n/c; 1 x 9 n/c							7.2.5	
7.2.6	3 x 1 n/c; 1 x 2 n/c; 1 x 9 n/c	1 x 3 n/c	1 x 7 n/c						7.2.6
7.2.7	4 x 1 n/c; 4 x 2 n/c; 2 x 3 n/c; 1 x 10 n/c			2 x 1 n/c; 2 x 3 n/c; 2 x 10 n/c	1 x 5 n/c; x 8 n/c; 9 n/c; 10 n/c				7.2.7
7.2.8									7.2.8
7.2.9									7.2.9
7.2.11	1 x 1 n/c							7.2.11	

Table 15 - Analysis of the non-compliances found in fireworks of category F2/F3 and F3 collected during the winter 2015/16.



	F1 Throwdowns	F1/F2 Cracking Granules	F1/F2 Sparklers
§Non-compliant products/products tested	1/1	2/2	7/2/5
*No non-compliances refer to EN 15947-5 Clause No:			*No non-compliance refer to EN 15947-5 Clause No:
4.1.2			4.1.2

4.2			2 n/c; 1 x 7 n/c; 1 8 n/c	4.2
6.1				6.1
6.2				6.2
6.3				6.3
6.4.1		2 n/c		6.4.1

6.4.2			2 n/c	6.4.2
7.1.2.1				7.1.2.1

**7.1.3**

7.2.1				7.2.1
7.2.2	1 n/c		2 n/c	7.2.2
7.2.3				7.2.3
7.2.4				7.2.4
7.2.5				7.2.5
7.2.6				7.2.6
7.2.7				7.2.7

**7.2.8**

7.2.9			2 n/c; 1 x 2 n/c; 2 3 n/c; 1 n/c	7.2.9
7.2.11		2 n/c		7.2.11

NOTES  
 §Explanation of the notation in this row 4/6 indicates that 4 of the 6 products tested were non-compliant in relation to at least one clause from the clauses in EN 15947-5 listed below

\*Explanation of the notation in the table 2 n/c indicates that in 2 of the products, from amongst the 10 samples tested of that product, 2 were non-compliant in relation to the clause specified.

Table 16 - Analysis of the non-compliances found in categories F1 and F1/F2 fireworks collected in the winter 2016/17.

	F2Bangers	F2Batteries	F2BatteriesFlash Bangers	F2BatteriesRoman Candles	F2Flash Bangers	F2Ground Movers	F2Rockets	F2Roman Candles	F2Spinners
Non-compliant products/No products tested	6/6	12/48	1/1	1/2	2/5	1	1/4	1	2/2
*Non-compliance seen 15947-5 Clause No:									*Non-compliance seen 15947-5 Clause No:
4.1.2									4.1.2
4.2									4.2
6.1									6.1
6.2				1x10h/c					6.2
6.3	1x1h/c					1x1h/c			6.3
6.4.1		1x2h/c		1x2h/c	1x1h/c				6.4.1
6.4.2									6.4.2
7.1.2.1									7.1.2.1
7.1.3									7.1.3
7.2.1							1x1h/c	2x2h/c	7.2.1
7.2.2	1x2h/c; 1x2h/c	1x3h/c; 1x1h/c	1x1h/c		1x1h/c			1x1h/c	7.2.2
7.2.3								1x3h/c	7.2.3
7.2.4									7.2.4
7.2.5		1x3h/c; 1x1h/c							7.2.5
7.2.6							1x1h/c		7.2.6
7.2.7	1x1h/c; 2x10h/c	2x1h/c			2x10h/c				7.2.7
7.2.8		2x1h/c							7.2.8
7.2.9		2x1h/c; 1x3h/c							7.2.9
7.2.11	1x1h/c	2x1h/c							7.2.11

Table 17 - Analysis of the non-compliances found in fireworks of category F2 collected during winter 2016/17.

	F2/F3 Bangers/ Flash Bangers	F2/F3 Batteries/ Shot/Tubes	F2/F3 Rockets	F3 Batteries	F3 Combinations	F3 Compound Fireworks	F3 Flash Bangers
\$Non-compliant products/No products tested	1	2/5	22/29	1/3	1	1	2/5
*No of non-compliance sites EN 15947-5 Clause No:							
4.1.2							4.1.2
4.2							4.2
6.1							6.1
6.2							6.2
6.3			2 n/c; x10				6.3
6.4.1		1 n/c					6.4.1
6.4.2							6.4.2
7.1.2.1							7.1.2.1
7.1.3			2				7.1.3
7.2.1			1				7.2.1
7.2.2	2	4	2 n/c	2	1	1	7.2.2
7.2.3			7 n/c; x10 n/c; x10				7.2.3
7.2.4							7.2.4
7.2.5		1 n/c;					7.2.5
7.2.6		2	3				7.2.6
7.2.7		1 n/c				1 x10	7.2.7
7.2.8							7.2.8
7.2.9	1	1 n/c;		1	1	1	7.2.9
7.2.11			1 n/c				7.2.11

Table 18 - Analysis of the non-compliances found in fireworks of categories F2/F3 and F3 collected during winter 2016/17.

As might be expected the range of non-conformities for each product varies significantly from one product to another. Figures 3 - 8 show a battery and a compound firework in which the non-conformity related to the incomplete firing of a number of tubes.



Figure 3 - Product collected by the Norway - all the shots failed to fire correctly.

This was a major non-conformity with regard to EN 15947-5: 2010 - Clause 7.2.2 - Functioning.



Figure 4 - A further example of samples SL 13 showing the parts that failed to fire.



*Figure 5 - Sample SL 13 - Compound firework showing that in this part of the firework the tube fired correctly*



*Figure 6 - Sample SL 13 - Compound firework in which this part of the firework failed to fire correctly.*



Figure 7 - Shows sample BE 116 - A Ground Mover which has been modelled in the form of a toy, in this case a tank



Figure 8 - Sample BE 116 in its box. Many consumers would think this is a toy rather than a firework.

Figures 7 and 8 show Sample BE 116 - which is boxed to look like a toy tank, but which is actually a Category F2 firework of the type 'Ground Mover'. When ignited the firework moved along the ground for a distance of circa 5m. One of the 10 samples failed to ignite because of a faulty fuse. In this case the product may then have been used indoors as a toy tank, thereby creating a domestic fire hazard.

### 3.3 Quality Control during the manufacturing process

The interpretation of the information at Section 3.2 suggests that, for those products where 1, 2 or 3 samples failed, i.e. in which 9, 8 or 7 respectively of these samples passed the test, insufficient attention was paid to quality control during the manufacturing process. For example, if too much explosive material is placed into the tube of the fireworks this would cause the explosion to be too loud.



Alternatively, if the length of the fuse is too long this would cause the duration time for its burning to exceed the requirement for the category of firework concerned.

Further evidence of this lack of attention to quality control was provided by a rocket, which was tested by the selected laboratory. In most of the samples it was not possible to remove the orange plastic cover of the fuse. When the laboratory tried to remove the cover the head of the rocket became detached. The laboratory concluded that the manufacturer used a mechanical method to put the plastic covers onto the rocket and that this would present a problem to the consumer when trying to light the fuse. Clearly this issue was not picked up during the inspection process. A photograph showing the rocket and its plastic fuse cover is at Figure 9.



*Figure 9 - Rocket in which the plastic fuse cover precluded access to the fuse and in which the head of the rocket became detached when the lab staff attempted to remove the fuse cover.*

It is suggested that by paying more attention to quality control during the manufacturing process many of the failures noted during the course of the market surveillance exercises could be eliminated and a much higher level of compliance could be achieved.

## 4. The follow up work on non-compliant products

### 4.1 The legislation and the relationship MSAs -economic operators

Directive 2007/23/EC and Directive 2013/29/EU specify at Articles 17 and 39 respectively that regulatory authorities can take the following measures in relation to non-compliant products:

‘Prohibit or restrict the placing on the market of a product;  
or to withdraw or recall a product from the market.’

Member States were asked to report on the follow up activities they undertook in relation to any non-compliant products. In this connection they were conscious that this product sector is probably unique amongst the wide range of consumer products available to the general public. This is because in many Member States fireworks are only available for purchase each year for a relatively short period of time. This is usually in the run up to New Year, or in some cases, in the period before a religious festival. They are also aware that once the New Year period, or the religious festival has passed, the stock levels maintained by both wholesalers and retailers is very low and that the public cannot purchase these products until the next window of opportunity to buy them is opened. During these closed periods fireworks are, in essence, withdrawn from the market.

Directive 2013/29/EU refers, at Article 9, to the traceability of pyrotechnic articles by requiring that:

‘Manufacturers shall label them with a registration number assigned by the notified body carrying out the conformity assessment pursuant to Article 17. The numbering shall be done in accordance with a uniform system determined by the Commission, and

Manufacturers and importers shall maintain records of the registration numbers of the pyrotechnic articles they make available on the market and shall make this information available to the relevant authorities upon request.’

During the course of the Project Group meetings and during meetings with EUFIAS the problems associated with ‘traceability’ were discussed on a number of occasions. Members referred to the ease with which fake traceability information could be included on the markings/labels of fireworks. They also referred to the fact that a producer outside the EU could make a batch of non-compliant fireworks and distribute it with different markings/labels to a range of countries. In these cases, it often proves to be almost impossible to establish the Member States to which the batch concerned had been placed on the market once it starts being sold to the public.

During the course of the market surveillance exercises nearly all the fireworks that were taken from the market were collected from the premises of importers or wholesalers, rather than from retailers. This had a number of advantages:

1. It enabled the inspector to collect 11 samples from the same batch for testing purposes. It also enabled the inspector to inspect any documentation relating to these products that was available and to photograph the ‘outers’ of the cartons that contained the batch of fireworks. (The ‘outer’ is the package in which the fireworks were transported to the wholesaler/importer and is important as it provides key information in relation to whether or not the product complies with the ADR requirements. Such information would not always be available at a retailer’s premises, or on a market stall where fireworks are being sold.)
2. It showed the importer of the goods that this particular market is being inspected, or re-inspected in the case of those Member States were involved in JA2011.
3. It provided the market surveillance authority with a point of contact should any of the goods prove to be non-compliant.



As there was a significant time lag between the collection of the products from the economic operator, i.e. during November/December. and the receipt of the results of testing from the lab, usually the following March, when stocks were at a minimum, the option of ‘withdrawing’ or ‘recalling’ non-compliant products from the market was usually not practicable for the market surveillance authority.

If the report from the test lab showed that one or more of the samples of a particular product were non-compliant it provided the opportunity for the authority to express their concerns to the economic operator about the safety procedures they had in place. This usually engendered a discussion concerning their quality control procedures, the compilation of their technical files and the efforts they were making to ensure that their products were compliant prior to being placed on the market. During the course of the discussion the market surveillance authority invariably referred to the fact that, although they wouldn’t be taking any regulatory action on this occasion, they would be collecting some further samples being placed on the market by the operator during following year and that if they were found to be non-compliant then regulatory action would follow. This ‘iron fist in the velvet glove’ approach seems to have worked very well in some participating Member States.

## 4.2 Regulatory action on ‘serious risk’ products collected in winter 2015/16

In a small number of cases the MSAs were able to establish that a non-compliant pyrotechnic article presented a serious risk to consumers and had been placed on the market in more than one Member State. They then made the product the subject of a RAPEX notification. As at 31 March 2017 the participating Member States had made 7 notifications (2 GPSD Article 11 notifications and 5 Article 12 notifications) in relation to the products taken from the market during the market surveillance exercise conducted during 2015/16:

<b>Alert Number:</b> A11/0062/16	<b>Year/Week:</b> 2016/26	<b>Alert submitted by:</b> Bulgaria
<b>Alert Number:</b> A11/0064/16	<b>Year/Week:</b> 2016/27	<b>Alert submitted by:</b> Bulgaria
<b>Alert Number:</b> A12/0736/16	<b>Year/Week:</b> 2016/24	<b>Alert submitted by:</b> Luxembourg
<b>Alert Number:</b> A12/0783/16	<b>Year/Week:</b> 2016/26	<b>Alert submitted by:</b> Luxembourg
<b>Alert Number:</b> A12/0801/16	<b>Year/Week:</b> 2016/26	<b>Alert submitted by:</b> Bulgaria
<b>Alert Number:</b> A12/1538/16	<b>Year/Week:</b> 2016/47	<b>Alert submitted by:</b> Iceland
<b>Alert Number:</b> A12/1778/16	<b>Year/Week:</b> 2016/51	<b>Alert submitted by:</b> Iceland

## 4.3 Regulatory action on products collected in winter 2016/17

As at the end of March 2017 the seven Member States that participated in the collection of products from the market during the winter 2016/17 are currently evaluating the results of the tests conducted on these samples by the chosen laboratories.

In the case of non-compliant samples, they are conducting a risk assessment on each product and may take regulatory action should the need arise. The discussions with economic operators in relation to these products are on-going at the close of the Joint Action and will no doubt continue throughout the summer period 2017. This may result in further notifications appearing on the RAPEX system in relation to these pyrotechnic articles later in the year.

## 5. The Risk Assessment of non-compliant fireworks

### 5.1 A 'library' of risk assessments relating to non-compliant fireworks

Following receipt of the results from the tests on fireworks collected during the winter 2015/16 the market surveillance teams in each country were invited to prepare a risk assessment on each of their non-compliant fireworks. The products chosen for risk assessment were from amongst those samples that had failed to comply with at least one 'major' or 'critical' hazard. (See Table 1)

A total of 62 risk assessments were sent to the Project Coordinator for further review. The number of risk assessments submitted for each type of firework was:

Bangers - 5;	Batteries - 23;
Flash Bangers - 6;	Fountains - 1;
Ground Spinners -2;	Rockets - 16;
Roman candles - 3;	Sparklers - 6.

The risk assessments were undertaken using the Risk Assessment Guidelines for Consumer Products detailed at pages L22/33 et seq. of Commission Decision 2010/15/EU - Laying down guidelines for the management of the Community Rapid Information System 'RAPEX' established under Article 12 and of the notification procedure established under Article 11 of Directive 2001/95/EC (the General Product Safety Directive).

For each type of firework, the following features were considered:

- The typical hazard scenarios associated with the type of firework concerned;
- The type(s) of consumer(s) who is/are likely to use the firework;
- The severity of the injury likely to be incurred, i.e. Level 1, 2, 3 and/or 4;
- The probability of each of the various steps to injury, expressed as a decimal;
- The overall probability of the injury occurring;
- The risk in this scenario, viz.: Low, Medium, High or Serious.

Where appropriate, a sensitivity analysis was undertaken to ascertain, if the circumstances were slightly different, this would change the level of risk.

In some cases, the risk assessments submitted by a number of Member States for a particular type/category of firework identified the same, or very similar, risk/hazard scenarios.

From the 62 risk assessments a library of the typical hazards associated with each type of firework was prepared. A paper summarizing the results of the risk assessments is published at the PROSAFE 'Dropbox' site for JA2014 - Fireworks 2. A typical risk scenario is shown at Figure 5.1.

#### SCENARIO

*Product:* Battery: Category F2 - 20 shots

*Hazard scenario 2:* Battery starts wobbling, tilts over and person is hit by burning projectiles and/or flames.

*Product risk in scenario:* The bystander is hit in the eye by debris from the firework.

*Consumer Type:* Consumers other than vulnerable or very vulnerable consumers.

*Severity of Injury:*

Level 3 - Eye injury, foreign body in eye. Partial loss of sight or permanent loss of sight (one eye).

*Probability of the steps to injury:*

Step(s) to Injury	Probability
Step 1: Battery starts wobbling	0.3
Step 2: Battery tips over	0.025
Step 3: Battery tips over towards people	0.25
Step 4: Person gets hit by projectile	0.5
Step 5: Projectile hits face of the person	0.15
Step 6: Eye is injured	0.1
Calculated probability: $0.3 \times 0.025 \times 0.25 \times 0.5 \times 0.15 \times 0.1 =$	0.000014
Overall probability: $> 1/100,000$	
Risk of this scenario: MEDIUM risk	

#### *Sensitivity analysis:*

Alternatively, if person is hit on face and this results on a level 2 burn, then the calculated probability would be:

$$0.3 \times 0.025 \times 0.25 \times 0.5 \times 0.15 = 0.00014$$

Overall probability  $> 1/10,000$

Risk in this scenario: MEDIUM RISK

Figure 5.1 - Typical risk scenario for a Category 2 Battery in which the battery topples over and a bystander is hit in the eye by incandescent burning material.

In each case the steps to injury and probabilities associated with each hazard, as used by the market surveillance team concerned, have been quoted.

In some cases, a firework might present a number of hazard scenarios, e.g. a particular firework may present both a hazard from noise and from burns due to hot or incandescent debris. In these circumstances the overall risk assessment for the firework would be the *highest* level of risk presented by the pyrotechnic item.

A review of the various risk assessments showed that the different teams of market surveillance officers in the participating Member States sometimes viewed the risks associated with the same hazard, such as a burn, slightly differently. This resulted in their presenting the varying severities of injury and different probabilities of the hazard occurring with slightly different results if one risk assessment is compared with another.

To some extent this is because of the size, shape, NEC etc. of the firework under review varies, and to some extent it is because the teams of market surveillance staff from the various participating Member States have different perceptions of the risk that a particular product is likely to present to the consumer. In the paper being placed on the 'Dropbox' system no attempt was made to prepare 'standardised' or 'definitive' risk assessments.

They are the result of the best efforts by different teams of market surveillance teams to assess the risks to the consumer presented by a particular product in the light of their current experience.

## 5.2 The hazards identified in the Risk Assessments 'library'

The following hazards were identified as being likely with the following types of firework:

BANGERS and FLASH BANGERS

- Noise in the range 120 dB to 128 dB as a result of the explosion taking place close to the bystander.
  - Noise of intensity > 128 dB as a result of the explosion taking place very close to the bystander.
  - Incandescent material from the firework hitting the bystander and causes burns to their skin or body, or to their clothing, which in turn may burn their skin or body.
  - Incandescent material from the firework hitting a person or a bystander whilst the person responsible for igniting the firework tries to reignite the firework following a failure of the fuse or the reserve fuse.
- (NOTE: These scenarios are also applicable to other types of firework.)

#### BATTERIES

- Battery is unstable and starts wobbling whilst shots are being fired; the battery tilts over and a bystander is hit by burning projectiles and/or flames.
- Noise in the range 120 dB to 128 dB as a result of the explosion taking place close to the bystander.
- Noise of intensity > 128 dB as a result of the explosion taking place very close to the bystander.
- Incandescent material from the firework hitting the bystander and cause burns to their skin or body, or to their clothing, which in turn may burn the skin or body;
- Incandescent material from the firework hits a person or a bystander whilst the person responsible for igniting the firework tries to reignite the firework following a failure of the fuse or the reserve fuse.

#### FOUNTAINS

- Children are in an apartment and play with firework. They light the fountain and the material from the firework burns one of them.

#### GROUND SPINNERS

- Person is near the explosive mixture; an ignition source causes an explosion; the person is hit by the shock wave, burning material and/or flames.

#### ROCKETS

- One of the initial fuses burns faster than 5 secs in the case of a category F2 rocket, or 4 secs, instead of 5 to 13 secs, for a category F3 rocket. The rocket ignites and person near to the source of heat gets burned.
- The firework ascends at too flat an angle and explodes at too low altitude. The user (or spectators) suffers from temporary impairment of hearing and/or is hit by incandescent material.

#### ROMAN CANDLES

- In the case of a particular Roman Candle 9/10 of the samples tested burst under the safety height 8 m. Burning and/or incandescent matter could hit the spectator's face, eyes and/or body.

#### SPARKLERS

- Burns to fingers and/or hand because handle gets too hot very quickly.

- Person is near the flammable substance; an ignition source which sets light to the person's clothes. It may also cause burns to their hands.

## 6. Liaison with stakeholders

### 6.1 Liaison with customs authorities

The Grant Agreement specifies at page 78 of 88 - Part B - Specification of Work:

*'Co-operation with Customs*

The importance of closer co-operation of Customs is widely acknowledged. The new Joint Action will seek to build on the progress that has been made in recent years. Customs will be involved, where relevant, in the Joint Action where the distribution chain for the specific product warrants it. Once again, the product specific activities will provide an opportunity to field test the best practice developed under the EMARS projects, other Joint Actions and by DG TAXUD.

To implement this initiative, the following activities are foreseen:

- Customs officials will be invited to events held within the framework of the project, as appropriate.
- The on-going co-operation between PROSAFE and TAXUD will be continued by key staff attending meetings in the Joint Action and in the DG TAXUD working group. This will provide a platform for feeding experiences and best practices on market surveillance into the activities undertaken by the TAXUD working group and for ideas developed by the TAXUD working group to be implemented, tested by the Joint Action and the experiences reported back.'

The Project Group were mindful that, as the bulk of fireworks being placed on the market are made in the Far East, customs authorities play a key role in deciding whether these goods are admitted to the European Economic Area (EEA). In this connection they were aware that these products generally arrive at the borders of the EEA by sea, and that a relatively small number of major ports play a key role in deciding whether to admit fireworks into the community. This view is reinforced by the fact that in JA2011 - Fireworks a survey of the 'country of origin' of the fireworks taken from the market during the course of the project revealed that only a very small proportion of these products were manufactured in the EEA. Nearly all were made in China.

During the first few months of the project contact was made with DG TAXUD with a view to ensuring that customs staff from the key ports of entry into the EEA would attend a meeting of the Project Group. This was with a view to ensuring a constructive dialogue between the members of the Project Group and staff based at the relevant ports, i.e. Rotterdam, Hamburg, Gdansk, Marseilles, Genoa, Barcelona etc.

In the event it became clear that invitations could only be issued for a joint meeting between the Project Group and customs staff from those customs authorities who are based in countries that are participating in JA2014 - Fireworks 2. An invitation was, therefore, extended to attend the 4<sup>th</sup> Project Group meeting on this basis to customs staff in Belgium, Bulgaria, Greece, Iceland, Luxembourg, Norway, Poland, Slovenia, The Netherlands and to DG TAXUD. In the event DG TAXUD did not attend the meeting and customs staff from only the following authorities met with the Project Group on 15 June 2016:

Bulgaria, Luxembourg, Poland and Slovenia.

The agenda for the meeting commenced with a brief introduction from the Project Coordinator on the aims and objectives of the Joint Action on Fireworks. This was followed by presentations from the customs officials from each of the Member States represented at the meeting concerning their current approach to monitoring potentially non-compliant fireworks from entering the EEA through their ports. In this connection the representative from Luxembourg said that, although they had no ports through which fireworks entered the country, they were concerned at the number of potentially non-compliant fireworks that transited Luxembourg en route to another EEA Member State.

The remainder of the time devoted to this item on the agenda included:

A discussion on how to establish closer relationships between customs and market surveillance authorities so as to prevent non-compliant fireworks entering the EEA;

Establishing what further support customs staff could be given by PROSAFE to achieve this objective;

How training and/or the exchange of knowledge might help to achieve this objective.

During the course of the discussion customs staff outlined the market intelligence procedures that they are currently using in relation to each economic operator with whom they are likely to have contact. Inter alia, this included information about their VAT records; whether previous consignments of goods were found to be compliant or non-compliant with the relevant safety requirements and the range of products they imported from outside the EC. They referred to the extensive use that they make of checklists and other sources of information and how this informs their decision making as to whether or not to inspect their goods at the dockside, or in transit. They said that economic operators that were new to this product sector were subject to more stringent checks and that operators with a good track record were given less scrutiny.

After a very fruitful discussion on how best market surveillance and customs staff could cooperate to ensure that only safe fireworks are placed on the market, it was agreed that the customs staff from the four countries present at the meeting would send the Project Coordinator a copy of the 'check list' they use when assessing the safety of fireworks.

## 6.2 Liaison with other stakeholders

### 6.2.1 List of Stakeholders

The following organisations were identified as being important stakeholders in the project and invitations were extended to them to attend the first (Open) Project Group meeting held on 7 July 2015:

ANEC (The European Association for the Co-ordination of Consumer Representation in Standardisation);

BEUC (The European Consumer Organisation);

CEN Technical Committee 212 - Pyrotechnic Articles;

The European Child Safety Alliance;

EuroSafe (The European Association for Injury Prevention and Safety Promotion);

EUFIAS (The European Fireworks Association);

Commission de la Sécurité des Consommateurs, France;

RoSPA (The Royal Society for the Prevention of Accidents, UK).

Although none of these organisations could be present at the meeting, written contributions were received from Commission de la Sécurité des Consommateurs, EUFIAS and RoSPA.

### 6.2.2 Stakeholders views concerning the safety of fireworks

The Commission de la Sécurité des Consommateurs were concerned about the lack of adequate markings and labels on the fireworks. They suggested that:

products are sometimes being sold with the 'instructions' in a language other than that of the country in which they are sold';



that the 'safe distances' to which consumers should withdraw when the firework has been ignited are sometimes too short. This is sometimes inconsistent with the category/type of firework concerned. It is suggested that a fuse of the appropriate length/burning time is used for each firework;

that pictograms should be given on the firework, and/or its packaging, showing the hazardous situations in which it should NOT be used.

The comments from RoSPA and The European Child Safety Alliance supported these views and also expressed similar concerns relating to the marking and labelling of fireworks. They were also concerned about the difficulty of tracing the manufacturers of non-compliant fireworks and recommended sharing good practice amongst Member States in relation to promoting the safe use of fireworks by the general public, particularly by children.

Experience from Member States when reviewing the markings and labels on products taken from the market during the course of the market surveillance exercises suggests that the 'Instructions for Use' are invariably in the language of the country in which they are being placed on the market, but that in some cases the type size is too small to be legible in the dark. A number of fireworks were found to have ignition times that were outside those prescribed in EN 15947-5. These are product design and quality control issues for the manufacturers. It was noted that in some cases these samples conformed to the safety requirements, whereas other samples from the same batch were outside the prescribed values.

EUFIAS sent a PowerPoint presentation to the 1<sup>st</sup> Project Group meeting. Amongst other things it drew attention to the problems that economic operators are facing in relation to obtaining a 'Declarations of Conformity' for those products that they were being placed on the market in the run up to New Year 2016. They also drew attention to the sale of 'illegal fireworks' and the problems associated with the sale of fireworks over the Internet.

With regard to the sale of fireworks via the Internet, members agreed that this development presented a number of issues for the market surveillance authorities that are unique to this method of selling and which are not replicated when using the traditional method of purchasing fireworks. They included the sale of Category 4 fireworks. This issue proved to be a recurrent issue during the various Project Group meetings. The difficulties of sampling of products by market surveillance authorities have, in part, been resolved, but issues relating to buying products on-line from outside an authority's area of control have yet to be resolved satisfactorily.

Two 'face to face' meetings were held with EUFIAS during the course of the project so as to exchange views on issues of mutual interest. A number of issues raised by EUFIAS, whilst being legitimate concerns, were considered to be outside the remit of the Joint Action. These included the relationship between economic operators and the regulatory authorities in the individual EU and EFTA Member States; the approval of Notified Bodies; the consistency of measurement by the test labs; the role of manufacturers vis-a-vis economic operators in the EU/EFTA Member States. The conclusions from these meetings was that in any future Joint Actions on Fireworks EUFIAS would welcome the opportunity to meet with PROSAFE to discuss and collaborate on issues of mutual interest.

## 7. Conclusions

### 7.1 Evaluation - lessons learned

On reviewing this activity there are a number of lessons that could be learned from the conduct of the project.

Firstly, it is important to point out that, as this is the second Joint Action concerning the market surveillance of fireworks, the Project Group for Fireworks 2 was able to build on the policies and practices that were developed during JA2011 - Fireworks. Some of the 'lessons learned' during the conduct of JA2011 - Fireworks were applied when developing the modus operandi for this project. These policies and practices were, again reviewed during the first two Project Group meetings and marginal amendments were made so that the procedures and practices adopted for Fireworks 2 were in accordance with the 2013 Directive on Pyrotechnic Articles and the changes that were made/being made to EN 15947. As a consequence, a considerable amount of time was saved during the planning process, during the meetings of the Project Group and in the 'behind the scenes' work by the Project Coordinator. Inter alia, one of the benefits of being able to streamline the work of the project was that it was possible to complete the project with five, rather than the six Project Group meetings provided for in the Grant Agreement.

A number of other lessons were learned relating to the project, for the most part they concerned issues that are peripheral to the project but, nevertheless are relevant to ensuring that safe products are placed on the market. They include:

#### 1. The relationship with customs authorities.

At Section 6.1 reference was made to the vital role that customs authorities can play in preventing non-compliant fireworks entering the EEA, The Project Group realised that much more needs to be done to ensure that the relationship between customs and market surveillance authorities is strengthened. In part this can be achieved by the better exchange of intelligence and, in part, by improving working practices between the two sets of organisations. This is a key issue and extends beyond the Joint Action on fireworks. It is recommended that PROSAFE and DG TAXUD review this matter again, but in a wider context than is provided for by the five or six product groups that constitute the vertical projects of a particular Joint Action.

#### 2. Internet sales

The growth of Internet sales for consumer products has presented the market surveillance fraternity with a new range of issues relating to how it ensures that only 'safe' products are available to the European consumer. This includes the following issues concerning the sale of fireworks which are over and above those relating to the traditional methods of selling consumer products, viz.:

How the economic operator can arrange for the safe transport of fireworks from his premises to the home of the consumer.

How market surveillance authorities can legitimately purchase fireworks over the Internet. Current problems in this connection include:

The act of purchasing the product means that Authority will probably encourage the illegal transport of the product to their premises;

How to store the products in the correct environment until they are transported to the lab for testing;

Whether they can undertake ‘mystery shop’ for fireworks;

Since many authorities don’t currently pay for products taken from the market for surveillance purposes, what mechanisms need to be put in place so that the Authority can buy products using a credit card and subsequently claim the cost of purchasing the goods from the economic operator.

In this connection a number of market surveillance authorities can currently purchase products via the Internet within their area of jurisdiction, but are not able to buy products via the Internet in a neighbouring country, even though they suspect that their consumers are able to buy these products via the Internet, and that the goods are probably non-conforming.

### 3. Approval of labs by National Accreditation Bodies to test category 1, 2 and 3 Fireworks to the provisions of EN 15947

This was the second occasion on which PROSAFE had received a poor response to the call for tenders, with, on this occasion, only 4 labs responding from the 14 labs invited to tender. Anecdotal evidence suggests that the bulk of the business in this sector undertaken by these labs relates to the issuing of ‘Declarations of Conformity’, rather than the testing of products. In a number of cases it would seem that the issuing of ‘Declarations’ is sub-contracted by the NANDO approved labs to test labs based in the Far East and that very little of their work relates to the testing of fireworks in the country in which they have been granted accreditation. This is a matter that is outside the scope of PROSAFE’s brief, but is an issue that the Commission may wish to pursue with the relevant national accreditation bodies.

### 4. CEN 15947-5 - Pyrotechnic articles – Fireworks, Categories F1, F2 and F3 – Part 5:

Requirements for construction and performance

The 2010 edition of this standard contained at Annex A - Table A.1 an indicative overview of the applicable requirements per firework type. This is a very useful table as, uniquely within the standard, it gives the range of requirements that pertain to each of the 31 different ‘types’ of firework. It is particularly useful to market surveillance authorities and to economic operators when specifying which tests should be performed on a particular type of firework.

Unfortunately this table has been omitted from the prEN 15947-5: 2014 and from EN 15947-5: 2015. The Project Group recommends to CEN TC 212 that this table be reinstated when a revision to EN 15947-5 is published.

### 5. The transport of fireworks from the participating Member States to the test lab

The transport of fireworks from the country in which they were collected from the market to the test labs proved problematic during the course of JA2011 - Fireworks. The lessons learned during the course of JA2011 were applied when the Member States undertook the same exercise during the course of JA2014 and, generally speaking, the transport of the fireworks to the test labs proceeded smoothly. On this occasion two participating Member States needed to transport their products by sea to mainland Europe (from Reykjavík to Rotterdam in the case of the Icelandic samples and from Langesund to Hirtshals in the case of the Norwegian samples.)

The transport of samples from Iceland to The Netherlands in 2016 was problematic as the master of the ship that had been engaged to transport the fireworks refused to carry the samples and an alternative ferry had to be used. As a consequence the transport of the fireworks was delayed and took place at a later time than was originally scheduled. Difficulties concerning obtaining the correct documentation proved to be impossible for DSB, Norway to overcome and for the samples collected during the winter 2015/16 the authority decided to have their samples tested by a Norwegian lab.

One of the lab's reported that they had difficulties in getting the relevant authorities in Spain to grant permission within a reasonable period of time for the transport of their samples from the French border to their lab. On the first occasion this was because the authorities required details of all the economic operators who had provided products to the various market surveillance authorities that made up the consignment of fireworks that was being transported from Belgium to Spain. Following discussions with the relevant authority, the lab persuaded the relevant authorities to grant permission for the products collected by the BENELUX countries and Iceland to be transported to their laboratory for testing.

The lesson learned from this aspect of the project is that obtaining approval from the relevant authorities is time consuming and needs patience, as many of the authorities will not have had experience in dealing with a market surveillance authority wishing to transport fireworks from a Member State to the test lab.

#### 6. Joint tendering for the testing of consumer products

The joint tendering for the testing of samples continued to show that it is very advantageous for market surveillance authorities since contracting for a large number of samples to be tested leads to achieving a considerable reduction in the cost of testing products. In turn this meant that, on this occasion, the Project Group could perform a higher number of tests than is specified in the Grant Agreement. This increased the validity and reliability of the Group's conclusions concerning the proportion of non-compliant products being placed on the market.

#### 7. Recording of physical tests by the laboratories on video systems

When discussing the results from Market Surveillance exercise conducted during the winter 2016/17 members noted that one of the labs had recorded on video some of the tests. This was not a requirement in the Agreement with the lab, but in the event, has proved to be very useful when the MSAs were reviewing the results of those fireworks that were non-compliant.

The Project Coordinator was asked to include a note in the Final Technical Report on the project that in any Joint Action on Fireworks that was conducted in the future, it would be helpful if the results of the physical tests on all the samples was to be recorded on video. A copy of the video recording any non-compliances in relation to these fireworks could then be sent to the MSA that had collected the product from the market.

## 7.2 Conclusions

The Project was very successful in that the nine participating Member States have achieved the objective of collecting a wide range of products from the market, sent them for testing, evaluated the results by conducting risk assessments on non-compliant products and, where appropriate, taking the appropriate regulatory action.

During the course of the Joint Action a total of 424 different products were collected from the market (431 if differently coloured labels on the same brand of rocket are included). Eleven samples of each product were collected, ten were sent to the laboratory for testing and one was retained by the Member State concerned in order to review its markings and labels. 58% of the products were found to be non-compliant, i.e. that one or more of the samples failed to comply with one or more of the 'major' or 'critical' non-conformities identified at EN 15947-5: 2015 - Clause 10.4 - Table 6.

A total of 363 separate non-conformities were identified. For the bulk of samples 1, 2 or 3 of the samples from the 10 tested were non-conforming, but in the case of 54 of the samples 7, 8, 9 or 10 samples were found to be non-conforming. The trade needs to note this and to take steps to improve its specification of the fireworks it orders from manufacturers so as to reduce the number of non-compliant products. Anecdotal evidence would suggest that, in many cases, fireworks are being purchased by economic operators on an 'as seen' basis, rather than as in other consumer product sectors, the importers clearly specifying the requirements for the various items that constitute the finished product.

JA2014 - Fireworks 2 collected considerably more products than in the case of JA2011 - Fireworks, where a total of 138 products were collected from the market. As a consequence, the Project Group were able to gain a more comprehensive picture of the extent of non-compliances than during the conduct of JA2011.

The Project's sampling regime concentrated on sampling the following types of firework:

From Category F1/1 - Fountains;

From Categories F2/2 or F3/3 - Bangers & double bangers; Batteries & combinations;

Compound fireworks; Flash bangers; Jumping ground spinners;

Rockets; Roman candles; Spinners.

In most cases a reasonable number of samples from each of these types of firework were taken from the market. In the case of 'Compound Fireworks' only 1 sample was found. This is a new, and expensive, type of firework which, should it prove to be non-compliant and fail to ignite, because of its bulk is hard to dispose of. Limited numbers of other 'type' of firework were also tested. They include a number of fireworks from Category F1/1 such as Sparklers, Fountains etc. as well as a small number of other types from Category F2/2 and F3/3 fireworks.

A worrying trend has been for some fireworks not to be designated on their label as being in class F1/1 or F2/2. This creates uncertainty in the minds of the public as to whether or not the product concerned is to be used as an 'indoor' or an 'outdoor' firework.

The trend for the distinction between 'toys' and 'fireworks' started to become blurred and is a matter of concern, as in the case of Belgian sample BE 116, a 'Ground Spinner', fireworks are being placed on the market in the form of a toy, in this case the product was shaped in the form of a 'tank' and from the way it was packaged clearly has 'pre-ignition' play value.

Collecting 431 products from the market meant that a total of 4,310 samples were tested during the course of the project. Each sample was subjected to an average of circa 14 individual visual or physical test requirements. This meant that circa 60,000 tests were conducted during the course of the project. This was considerably in excess of that specified in the Grant Agreement, which required that tests be conducted on 190 products.

The collection from the market of products that are sold 'on-line' proved to be a challenge for the Project team. Restrictions on both the purchase of products by this method and the practicalities of transporting the products from the premises of the economic operator to those of the MSA largely precluded the acquisition of products from this source of supply. A small number of products were however acquired on the basis of 'on-line' sales in the market surveillance exercise conducted during the course of the winter 2016/17 market surveillance exercise.

Finally, PROSAFE would like to thank the members of the Project Group for JA2014 - Fireworks 2, the staff of the market surveillance authorities who assisted in collecting samples for the project from the premises of economic operators and the staff of both laboratories who have provided an excellent service during the course of the Joint Action.