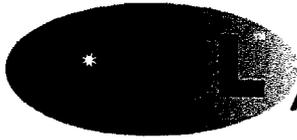


**Comments provided on September 11, 2006 by the
American Fireworks Standards Laboratory on the
Advance Notice of Proposed Rulemaking issued
by the CPSC on July 11, 2006**

APPENDIX 2



American Fireworks Standards Laboratory

OVERVIEW OF THE AMERICAN FIREWORKS STANDARDS LABORATORY

I. BACKGROUND

The American Fireworks Standards Laboratory (AFSL) is a nonprofit corporation organized by members of the fireworks industry to establish standards for fireworks and to test fireworks for public safety. AFSL was incorporated in March 1989 to address industry and Consumer Product Safety Commission (CPSC) concerns that an unacceptably high percentage of fireworks manufactured in China failed to comply with the CPSC performance and labeling requirements.

In the late 1980's CPSC conducted intensive import surveillance of fireworks manufactured in China and shipped to U.S. importers. Seventy-five percent of fireworks tested failed to comply with the regulations. In an effort to correct the areas of noncompliance and improve the overall safety of Chinese-manufactured fireworks, several industry members organized to develop a program for monitoring the compliance and safety of fireworks in China, before they were shipped to the U.S. market. The result was the establishment of AFSL.

A. The AFSL Standards

One of AFSL's first efforts was to establish a Standards Committee to develop voluntary standards for improving the safety and performance of consumer fireworks. The Committee consists of technical experts; representatives that manufacture, import, distribute, or retail fireworks; federal and state agencies that regulate the safety of fireworks (two representatives from the CPSC staff are members); the insurance industry; and a consumer.

In 1990 and 1991 the Standards Committee developed performance and labeling standards for all categories of consumer fireworks. Each standard incorporates existing CPSC and U.S. Department of Transportation requirements, as well as additional provisions developed by the Committee to address potential risks of injury. For example, in response to CPSC concerns about the tip-over of large multiple-tube mine and shell devices that reportedly had resulted in two deaths to consumers, the Committee developed additional requirements for the devices. These provisions reduced the amount of pyrotechnic composition permitted; required a dynamic stability test; and established cautionary labeling to warn consumers of the potential risks associated with tip-overs.

The Committee regularly reviews all AFSL standards to determine if modifications are needed. Any concerns identified with new or existing products are referred to the Committee to determine whether they may be addressed by an amendment to the appropriate standard. The standards were just recently revised and streamlined to eliminate requirements that are no longer necessary. A copy of the full AFSL standards is provided at Appendix 4.

B. The AFSL Testing and Certification Program

In January 1994, following extensive efforts to educate Chinese fireworks factories about the new voluntary standards, AFSL implemented a program known as the China Fireworks Quality Improvement Program (QIP). A key element of the QIP is a testing and certification program in which U.S. importers are offered the opportunity to have fireworks tested and certified in China by AFSL through an independent third party prior to shipment to the United States. Goods that are certified under the program are tested for conformance to all CPSC and Department of Transportation regulations, as well as to the additional provisions of the AFSL voluntary standards.

The testing and certification is conducted by Intertek Testing Services, Ltd. (ITS), an independent, internationally renowned testing laboratory that specializes in testing consumer products for compliance with standards established by governmental agencies or voluntary standards organizations. ITS employs approximately sixty staff for the fireworks certification program. ITS' technicians initially were trained by AFSL with the assistance of Mr. Neal Gasser from the CPSC's Health Sciences Laboratory. All technicians are re-certified annually by AFSL.

The testing program employs a random sampling plan used by the military to test munitions. Samples are selected for testing at factories or storage warehouses. Lot sizes vary in the number of cases, depending on the importers' needs. Samples are physically collected by AFSL technicians and tested according to specific procedures described in the AFSL Fireworks Test Manual. Completed test reports are reviewed for accuracy by a senior supervisor.

If a tested Lot conforms to all standards, it is designated as certified by the application of a unique AFSL certification label to the shipping carton(s). Access to the certification labels is tightly controlled by ITS, and the labels have a number of security features built in to avoid duplication or reuse. If a lot fails to conform to all provisions of the standards, the U.S. importer is prohibited, under a contractual agreement with AFSL, from importing the Lot into the United States.

The testing and certification program is monitored by AFSL through frequent visits to China and through an elaborate database containing detailed results of each product test. The database permits AFSL to spot trends in specific products and identify factories that consistently have problems meeting the standards.

AFSL has built into the program numerous features to ensure that testing is performed correctly, that the technicians maintain objectivity, and that only conforming merchandise receives the AFSL certification label. The program is continually evaluated to increase efficiency and effectiveness in improving safety and quality.

D. Participation in the Certification Program.

The decision by a U.S. importer or a Chinese shipper to participate in AFSL's certification program is entirely voluntary. Furthermore, only those firms that have signed a participation agreement with AFSL are entitled to participate in the program. Participation is

available to any U.S. fireworks importer that is willing to sign and abide by the terms of the agreement. AFSL charges a small volume-based fee for the testing and certification services.

Although participation is voluntary, program participants currently import an estimated 80 percent of the total annual volume of fireworks imports.

II. RELATIONSHIP BETWEEN AFSL'S CERTIFICATION PROGRAM AND THE CPSC'S IMPORT SURVEILLANCE PROGRAM

AFSL originated as a direct response to the CPSC's Import Surveillance Program. The threat of having incoming shipments stopped by CPSC and the resulting delays, uncertainties, and costs of handling noncompliant goods, have motivated many U.S. importers to participate in AFSL's voluntary program. In that way, the CPSC's Import Surveillance activities have been an effective tool in achieving compliance with the Commission's regulations, while also detaining a large volume of noncompliant products that otherwise would have reached consumers.

The AFSL certification program and the CPSC Import Surveillance Program are similar in terms of their operation and their impact on the safety and compliance of fireworks manufactured in China, but the programs differ markedly in their scope and operation. The following discussion emphasizes some of the distinctions between the two.

A. Number Of Products Tested.

In a normal year, the CPSC tests 200-400 incoming lots of fireworks, spread across an industry of more than 150 importers. Furthermore, the CPSC's activities at Ports of Entry appear to be unequally distributed throughout the country. Thus, companies wishing to avoid CPSC surveillance may do so by bringing shipments into Ports that are not actively monitored by the CPSC.

Under the AFSL certification program, nearly 30,000 Lots were tested in 2005, and the number continues to increase each year. These Lots represent approximately 6.15 million cases of fireworks tested last year. By comparison, in 1994, the initial year of the AFSL testing program, about 900,000 cases of fireworks were tested by AFSL. See the graph in Appendix 1 for more information about AFSL's testing history.

B. Categories Of Products Covered.

The CPSC's Import Surveillance Program appears to target a limited number of models within the categories of products that have a history of violations. This creates the potential for new or unmonitored products with significant violations or serious injury potential to escape surveillance by CPSC, especially in the introductory year.

Although only a limited number of product categories were tested by AFSL in 1994, AFSL now tests all product categories shipped to U.S. importer participants, with very limited exceptions. Only Party Poppers shipped in bulk, Snappers, and Booby Traps currently are not tested. These items are shipped in limited numbers and are relatively low energy items.

C. Effectiveness in Detecting Violations.

The CPSC's Import Surveillance Program screens a non-statistical sampling of incoming shipments. Samples are taken for enforcement purposes only, and 8–10 units of each Lot are tested by the CPSC, regardless of Lot size. By comparison, the AFSL certification program is based on a statistically valid random sampling plan that typically tests from 20–50 units per Lot, depending on the number of units within the Lot.

In addition, AFSL tests products in China at the point of manufacture, and therefore is potentially more effective in obtaining actual corrections at the manufacturer level. Areas of noncompliance identified by AFSL are brought to the manufacturer's attention immediately. The knowledge that this and future Lots of the same item are likely to be rejected serves to motivate the manufacturer to correct areas of noncompliance promptly.

D. Flexibility in Addressing Generic or Design Issues.

When a generic or design issue is identified in a product or category of products, AFSL, through its Standards Committee, has the ability to establish or modify a standard quickly to address the concern. For example, in the summer of 2004, a young child was killed when she reportedly was struck by a component for a reloadable tube aerial shell device. AFSL immediately modified the standard for reloadable shell devices, including two provisions designed to address similar injury potentials. One provision, a prohibition against hard discs in the devices that could act as projectiles, was implemented in October 2004. The second provision, a strength test prohibiting the launcher tube from rupturing when a shell functions inside the tube, was implemented in August 2005. Neither of these testing requirements is included in the existing CPSC regulations.

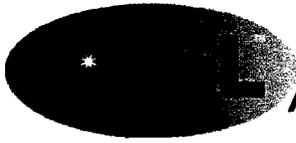
AFSL's Standards Committee is designed to facilitate participation in the standard-setting process by a broad cross-section of affected stakeholders while also drawing upon the deep knowledge of some of the leading technical experts in the field. The Standards Committee includes industry, government and consumer representatives, as well as representatives from the insurance industry and the fire services sector. Also, two representatives from the CPSC and one from the U.S. Department of Transportation serve on the Committee. Collectively, they are able to develop practical, effective solutions to safety concerns, often without the time-consuming procedural restrictions that apply to the rulemaking process for federal agencies.

III. BENEFITS OF INDUSTRY/GOVERNMENT COOPERATION

The industry-based testing and certification program established by AFSL is an effective means of monitoring conformance with the Commission's regulations and reducing the risks of injury associated with fireworks. CPSC staff readily acknowledge the value of industry-based certification and regularly encourage companies to participate in an independent, reliable third-party testing program to achieve compliance with the Commission's regulations. While CPSC staff have been careful in not limiting their support to the AFSL program alone, it is clear that the cooperative working relationship developed between AFSL and the CPSC has had major benefits both to the industry and to consumers.

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APPENDIX 3



American Fireworks Standards Laboratory

THE AFSL CERTIFICATION PROGRAM

The American Fireworks Standards Laboratory (AFSL) has established voluntary standards (the "Standards") for twelve categories of consumer fireworks sold in the U.S. marketplace. The Standards, developed by AFSL's Standards Committee, contain design and performance criteria, as well as cautionary labeling provisions, to provide assurance that fireworks meeting the Standards provide the highest level of safety to consumers who use them.

AFSL publishes Chinese and English language versions of its Standards, which are widely distributed to U.S. importers and Chinese manufacturers and shippers. AFSL also regularly conducts training programs for factories and shippers to promote greater understanding and acceptance of AFSL's Standards and certification program. Participants in AFSL's Quality Improvement Program in China ("QIP") must meet the provisions of the Standards.

Recognizing that training programs alone may not be sufficient to ensure compliance with its Standards, AFSL has developed a successful certification program to provide greater assurance that fireworks shipped to AFSL's U.S. members meet or exceed the requirements of the Standards. A description of the certification program is provided below.

I. COMPONENTS OF THE CERTIFICATION PROGRAM

A. Selection of Testing Laboratory.

Since 1994, AFSL has contracted with Intertek Testing Services, Hong Kong (ITS) to conduct testing under the certification program, with direct guidance and review by AFSL. ITS is an independent, world renowned consumer product testing laboratory, one of the largest in the field. ITS is a publicly held company with no affiliation with companies in the fireworks industry. AFSL selected ITS from among several potential candidates because ITS best met criteria established by AFSL to provide assurance that the certification program is conducted with the highest level of objectivity and effectiveness. Those criteria, which AFSL continues to apply in evaluating ITS' performance, include the following:

1. **Competence.** To assure that the testing program effectively evaluates the compliance of tested products, the testing provider must have sufficient resources, including personnel, to conduct the required testing in accordance with the procedures spelled out in the AFSL Test Manual. (Currently, ITS has 50 technicians, as well as eight program managers and clerks assigned exclusively to AFSL's certification program. ITS maintains fireworks testing centers in three primary locations in the principal manufacturing centers in China.). AFSL also requires the testing provider to have a thorough knowledge of AFSL's Standards and testing procedures as well as of the business environment in China.

2. Training. The testing provider must demonstrate the ability to maintain an adequate level of training for personnel who conduct certification testing. AFSL also provides training to all testing personnel and evaluates all testing technicians annually to ensure their competence. This provides assurance that results obtained by individual testers are consistent in their application of the Standards and test procedures to products tested.¹

3. Independence. The testing provider must be an independent entity with no affiliation with companies that manufacture, distribute or export fireworks from China. AFSL also is an independent non-profit association that also is not affiliated with any segment of the fireworks industry. AFSL operates as a membership organization, with membership open to all companies that have an interest in improving fireworks quality and safety.

4. Objectivity. The testing provider must demonstrate a commitment to testing and evaluating all shipments fairly and equally for all program participants. To reduce the potential for bias in the testing or evaluation process, the identity of the U.S. importer is not known before, during, or after the testing process, either by AFSL or the testing provider.

AFSL also requires the testing provider to operate under strict ethical standards that prohibit any conduct, such as the acceptance of gifts, that could bias the sample selection process, the test results, or any other aspect of the certification program. The testing provider also must maintain an internal audit program, the results of which must be open to review by AFSL.

B. Product Testing and Certification Service.

The various steps involved in certifying fireworks under AFSL's program are described below.

1. Requests for Testing.

Acting on behalf of a participating U.S. importer, the Chinese trading company or factory that ships consumer fireworks (the "Shipper") arranges with AFSL to have all the importer's Category I fireworks tested prior to shipment from China. At present, all consumer fireworks sold in the U.S. market are classified as Category I, except Booby Traps, Snappers, Crackling Whips, and Party Poppers shipped in bulk cartons (although

¹ Under the current program, testing technicians were initially trained by AFSL to develop a high level of competence in testing fireworks in accordance with the procedures spelled out in the AFSL Testing Manual. The initial training was conducted by the Executive Director of AFSL in 1993, prior to the initiation of testing in February 1994. During the initial training, a representative from the Consumer Product Safety Commission's fireworks testing laboratory accompanied AFSL and participated in the training program. This helped to ensure that the procedures developed by AFSL were consistent with those employed by CPSC. AFSL continues to work closely with CPSC staff to maintain that consistency.

Party Poppers included in Assortment Packages are tested by AFSL). AFSL intends to expand the list of Category I fireworks it tests to include these items in the future.

After the Shipper has identified the factory supplying the order on behalf of the participating U.S. importer, the Shipper requests testing by submitting an application for testing to the local ITS office. The application includes all identifying information for the product, as well as the location of the merchandise to be tested. Once ITS verifies that the applicant is an AFSL participant, the application is assigned a Lot Identification Number used to track the Lot throughout the certification process. The Lot is then scheduled for testing within 72-hours. As a matter of practice, the vast majority of tests are conducted within 48 hours of receipt of the testing requests.

2. Testing Procedures.

ITS technicians, working in teams of two, including at least one certified technician, travel to the factory or warehouse designated in the application for testing. Once the Lot is identified, the technicians mark the Lot by stamping the Lot Identification Number on shipping cartons within the Lot. Technicians open a pre-determined number of cartons, selected at random, and then collect the requisite number of samples for testing in accordance with the Sampling Plan described in the AFSL Test Manual. Shipping cartons from which samples are collected are re-sealed using tape bearing the ITS name. Samples are secured to maintain their integrity by placing them in a plastic bag sealed with the technicians identifying initials and then transported to the testing site.

Testing is conducted in accordance with procedures contained in the AFSL Testing Manual, again using two technicians to conduct the tests. The Test Manual contains written procedures to be followed in performing each test required to evaluate conformance to each provision of each of the twelve AFSL Standards. A copy of the Test Manual is provided as **Exhibit 1** to this appendix.

A Test Report is prepared by the team to record the results of each test performed. A separate test report, containing a description of the specific requirements for the product has been developed for each of the twelve product categories. A sample test report can be provided upon request.

3. Verification of Results.

Once all applicable tests have been conducted, the completed test report is reviewed by the ITS Supervisor or a Senior Certified Technician. The reviewer and the certified technician must both sign the test report before it is considered official.

- a. Passing Lots.** When a shipment tested by ITS meets all requirements, the test report is marked "CO" to indicate compliance. At this point, the technicians, with the assistance of factory or warehouse personnel, apply a certification sticker bearing the AFSL service mark to one of the side panels of each carton of

fireworks in the lot tested. The application of the stickers is performed by or under the direct supervision of ITS technicians. Additional information regarding the service mark is provided below. Once the certification stickers are applied, the Shipper is authorized to ship the order to the participating U.S. importer.

b. Failing Lots. When a lot evaluated by ITS fails to comply with one or more requirements of the Standards, ITS identifies the test report as “NC” or noncomplying, and provides a copy of the test report to the Shipper and to AFSL. The test report describes each failing result obtained during the test. Failed lots can be identified by the absence of an AFSL sticker on the shipping cartons. Upon receiving notice of a failed lot, the Shipper may not ship the goods in the failed lot to the participating importer without first reconditioning the goods and having them re-tested by ITS.

Whenever a lot fails the testing program, AFSL makes an effort to contact the factory and assist it in correcting the identified problem. Such efforts may be in the form of (a) technical advice and guidance provided in writing to the individual factory, (b) manufacturing and quality control assistance provided during on-site visits to the factory, or (c) AFSL-sponsored training seminars. Where known, AFSL will also inform the factory's trading company and request that the trading company inspect future shipments of the item more carefully.

4. The AFSL Service Mark.

A crucial element of the certification program is the ability to identify shipments that have been tested and certified by AFSL as complying with the Standards. For this purpose, AFSL has developed a service mark which is registered in the United States and in China and protected by the laws of each country.

Products submitted to AFSL for testing that are found to conform to the requirements of the Standards will have a sticker bearing the AFSL service mark applied to each shipping carton in the tested lot. The design of the sticker is modified each year. It is manufactured with special materials and printing inks to prevent counterfeiting and it contains other features to maintain the security of the label. Stickers printed for a given year are numbered sequentially to allow tracking of shipments after a lot has been certified. Use of the AFSL service mark without express written consent of AFSL is prohibited. Sample stickers bearing the service mark can be provided upon request.

The service mark label is the only means by which a U.S. importer may confirm that samples of the product have been tested to meet all applicable requirements of the AFSL Standards. It is also a means by which the effectiveness of this quality improvement program can be monitored by federal, state, and local governmental agencies or enforcing authorities. Both the Consumer Product Safety Commission and U.S. Customs monitor the presence of AFSL stickers on shipping cartons in determining whether to sample fireworks shipments arriving at U.S. ports.

Fireworks which have not been tested or which have been tested and failed may not be included in a shipping case bearing the AFSL mark. Anyone who knowingly misuses the AFSL service mark may be subject to termination from the program and to other legal remedies available to AFSL.

5. Tracking Test Results.

ITS provides copies of a completed test report to the requesting Shipper and to AFSL. ITS also maintains a computer database of the results of each test it performs. For accounting purposes, ITS prepares a monthly summary of the tests performed and forwards it to AFSL and to AFSL's Escrow Agent in China. From those reports, AFSL compiles an annual summary of all test results and distributes it to program participants to allow them to check the compliance history of products before ordering them.

6. Certification Costs.

Shippers must report to AFSL's Escrow Agent in China all cartons shipped to a participating importer, whether tested or not, and collect and pay the appropriate fee to the AFSL Escrow Agent located in Hong Kong.

II. INDEPENDENT MONITORING BY AFSL.

The final element of the certification program is independent monitoring of the testing provider. AFSL provides such monitoring through several means.

A. Daily Input/Review of Certification Program. AFSL frequently advises ITS on the certification program. Technical questions such as those relating to the applicability of the AFSL Standards to certain products, appropriate cautionary labeling, and the identification of emerging hazards, are referred to AFSL staff for resolution on a daily basis. Procedural questions, such as those relating to testing methods, are resolved by AFSL staff in consultation with the ITS Program Manager for the certification program.

B. On-site Review of Certification Program. AFSL frequently inspects the certification program through on-site staff visits to China. Such visits include meetings with ITS' senior management to ensure that the program receives the appropriate level of ITS management review. These on-site visits also include meetings with the certification program's field management staff to resolve any outstanding technical or operational issues that arise and to ensure that ITS is devoting an appropriate level of resources to the program. One of the key benefits of the on-site visits is the opportunity to meet directly with testing technicians to evaluate the level of training and consistency in test results being obtained through the system.

C. Database Monitoring. In 2004, AFSL contracted with ITS to develop a new data tracking system that permits AFSL to independently monitor the results for each shipment that is

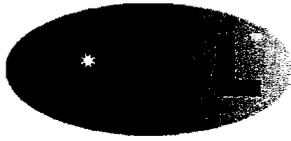
certified under the program. The new system was implemented in mid-2005. ITS Data Entry Clerks enter into the system the details of each test performed under the certification program, including items that are rejected. Through this system, AFSL can monitor the overall results of the program on a daily basis. Reports can be run to monitor the results of specific factories, shippers, product categories, and even technicians. The system is also designed to enable AFSL to provide database access to other entities with a need to monitor the program's results.

D. AFSL China Liaison Office. AFSL has established, through an independent contractor, a liaison office in China. One of the primary functions of the office is to monitor the performance of the testing laboratory through (a) frequent contact with the Shippers whose products are being tested, (b) unannounced visits to test sites where testing is being performed, and (c) frequent visits to the factories and warehouses to discuss ITS' performance in conducting the certification program. The liaison office also provides a convenient way for factories or shippers to report concerns about the certification program directly to AFSL without relying on the ITS to address such concerns. Modifications to AFSL's Standards and testing program procedures are disseminated to the factories through the Liaison Office.

E. Coordination with Regulatory Authorities. AFSL maintains its headquarters in the U.S. to provide technical guidance and assistance to U.S program participants. AFSL's location in Bethesda, MD also facilitates its role in providing information on AFSL's certification program to the CPSC, the U.S. Department of Transportation, U.S. Customs, and other regulatory agencies.

CPSC and Customs officials frequently consider whether a shipment has been certified by AFSL in determining whether to sample and test the shipment at a U.S. port of entry. Through its headquarters office, AFSL can provide direct and prompt responses and feedback to these agencies on issues relating to the certification program. This also provides an opportunity for AFSL to learn which products are creating concerns, particularly any products that may have been involved in injury incidents. Through its elaborate database and direct involvement in the certification program, AFSL has the ability to redirect the focus of the certification program to address such concerns or emerging hazards. Product design or performance issues often can be addressed with the manufacturers within a matter of days rather than months.

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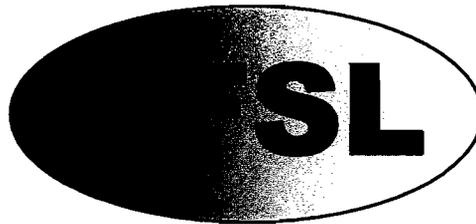


American Fireworks Standards Laboratory

TEST MANUAL FOR AFSL

QUALITY IMPROVEMENT PROGRAM

February 5, 1994
October 28, 1994
February 5, 1995
March 12, 1996
July 21, 1998
November 16, 1999
November 19, 2001
June 25, 2005
August 10, 2006



INCORPORATES TESTING PROCEDURES FOR REQUIREMENTS ESTABLISHED BY THE US CONSUMER PRODUCT SAFETY COMMISSION, US. DEPARTMENT OF TRANSPORTATION AND THE AMERICAN FIREWORKS STANDARDS LABORATORY. THIS MANUAL COVERS ONLY CATEGORY 1 FIREWORKS DEVICES AS DEFINED BY AFSL.

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APPENDIX

- Appendix 1 - Fireworks Categories and Implementation Date**
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CHAPTER 1 -- GENERAL INFORMATION

A. INTRODUCTION

All fireworks distributed in the United States and intended for use by consumers are subject to certain performance and labelling requirements established by the US. Consumer Product Safety Commission (CPSC) and the U.S. Department of Transportation (DOT). The purpose of the regulations is to reduce the risk of injury to consumers during normal handling, storage, and use and to reduce the risk of injury during the transportation and storage of the devices.

During the decade of 1980's, these federal agencies, particularly CPSC, have determined that a substantial percentage of fireworks shipped to the United States from the Peoples' Republic of China do not comply with the applicable regulations. In addition, the number of injuries associated with fireworks, an estimated 10,000 per year, has not declined as expected when the regulations were established.

To address the problem of unacceptably high injury levels, the American Fireworks Standards Laboratory (AFSL) was established in 1989 to develop additional requirements above and beyond federal regulations and to assist manufacturers and importers in ensuring that their products comply with federal regulations and voluntary standards established by AFSL. Toward that goal, AFSL has established a quality improvement and testing program in China to evaluate fireworks devices before they are shipped to the United States. An independent testing laboratory, under contract to AFSL, tests shipping lots of fireworks destined for the U.S. market to determine whether they comply with all applicable requirements.

This test manual contains the procedures to be followed in testing fireworks under the AFSL independent testing program. It is intended to serve as a reference for all persons involved in testing fireworks and determining whether they comply with the applicable requirements.

The test procedures contained herein are based on the regulations or standards established by the AFSL and DOT. In the event of a discrepancy between the requirements as described herein and the actual regulations or standards, the regulations or standards will take precedence over the requirements described in this manual.

B. SCOPE

The testing procedures described herein apply to all fireworks defined as "high priority" or "Category I" fireworks by AFSL. Items included in this category have been determined by AFSL in consultation with CPSC to warrant testing based on the potential risk of injury associated with the device and the likelihood that the device will be evaluated by CPSC under the Import Surveillance Program.

Appendix 1 lists the types of fireworks devices that have been classified as Category 1 fireworks.

The list of fireworks devices included in Category I fireworks may be expanded to include other types of fireworks devices, as determined by AFSL, based on the availability of testing resources and an assessment of the risk of injury associated with the device. If you have a question as to whether the specific device in question appropriately fits into Category 1, please contact AFSL.

C. SAMPLING PLAN

Appendix 2 contains the sampling plan used by the testing laboratory. The number of samples to be tested for compliance with the various requirements is given in the Table 1 of **Appendix 2**.

The "Lot" of the merchandise is defined as a definite quantity of the item accumulated under conditions that are considered uniform for sampling. These conditions are including and not limited to, same manufacturing process, same factory, same stocking area, and same packing.

Testing is performed using procedures outlined in Chapter 2, below.

NOTE: The number of items to be tested under each testing procedure will vary depending on the size of the shipping lot. Please refer to Appendix 2, Tables 1 and 2, to determine the number of items to test for each lot.

D. FACTORY IDENTIFICATION NUMBER

The AFSL Quality Improvement Program states that each shipping carton must bear a Factory Identification Number identifying the factory that manufactured the product. Each factory providing merchandise tested under the program must be assigned a unique factory identification number by the appropriate China Trading Company and AFSL must be provided a list of such assigned factory identification numbers by the Trading Company or Shippers.

In order for a Shipping Lot to be tested under the Quality Improvement Program (QIP), each shipping carton within the Lot must bear the same unique factory identification number assigned. Lots containing shipping cartons that fail to bear a factory identification number will automatically be rejected without testing. Intertek Testing Services will notify the Shipper that the Lot is rejected by providing a test report form describing the reason for rejection in the comments section of the test report form. For tracking purposes, Intertek Testing Services will identify the Lot as "NF".

While it is expected that each Lot submitted for testing will consist of merchandise from the same manufacturing Lot, there may be instances where the Lot will contain merchandise from two (or more) factories. In such instances, it is the responsibility of the Intertek Testing Services technician to ensure that the sample taken from the Lot for testing is representative of the Lot. To accomplish this, use the following guidelines:

- (1) Increase the sample size, using the following formula: If the Lot would normally be sampled and tested at the S-3 level, increase the sampling level to S-4. If a specific requirement calls for sampling and testing at the S-1 level, increase the sampling level to S-2.
- (2) Include within the sample a proportionate number of units from all factories represented within the Lot using the following formula as an example: where a Lot of 500 cases of merchandise consists of 400 cases from Factory A, and 100 cases from factory B, the technician should make every reasonable effort to collect 4/5 of the sample from Factory A cartons and 1/5 of the sample from Factory B cartons.

In those instances where the Lot is rejected due to the absence of Factory Identification Numbers on some of the shipping cartons, the manufacturer, trading company or warehouse personnel will be permitted to separate unmarked cartons from marked cartons and re-submit the Lot containing marked cartons for testing.

E. BACKFILLING CARTONS AFTER SAMPLING

In some instances, the U.S. importer may request that cases from which samples have been taken are back-filled to avoid having empty spaces in cases during shipment of the merchandise to the U.S. At the request of the Shipper, Intertek Testing Services will supervise the backfilling of carton using the following guidelines:

1. The shipper, his representative, or the warehouse or factory personnel is responsible for providing personnel to re-pack or backfill empty spaces in cartons from which samples are taken;
2. Cartons that have been back-filled after sampling must be sealed with tape bearing the name of the testing laboratory.

The following procedures are being implemented,

- a. AFSL technicians will collect samples according to previously established procedures. Once samples are collected, the opened cartons will be resealed, using tape bearing the Intertek Testing Services name.
- b. If the Lot complies with all AFSL requirements, technicians will be dispatched to the factory or warehouse to monitor the application of the AFSL stickers on the shipping cartons.
- c. Prior to the application of the AFSL stickers to the shipping cartons, factory personnel must back-fill all cartons from which samples were taken, using merchandise from **cartons within the same Lot**. If merchandise used to backfill the cases is taken from outside the shipping lot, the integrity of the lot will be compromised and the complying test results for that lot to become invalid. AFSL technicians must also monitor the backfilling of the cartons by factory or warehouse personnel. After the cartons are backfilled, AFSL technicians will reseal the cartons using specially marked Intertek Testing Services tape, as usual.
- d. To assure that the lot remains intact it will be necessary for the factory to include several extra cartons of merchandise with the Lot. This will provide enough extra merchandise to backfill the cartons from which samples are taken. The number of extra cartons required to be provided with the lot would vary, depending on the size of the lot. For example, if the original request is for 100 cartons of merchandise, which is, packaged 24 pieces to each carton (a total of 2400 pieces in the lot), the number of samples required for testing will be 26 pieces. In order to replace the samples taken for testing, 26 pieces or two additional cartons must be provided with the lot.
- e. The shipper will assist the factory in determining how many additional cartons of merchandise are required. Refer to the Sampling Plan in Appendix 2 for assistance in determining the number of cases needed. When placing the original order with the factory, the shipper will indicate the number of extra cartons of merchandise to be provided. For example, when requesting 100 cartons of merchandise, the shipper will indicate "100 cartons + 3 extra cartons" on the order form.
- f. The failure of the factory (or warehouse) personnel to backfill shipping cartons under the supervision of Intertek Testing Services technicians who are present to monitor the application of the AFSL stickers to the shipping cartons will result in the **refusal of the technicians to provide AFSL stickers for application to the shipping cartons.**

F. RE-PACKING PREVIOUSLY APPROVED LOTS

In some unusual instances, the Shipper may request re-packaging of a Lot, which previously has been approved by the application of the AFSL stickers to the shipping cartons within the Lot. For example, if the

shipper learns that the Lot has been packaged in the wrong carton type, Intertek Testing Services will monitor the re-packing of the Lot provided that the following guidelines are met:

1. The Intertek Testing Services technician will check the quantity of cartons before the re-packing process begins.
2. The Shipper's representative or warehouse or factory personnel are responsible for providing the appropriate personnel to cut off the original stickers, re-pack the shipping cartons, and apply new stickers to the replacement cartons;
3. The AFSL stickers must be cut from the original shipping carton and provided to the Intertek Testing Services technician who is monitoring the operation;
4. The Intertek Testing Services technician must provide new AFSL stickers to the appropriate personnel and monitor the application of the stickers to the newly packed shipping cartons.
5. The serial numbers from the original stickers must be voided in the AFSL e DATA BASE and replaced by newly assigned sticker serial numbers. The re-packing must be noted on the original test report for the Lot, a copy of which will be sent to the Shipper.

G. TESTING OF ARSENIC CONTENT FOR SNAKES

1. In order to be approved for testing under the QIP, Snakes must be manufactured by a factory which is registered under the AFSL Factory Registration Program (FRP). The program required the factory be audited annually by an AFSL certified auditor. The audit must be indicated that the factory is complied with Good Manufacturing Practices (GMP).

Note: Please refer to **Appendix 7** for the list of registered factories.

2. The shipping cartons must bear the unique registered number assigned by AFSL to identify the factory.
3. On-site testing of the item will be performed according to the AFSL Standards.
4. Three (3) samples will be randomly selected from the lot and tested for Arsenic content by Intertek Testing Services laboratory. If the Arsenic content exceeds 0.005% by weight, the shipment will be rejected.

H. RECORDING TEST RESULTS

Appendix 4 contains a sample AFSL Test Report Form, which is used to record the results of all tests, conducted. It is essential that this report be completed accurately for all requirements that apply to the specific product being tested. When field-testing is being performed, each testing crew consists of two persons: - one person to ignite the items and perform the tests, with a second person to serve as the recorder. It is the recorder's responsibility to accurately record the results while the second person performs the test. For example, when testing for fuse burn time, the tester ignites the device, moves to a safe observation point, and observes the functioning of the device. The recorder clocks the fuse burn time using a stopwatch and records the results on the test report form.

I. SAFETY CONSIDERATIONS

SAFETY is very important and must constantly be kept in mind while testing is underway. It must be assumed that at least some items will perform erratically. An appropriate test area is required that is free of flammable material - the required size of this area will be determined by the types of items to be tested; aerial items require a larger test area than fountains and ground-based fireworks. A water supply must be on hand in the event of any grass fires or other incidents. **ALL personnel who are present in the testing area must wear safety glasses.**

In performing the fuse side ignition test and measuring the weight of report powder, the technicians will accumulate a significant amount of waste pyrotechnic material. This must be disposed of on a regular basis. Loose powder will burn much more quickly than powder pressed into a tube, and a significant quantity of loose powder poses a potential hazard to the test crew.

The best way to dispose of scrap powder and waste fireworks material is to burn small amounts at a time. A covered plastic container containing diesel fuel should be kept near the test area; scrap material should be placed in this container, mixed with the diesel fuel, and then burned in a pit on a regular basis. It is very important that any employees involved in disposal be properly trained in the appropriate way to dispose of waste fireworks and powder. If you have any questions about disposal, contact the AFSL office. **DO NOT** allow waste materials to accumulate.

Note: The purpose of the diesel fuel is to render the waste material insensitive to ignition by friction and spark.

A separate document "Fireworks Testing Safety Guideline" has been developed to detail the criteria and procedure for maintaining a safe working environment. Intertek Testing Services technicians must be properly trained before commencing any assigned job independently. Such safety training must be carried out annually.

J. TEST EQUIPMENT

Equipment needed to perform testing specified in this manual includes:

- 1) Stopwatches, 0.01second ;
- 2) Razor blade or other sharp cutting tool;
- 3) Cigarettes, "Double Happiness" (preferably Pall Mall unfiltered);
- 4) Type size finder;
- 5) Matches or lighter;
- 6) 8-ounce weight;
- 7) Ruler;
- 8) 12°, 18°, 22° and 61° tilt blocks;
- 9) Sky rocket test board (see Appendix 5);
- 10) Balances capable of reading to 0.01 g. and 0.01mg;
- 11) Callipers or Pliers;
- 12) Flight Trajectory Cone (see Appendix 6);
- 13) Steel Sieve (20 meshes);
- 14) Weighing Paper and Dishes;
- 15) Pen or pencil;
- 16) AFSL Test Report Form;
- 17) Safety glasses;
- 18) Hose or bucket of water;
- 19) Covered container for pyrotechnic scrap;
- 20) Scale, 5Kg, 0.02 Kg.

- 21) 1.0", 1.5", 1.75" gauges
- 22) Chlorate test kit.

All items of equipment needed to perform testing should be available at the Test Station.

K. RE-TEST OF REJECTED LOTS

At the request of the Shipper who submitted the original application for testing, AFSL will re-test a rejected Lot if the Shipper:

- (a) has reason to believe that an error has been made in the testing procedure;
- (b) has reason to believe that the result obtained by the Technician is not representative of the Lot of merchandise.

Under the conditions described above, the Shipper may request in writing to Intertek Testing Services that the Lot be re-tested. Intertek Testing Services will re-test the Lot using a larger sample size. For example, if the Lot was originally tested at the S-3 level, the re-test would use the S-4 level. The re-tested Lot will retain the original Lot Identification Number **with a suffix "R"**.

If the re-test indicates that the Lot complies with the applicable requirements, the Shipper will not be charged for the re-test and AFSL will absorb the cost charged by Intertek Testing Services. If the re-test confirms the original failing test result, the Shipper will be obligated to pay for the re-test at the rate of twice the normal cost charged by Intertek Testing Services for testing a Lot. Intertek Testing Services will invoice the Shipper for the re-test work performed, and provide a copy of the invoice to AFSL headquarters office. The invoice will identify the Lot identification number for the original test, including a copy of the original test report and a copy of the test report covering the re-test. For re-test results that comply with the requirements, Shipper is required to pay the costs directly to Secretary Ltd. for credit to AFSL's program account, following normal procedures.

L. OUTSIDE OBSERVERS

The Shipper or the Shipper's representative will be permitted to monitor the testing as it is being performed, at their request. However it is important that the Technician is able to perform the test without interference from the Shipper or its representative. Also AFSL must rely only on the results provided by the Intertek Testing Services technician in determining whether a Lot passes or fails.

CHAPTER 2 -- TESTING PROCEDURES

A. PYROTECHNIC LEAKAGE

1. Requirement

Fireworks devices must not leak pyrotechnic material during normal shipping, handling, and operation. [CPSC regulation 1507.5]

2. Test Procedure

Gently shake the item over a clean white sheet of paper to see if any powder or granules are released. No leakage other than a slight dusting should occur, nor should any leakage be observed in shipping cartons. If more than a light dusting is observed, collect all of the material that has leaked, separate out any noticeable inert material, form the pyrotechnic material into a small pile, and attempt to light it with a piece of safety fuse. If it ignites and rapidly burns, the item fails. Record the number of units that pass/fail this test on your data sheet. It is possible that one (or several) shipping cartons in a shipment were damaged in transit, and the leakage may be the result of such damage. If leakage is observed, segregate those cartons with damaged items from the undamaged merchandise and repeat the test on the undamaged items.

B. FUSE ATTACHMENT

1. Requirement

Fuses on devices that are ignited with a fuse must be securely attached to the device to ensure that they do not detach during shipping, handling, or use. [CPSC regulation 1507.3 (b)]

2. Test Procedure

If the item weighs less than 8 ounces (227 grams), fasten two items together with a rubber band or tape. Grasp one of the fuses and gently lift the devices; then reset, grasp the other fuse and lift the devices. The fuse should not separate from the device. If the fuse does separate, the device fails this test. For large items weighting more than 8 ounces, attach an 8-ounce weight to the item when performing this test (rather than attaching a second item).

Note: If the fuse is taped to the device or is wrapped in paper, do not remove the tape or unwrap the paper when performing this test. If the tape does not allow access to the fuse, cut the tape down to a point where the fuse can be grasped (perhaps with pliers or a tweezers). Then perform the test as prescribed above. Report the number of items that pass/fail this test on the test report.

C. ONE PIECE SAFETY FUSE -- RELOADABLE SHELL DEVICES

1. Requirement

Reloadable Tube Aerial Shell Devices must have a one - piece safety fuse, defined as any fuse that is very resistant to side ignition and has a very consistent and constant burn rate. Green, thread-wrapped fuse is frequently used to meet this requirement.

2. Test Procedure

Examine the fuse attached to the shell of the device. If it is a one - piece construction rather than two pieces joined together, and appears to be a coated safety fuse rather than an uncoated paper fuse, test the fuse for resistance to side ignition in accordance with the procedures described in **paragraph J, page 14**, below. If the fuse is a one-piece construction, is a safety fuse, and passes the side ignition test, the device passes this requirement. Record whether the device passes or fails this requirement on the test report.

D. BASE-TO-HEIGHT RATIO AND STABILITY

1. Requirement

Fireworks devices that operate in a standing, upright position (including fin-type missiles) are required to have a stable base. [CPSC regulation 1507.4] This reduces the likelihood that the device will tip over during normal operation and fire charges in the direction or the user or onlookers. There are two criteria that are evaluated in determining whether an item passes this requirement: (a) base to height ratio, and (b) stability (tip-over) test. The regulation states that the minimum horizontal dimension of the base must be at least 1/3 the height of the device, including the base and any cap on the top.

2. Test Procedure

a. Base -to- Height Ratio

To perform this test, measure the overall height of the item with a ruler, and then measure the minimum dimension of the base. Divide the height by the base dimension; if the result is equal to or less than 3.0, the item passes.

Example: Overall height = 12.0 inches
Minimum base dimension = 4.5 inches

$$\frac{\text{Height}}{\text{Base}} = \frac{12.0}{4.5} = 2.67 \text{ (result is less than 3.0, item passes)}$$

Note: Simplified Test Procedure.

The simplest way to test for height to base ratio is to line up three items on level surface, one next to the other with their bases touching. Then lay a fourth item down along the length of the three

bases. If the length of the item is less than the length of the three bases, the item passes the stability test. If the item has approximately the same length as three bases, use a ruler to determine the exact dimensions.

b. Stability Test

If the height/base ratio is **greater** than 3.0, perform a stability test on the device using a tilt block. Note that Fountains, Toy Smoke and Flitter Devices are required to pass an 12° tilt block test; Missiles and Mine and Shell (single tube devices and multiple tube devices with tubes less than 1.5" i.d.) are required to pass an 18° tilt block test; Reloadable Shell Devices are required to pass an 22° tilt block test; multiple tubes devices with tube larger than 1.5"i.d. are required to pass an 61° tilt block test.

To perform this test, gently place the item on the appropriate tilt block, release the item, and note if it falls over or remains upright. Rotate the item through all possible orientations of the base on the tilt block. Any device that fails either the 3 to 1 height/base ratio or the tilt test, fails this requirement. Record the number of units that pass/fail this test on test report.

E. REQUIREMENTS FOR ROMAN CANDLES

1. 4 - Inch Void Space

a. Requirement

Roman Candles are required to have a minimum four-inch void space at the base of the device, below the pyrotechnic chamber.

b. Test Procedure

Measure the length of the void space below the pyrotechnic chamber by extending a pencil or ruler into the empty end of the candle tube and measuring the length of the empty portion of the tube. If this void space is at least four inches in length, the item passes. An inert clay plug in the bottom of the pyrotechnic chamber is also considered part of the void space, so if the measurement taken above does not indicate a four-inch handle, dissect the items and measure the total of void space (or wood handle), plus clay plug. If the void space is less than four inches, the item fails this test.

Record the number of units that pass/fail this test on the test report.

2. Spikes on Roman Candles (if present)

a. Requirement

Devices that are designed to be operated by sticking into the ground may have a spike that is at least 2 inches in length protruding from the device. In addition, the spike must be blunt (not less than 1/8th-inch across at the tip) and the spike must be securely attached to the item. **[CPSC regulation 1507.7 (b)]**

b. **Test Procedure**

For devices that are designed to be held upright in the ground by means of a spike, measure the length of the spike protruding from the base of the item. There must be at least two inches of spike protruding from the item. Use a "reasonable" twisting force to test for secure attachment of the spike. Record the number of spikes that pass/fail these tests on the test report.

3. **Number Of Shots**

a. **Requirement**

Roman Candles may not have more than 10 shots per candle tube.

Roman Candles may not have less than 5 shots per candle tube.

All Roman Candles within a retail package must have an identical number of shots per candle. Within an assortment retail package, Roman Candles having a different number of shots must be wrapped separately.

b. **Test Procedure**

Count the number of shots (either individual stars or star and report combinations) and record the number on the test report form. If the number of shots is less than 5 or exceeds 10, the device fails this requirement.

F. ROCKETS WITH STICKS - STICK ATTACHMENT AND STRAIGHTNESS.

1. **Requirement**

Sticks on sky rockets must be securely attached, and they must be straight and rigid to provide direct and stable flight [CPSC regulation 1507.10]

2. **Test Procedures**

a. **Stick Attachment**

To test for stick attachment, grasp the rocket by the stick and attach an 8-ounce weight to the motor tube, using a clip and/or piece of string, with the rocket motor pointing down. The motor must not separate from the stick when the 8-ounce weight is attached. Report the number of units that pass/fail this test on test report.

b. Stick Rigidity

Rocket sticks must also be rigid. In selecting rockets for the test, intentionally select rockets that have the thinnest stick visible within the packaged unit and which appear to have the greatest curvature. To perform this test, a **rocket testing board** is required and is included in the Technician's testing kit. A sketch of a sky rocket board appears in **Appendix 5**, Figure 1. Perform the tests for rigidity by clamping a 1" section of the stick, furthest from the driver, against the flat surface of the stick clamping block. Measure the distance the end of the rocket driver arches downward (see Figure 2 in **Appendix 5**), and observe if the end of the rocket driver arches downward over the line which is tangent 0.25 to the horizontal line. Report the ratio of the downward arch to stick length, i.e., the tangent. If the tangent exceeds 0.25, the device fails. Record the number of devices that fail on the test report.

c. Stick Straightness

To perform the test for rocket stick straightness, select the rockets that have the greatest curvature, (i.e. most crooked sticks) in the sample selected. Lay the stick on the flat surface of the sky rocket stand and roll the device. Measure the greatest arch, which occurs (see Figure 3, in **Appendix 5**). If the arch is one inch or greater, the device fails this requirement. Report the number of devices which fail this requirement on the test report.

G. SHELL SIZE IN RELOADABLE SHELL DEVICES

1. Requirement

Individual shells in Reloadable tube aerial shell devices may not exceed 1.75" o.d. [CPSC requirement 1500.17 (a) (11)]. AFSL also limits the number of shells to 12 per retail package.

2. Test Procedure

Using the reloadable shell test gauge developed for this test, perform the test by passing the shell through the gauge. If the diameter exceeds 1.75" or the shell does not pass through the gauge, the device fails this test.

Count the number of shells (shots) included with each retail package and record the results.

H. REPORT WEIGHTS -- FIRECRACKERS AND REPORTS IN ROCKETS AND OTHER AERIAL DEVICES

NOTE: FLASH POWDER USED TO MAKE FIRECRACKERS AND OTHER FIREWORKS REPORTS CAN BE A DANGEROUS EXPLOSIVE MATERIAL. GREAT CARE MUST BE EXERCISED WHEN WORKING WITH THIS POWDER. THERE MUST BE NO SMOKING OF ANY TYPE OF FLAME NEAR FLASH POWDER. CARE MUST BE EXERCISED WHEN OPENING ANY TUBE OR CONTAINER THAT CONTAINS FLASH POWDER. AFTER WEIGHING, FLASH POWDER SHOULD BE PLACED IN A PLASTIC CONTAINER CONTAINING SUFFICIENT DIESEL FUEL TO COVER THE POWDER, AND MIXED INTO DIESEL FUEL. CONTAINERS

MUST BE CAREFULLY REMOVED FROM THE TEST AREA ON A REGULAR BASIS AND DESTROYED BY BURNING.

DO NOT ALLOW QUANTITIES OF FLASH POWDER TO ACCUMULATE. TO DISPOSE OF FLASH POWDER, SPREAD THE DIESEL FUEL/FLASH POWDER SLURRY OUT ON THE GROUND IN A THIN TRAIL. IGNITE THE END OF THE SLURRY USING A SMALL BAG CONTAINING SEVERAL GRAMS OF FOUNTAIN COMPOSITION INTO WHICH A LENGTH OF SAFETY FUSE OR AN ELECTRIC MATCH HAS BEEN INSERTED. LIGHT THE SAFETY FUSE AND RETREAT QUICKLY, OR IGNITE THE ELECTRIC MATCH FROM A SAFE DISTANCE AWAY. THE FOUNTAIN COMPOSITION SHOULD IGNITE THE DIESEL FUEL, AND THE FLASH POWDER SHOULD FLARE AND BURN, RATHER THAN EXPLORE, IF DESTROYED IN THIS MANNER. THE MAXIMUM QUANTITY OF POWDER TO BE DISPOSED OF IN THIS MANNER AT ANY ONE TIME IS ONE POUND.

1. Firecrackers

a. Requirement

The weight of powder allowed in firecrackers intended to be used as firecrackers by consumers is limited to 50 milligrams per unit. [CPSC regulations 1500.17 (a)(8)]

b. Test Procedure

Carefully slice the casing of the firecracker length-wise with a razor blade or cutting knife, and then unwrap the paper to expose the silver-to-grey flash powder. Carefully transfer all of the flash powder to a piece of weighing paper (do not include any clay that may be used as an end plug - it will typically be orange or brown in colour). Transfer the powder to a piece of weighing paper that has been pre-weighed on the automatic balance, and record the weight of the powder of each unit tested. Weigh the number of unit specified in sampling plan and calculate the average weight. Record the results on the test report form.

If the average weight exceeds 60 milligrams, the firecrackers fail. Record the weights and the average weight of the firecrackers on the test report form.

2. Aerial Reports

a. Requirements

Sky rockets and other aerial items with report are limited to a maximum of 130 milligrams of pyrotechnic composition per report. [CPSC regulation 1500.17 (a)(3)]. Items are permitted to have multiple reports, and **each** individual aerial report tube is limited to 130 milligrams of powder.

b. Test Procedure

When the fuse burn time and performance test are done, the technician will note whether or not an item contains a report. If it does, this test must be done. Follow the procedures outlined below for the various types of aerial devices that may contain reports. Record the individual report weights on the test report form and calculate and record the average report weight. If the average report weight exceeds 143 milligrams, the device fails this requirement.

(1) Sky Rockets -- Rockets with report will either contain a firecracker-type insert or the flash powder will be located in the powder train of the item. The propellant is usually black in colour, and located at the bottom of the tube. There will be a layer of silver-grey powder near the top. This is the flash powder that you must weigh. **Note:** Some rockets can be quite a challenge to dissect. Be patient and carefully cut the item apart to isolate the silver powder.

(2) Reports in Mines and Shells -- The reports in these items will usually be found in small, firecracker-shaped paper tubes inside the larger tube. Inserts may either be reports or they may be whistles, flitter, or contain stars. It will be necessary to determine which insert is the report. To do this, carefully tape a piece of fuse (there will be plenty lying around as you dissect these items) to the short lead fuse of the insert. Go outside and ignite the fuse. Notice if the insert produces a report or some other effect. If it is a report, collect the required number of reports, dissect them to remove the pyrotechnic composition, and determine the average powder weight. There may even be reports of several different sizes; if so, you must determine the average weight of each size. Each size of report is limited to the 130 milligram limit.

Note: Multiple-tube items with report are the most complex analysis that you will have to do. Be patient, locate the reports, and weigh them.

Special Note on Aerial Shells: If you are testing either single-shot or Reloadable aerial shells, you should carefully open at least one of the balls to determine that black powder has been used for the bursting (break) charge. The fine, loose powder in the ball should be black in colour. If it is silver in appearance, it is most likely flash powder and it cannot exceed 130 milligrams in weight. Make a note on the test report of the colour of the burst/break charge for such items. Refer to AFSL standard for limits on the amount of break charge that may be used.

Recently, AFSL found some aerial shell devices contain rice hulls included with the pyrotechnic composition in the shell, for the rice hull policy and test procedure, please refer to the **Appendix I** in AFSL Standards.

Note: Some items (common examples include "Howling Tiger", "Glider Bomb", "Rainbow Knight", etc.) contain a mixture of black powder and silver grey (flash) powder which produce a loud audible effect. CPSC concluded these such devices not using pure black powder in fact contain a report and are required to comply with the 130 mg limit for aerial reports. In such a case, two criteria must be evaluated to determine if the item complies with the 130 milligram limit for aerial reports. First, the technician must observe the noise that is produced when the shell functions. If the noise produced is a loud sharp crack similar to that produced by a flash powder report, the technician should conclude that the device contains a report and measure the pyrotechnic composition for compliance with the 130 milligram limit.

Secondly, if the pyrotechnic mixture contains what appears to be a grey metal powder mixture, a field screening test with water is required to determine if the mixture contain flash powder. If it is not clear enough to determine, a sample is brought back to laboratory for a chemical analysis to determine whether the powder contains aluminium. The lot is held pending until a decision is reached. If the Aluminium content exceeds 3.0% by weight of the powder, then the item will be deemed as containing flash powder and must comply the 130mg limit.

To perform the pyrotechnic composition weight, carefully slice the report casing lengthwise with a razor blade or cutting knife, and then unwrap the paper to expose the silver-to-grey flash powder. Carefully transfer the powder to a piece of weighing paper (do not include any clay that may be used as an end plug - it

will typically be orange or brown in colour) that has been pre-weighed on the automatic balance, and record the weight of the powder of each unit tested. Weigh the number of unit specified in the sampling plan and calculate the average weight. Record the results on the test report form.

If the average weight exceeds 143 milligrams, the report fails. Record the weights and the average weight of the reports on your test report form

I. TOTAL PYROTECHNIC COMPOSITION WEIGHT

1. Requirements

The AFSL standards require that each category of fireworks devices must meet specific total pyrotechnic composition limits in order to meet the UN0336, 1.4G (Class C) classification. Refer to the appropriate standards to determine the pyrotechnic weight limits for each type of fireworks device.

2. Test Procedures

To perform this test it is necessary to weigh the total pyrotechnic weight of each device. This includes the weight of the propellant or lift charge, break charges, pyrotechnic effects, and any reports that may be present. Exclude any inert material such as clay plugs of fillers and paper or plastic casings, etc. The procedures described in Paragraph H, above for testing report weights will be helpful in performing this test.

J. FUSE SIDE IGNITION

1. Requirement

Fuses on devices that are ignited with a fuse must be treated or coated in a manner to resist side ignition. [CPSC reg. 1507.3 (a)(1)]. This is to protect against accidental or premature ignition of the device. The AFSL Standards require that the fuse used must be safety fuse. Most manufacturers use a green coloured coated "safety fuse" to comply with this requirement. Generally, green-colored, thread wrapped, coated fuse comply with this requirement whereas plain paper fuses are more likely to fail the requirement. **NOTE:** Certain small items that **require** a restricted opening (and thin fuse) for proper functioning where the fuse enters the item - such as ground spinners, bottle rockets, and small smoke devices - are exempt from this requirement if they contain less than 6 grams of pyrotechnic composition. Such fuses must still meet the fuse attachment and fuse burn time requirements, however.

2. Test Procedure

Use the items examined in the preceding tests for this test. Use a razor blade or cutting knife to separate the fuse from the item at the point where the fuse enters the device, leaving intact any tape or paper wrapping used to cover the fuse. Place the side of the fuse (not the tip) and any tape or paper wrapping directly on the glowing tip of a lit cigarette, and use a stopwatch to measure the time required for ignition of the fuse. If the fuse does not ignite in 3 seconds, the device passes the test. If the fuse

does not ignite after 5 seconds the test may be stopped. If the fuse ignites through the side in less than 3 seconds, the item fails this test. Report the number of items that pass/fail this test on the test report form.

K. FUSE BURN TIME

1. Requirements

The fuse on each fireworks item must burn at least three seconds but not more than nine seconds according to [CPSC regulation 1507.3 (a)(2)]. Fuse burn time is measured using a stopwatch readable to 0.1 second. AFSL requires three seconds to twelve seconds for Roman Candle.

2. Test Procedures

Measuring fuse burn time requires two analysts, one analyst to ignite the fuse and the second analyst to clock the fuse burn time with a stopwatch and record the results. On some devices, if the tip of the fuse is covered by tape or wrapped in paper, expose the tip of the fuse before lighting it.

Place the fireworks item in the proper position for ignition, and light the tip of the fuse with a piece of punk or a cigar/cigarette. Measure the time delay from the initial ignition of the fuse (when the fuse sputters and supports combustion) to the time when the device starts to function. If tape or paper covers the tip of the fuse, expose the tip of the fuse before lighting. The device "begins to function" when it becomes **obvious** that combustion of pyrotechnic materials has begun - the device starts to produce readily visible or audible effects such as smoke, sparks, movement, or a whistle. Record the individual fuse burn times and the number of items that pass/fail this test on the test report form.

On most items, the measurement of fuse burn time is straightforward. However, you will have to use your judgement in some instances. What is clearly a failure is any item that propels sparks or projectiles in less than three seconds, or any item that appears to be doing nothing at the 9-second mark. If the fuse ignites but fails to cause the device to function after 20 seconds, stop timing the fuse burn time and record the number of devices that failed to function on the test report form. When determining whether the sample passed or failed, count the number of devices that failed to function as fuse burn time failures (long fuse burn time.)

Note 1: The fuse burn time is done in conjunction with the other performance tests to minimise the number of units required for testing. Be certain you also observe the performance of each item once it begins to function.

Note 2: Where test space is limited or where fire conditions are a concern, you may wish to test **rockets and missiles** in the "down" position. Place the device upside-down in a bucket or drum of sand, with at least 2/3rd's of the motor tube imbedded in the sand, and then light the fuse. In this way, you can measure fuse burn time and listen for reports without firing the rocket into the air.

L. 2" FOAM DYNAMIC STABILITY TEST

1. Requirement

The AFSL standard for mine and shell devices requires that multiple tube comet and aerial shell devices with tubes larger than one-inch in diameter must remain upright when tested on a two-inch thick medium density polyurethane upholstery foam pad. Such devices may pose a risk of injury to the operator or to spectators if they tip over during operation and fire shots horizontally.

2. Tube Measurement

As indicated above, the 2" upholstery foam test applies only to devices that have any tube larger than 1" i.d. In order to determine whether the product is subject to the 2" foam dynamic stability test measure the tubes on the device by inserting a 1" steel dowel into the tube. If the dowel can be inserted into the tube, the stability test will be performed. If the steel dowel does not fit into the tube, the stability test will not be performed.

3. Test Procedure

To perform this test, place a block of medium density polyurethane upholstery form 2 inches thick and approximately 2' x 2' square on a smooth, hard, flat surface. Place the device to be tested in the centre of the upholstery foam pad and ignite the device. Observe whether the device tips over while operating. If the device tips over on its side in any direction during operation, the device fails the test.

This test should be performed inside a wire mesh cage or other fencing to protect the testers from potential injury in the event that tip over of the device occurs during operation.

M. BURNOUT AND BLOWOUT

1. Requirements

The pyrotechnic chambers of fireworks devices are required to be constructed in such a manner that the device functions in the intended [CPSC regulation 1507.6]. The tube must not "burnout", or burn through the side or bottom of a tube during functioning, such that the pyrotechnic effect - sparks, flame, etc. - is projected sideways rather than up in the air. Also, the tube must not "blowout" - an **unintended** rupturing of the tube, bottom plug, or other part of an item during functioning that projects pyrotechnic debris. "Blowout" also occurs when an aerial item (rocket, mortars, or aerial shell device) produces its primary effect immediately above the top of the tube, or the rocket or aerial shell detonates on the ground. For example, if an aerial shell fires into the air, then falls back to the ground and detonates on the ground, the effect would be considered "blowout".

2. Test Procedure

This test is performed in conjunction with other tests that require ignition of the device, such as fuse burn time testing. While the device is functioning observe the operation of the device to determine whether the device projects and charges or components from the side or bottom of the device rather than operating in the intended manner. In addition, after the device has finished functioning completely (allow several minutes to ensure that the device has completed its functioning,), examine

the spent casing to determine whether a blowout or burnout occurred during functioning. Report the number of units that pass/fail this requirement on test report.

N. RELOADABLE TUBE INTEGRITY TEST

1. Requirement

a. **Tube Integrity Test.** The AFSL Standard for reloadable tube aerial shell devices requires that the launcher tube packaged with the device must be able to withstand at least 2 times the intended number of uses. Such devices may pose a risk of injury to the operator or spectators if the tube experiences blowout, i.e. an unintended rupturing of the tube, or bottom plug, during operation of the device.

b. **Tube Abuse Test.** The AFSL Standard for Reloadable tube aerial shell devices requires that the launcher tube packaged in a reloadable shell kit must be able to withstand the explosion of an single shell in the kit, without fragmenting, when the shell is inserted in the tube upside down and ignited. Such devices may pose a risk of injury to the operator or spectators if the tube experiences blowout and/or fragments, or if the shell functions inside the launcher tube.

2. Test Procedure

a. **Tube Integrity Test.** This test is performed in conjunction with other tests that require ignition of the device, such as fuse burn time testing. To perform this test, load the launcher tube with a shell that is designed to be fired from the tube and ignite the fuse, allowing the device to function as intended. Observe the launcher tube after the firing to determine if any rupture of the tube has occurred. Repeat the test using the same launcher tube for the required successive firings (twelve or twenty four, depending on whether the retail package contains six or twelve shells). Do not load more than one shell in the tube for each firing and allow 30 seconds between each firing. After completing the required number of firings, examine the tube to determine whether any rupture of the tube has occurred. If a complete or partial rupture of the tube occurs after any firing, discontinue any additional firings from the tube. Note on the test report that the tube ruptured **after __ firings** (insert the correct number of shell firings that were accomplished before the tube ruptured.).

b. **Tube Abuse Test.** The test is performed by inserting a single shell into the launcher tube upside down, i.e. with the lift charge pointing upward. The shell selected from the retail package for this test will be the most powerful shell in the retail package. Insert the shell upside down into the launcher tube with the fuse extending from the top of the tube. Ignite the fuse and quickly retreat to a safe distance. Observe the launcher tube after the firing to determine if any fragment of the tube or base has occurred. Repeat the test using another launcher tube and shell until the required sample size has been evaluated. Do not load more than one shell in the tube for each firing. After completing the required sample size, record the result on the test report.

To determine which shell is the most powerful one, consider the total maximum weight of break charge of the shell. If it is a multi break shell, the total weight of each break will be counted. However, note that a single break shell is likely to be more powerful than a multiple break shell which may consist on several smaller breaks.

O. FUNCTIONING/PERFORMANCE REQUIREMENTS FOR SPECIFIC DEVICES

1. Observation For Reports

a. Requirement

Reports in Aerial devices such as rockets and mine and shell devices are limited to 130 milligrams of total pyrotechnic composition.

b. Test Procedure

Carefully observe the functioning of each item, and pay particular attention to any type of malfunction or erratic performance that could pose a hazard to a consumer. Make a notation of the effect on your test report form ("shoots sparks 12 feet in the air", shoots inserts into the air that burst with red stars", etc.). Make a special note on your test report form if the item contains a **report** - the weight of the report charge will have to be measured. Note on the test sheet the number of reports that are observed, and where they appear during the functioning of the item. This will assist in locating the report units for weighing.

For aerial devices that contain a bursting or break charge, pay attention to the loudness of the break. If the noise is loud and sharp, make a note on the data sheet to test for the presence of flash powder.

Note: Testing flash powder may need laboratory analysis if confirmation cannot be decided by the screening method perform on site.

2. Aerial Effects Produced At Less Than 5 Meters In Air

a. Requirement

For Rockets, Missiles, and Reloadable Tube Aerial Shell Devices, the AFSL standards require that the primary effects produced by the devices (starbursts, reports, etc.) must occur at least 5 meters in the air. This requirement prevents the effects from occurring near ground level where they may be harmful to the user or bystanders. If the aerial item (rocket, mortar, or aerial shell device) completes the initial stage of ignition inside the tube and starts on its upward path but explodes or functions before it reaches 5 meters, the device fails this requirement. Also, if the aerial item launches into the air, starts to fall back to the ground, but explodes or functions within 5 meters of the ground, the device also fails this requirement.

b. Test Procedure

Observe the functioning of the device during fuse burn time testing. Determine at what level the effects are occurring. In most instances the determination will be clearly above or below five

meters. In instances where the determination is questionable, an objective measurement will have to be taken. Measure the height level of a nearby object that is known to be higher than 5 meters or use an incrementally marked vertical pole to determine the height of the primary effects produced by the device. Record on the Test Report Form the number of devices that pass or fail this requirement.

3. Function of Effects

a. Requirement

There may be instances where a device travels into the air but does not function as intended, i.e., the shell does not break, reports do not explode, stars do not burn, etc. If the device falls back to the ground without performing the intended functions, this should be reported on the test report as "NO EFFECTS" (NOEF).

4. Ground Spinners Must Not Rise above 1 Meter in the air

a. Requirement

The AFSL Standard for Ground Spinners requires that Ground Spinners may not rise more than 1 meter in the air when functioning.

b. Test Procedure

Observe the functioning of the device during testing for fuse burn time. Determine how high the device rises while spinning. In most instances the determination will be easy to make from visual observation. In instances where the determination is questionable, an objective measurement will have to be taken. Measure the height level of a nearby object that is known to be higher than 1 meter or use an incrementally marked vertical pole to determine the height the device rises to when spinning. Record on the Test Report Form the number of devices that pass or fail this requirement.

5. Flight Trajectory For Aerial Devices.

a. Requirement

AFSL requires that fin stabilised missiles and multiple tube aerial devices known as "Saturn Missile Battery" and similar devices, must follow a stable flight trajectory when functioning. The flight direction for these devices must be within $22\ 1/2^{\circ}$ in any direction from the vertical, up to the maximum height of 5 meters.

b. Test Procedure

Observe the flight trajectory of the device during testing for fuse burn time. If it is not clear from subjective observation that the flight trajectory is within or outside of the above described limit, the device must be tested using the Flight Trajectory Cone constructed for this purpose. See **Appendix 6** for a description of the Cone.) Ignite the device to be tested on the base of the cone and observe the trajectory of the effects. (Note: Because the rods on the Cone do not extend 5 meters into the air, it is necessary for the technician to use his judgement or another objective measuring device, such as a 5 meter pole, to determine when the height of the effect reaches 5 meters.) Record on the test report form whether the device passes or fails this requirement and the number of devices that fail.

6. Wing/Fin/Wheel Driver Attachment -- Helicopters And Missiles Devices.

a. Requirements

The AFSL Standard for Helicopters and Missiles requires that flight stabilising features such as wings or fins must be securely attached to the item. The AFSL Standard for Wheel requires that the wheel driver must be securely attached. This is to assure that the stabilising features remain attached to the device during shipping, handling, and use of the products.

b. Test Procedure

In order to perform this test, the technician will attempt to separate the wing, fin, or wheel driver from the device by applying a reasonable twisting force (using his hands) to the applicable part. The technician must exercise judgement in determining what constitutes a reasonable force. To do so, the technician should consider the amount of force a reasonable person would expect to be able to apply to the part without having it separate from the body of the device. If any wing, fin, or wheel driver separates from the body of the device after a reasonable force is applied, the device fails this requirement and the results should be recorded on the test report.

7. Wheels -- Performance

a. Requirements

The AFSL Standard for Wheels requires that Wheels must only produce effects which take place at or relatively close to the surface of the Wheel. The radius of the flame produced by the Wheel may not exceed 1 meter (sparks are not considered as flame on wheel effects).

b. Test Procedure

Attach the Wheel to a tree, pole or other similar object as specified in the directions for use printed on the Wheel package. If no such object is available, it may be necessary for the technician to construct a "T" shaped device made of wood for the purpose of performing the test. Ignite the device and observe the function of the Wheel. If the radius of the flame exceeds one meter, the device fails this requirement. If the radius of the flame is questionable or appears to exceed one meter, the radius should be confirmed using a one-meter measuring stick mounted below the Wheel prior to igniting the device. Record the number of products that pass or fail this provision on the test report.

c. Requirement for Nail/String Attachment

The AFSL Standard for Wheels requires that nails or other suitable fasteners must be provided for axle type wheels. The nail must be able to allow free spinning of the wheel while at the same time securely positioning the wheel during operation. String-type wheels must have a securely attached string so that the string remains attached to the device during normal operation. String-type wheels must not be designed for or give the impression that they are suitable for being hand-held by the string during operation.

d. Test Procedure

The technician should operate the device following the instructions printed on the product package. The product should remain attached to the string or nail (or other fastener) for the entire duration of the flame. If, for instance, the wheel's centre portion breaks away or the nail or sting becomes detached from the body of the device, the product fails this requirement. If the instructions for use indicate that the product may be operated by holding the string by hand during operation, or if the string appears to be designed to be hand-held, the device fails this requirement. Record the number of devices that pass or fail this requirement on the Test Report.

P. ORIENTING LOOP ATTACHMENT – RELOADABLE SHELLS

a. Requirement:

The AFSL Standard for Reloadable Tube Aerial Shells requires an orienting loop to be attached securely to the top of the shell, adequate to maintain correct shell orientation and fuse attachment when the shell is loaded into the launch tube.

b. Test Procedure

Attach an 8-ounce (227 grams) weight to the shell, then grasp the orienting loop and lift the shell. The orienting loop should not separate from the shell. If the orienting loop does separate, the device fails this test.

Q. CHLORATE SCREENING TEST – MORNING GLORY ITEMS

a. Requirement:

The AFSL Standard for Hand-held Sparkling Device requires the device must not contain chlorate great than 15% by weight (W/W).

b. Test Procedure:

Remove the pyrotechnic powder from the Morning Glory to be tested. Use the Chlorate Test kit to determine if Chlorate is present. If the result indicates chlorate is absent, the device passes this test; if the result indicates chlorate is present, a sample of the device will be taken to laboratory for a chemical analysis to determine whether the chlorate content is below 15% limit.

R. LEAD SCREEN PROGRAM – CRACKLE EFFECTS

a. Requirement:

Since 2001, AFSL Standards prohibited any pyrotechnic composition from containing lead in excess of 0.06% by weight.

b. Test Procedure:

One sample per lot is randomly selected for lead analysis if the device is suspected of containing lead. Generally, item containing crackle effect are more likely to contain lead than those producing other effects. The analysis will be performed in the chemical laboratory using AAS, ICP, or other method, to determine the total lead content by weight. If the result is below 0.06%, the sample passes this test; if the result is excess 0.06%, the item fails the test. AFSL will maintain a list of all that fail the lead content test. Future applications for testing of these items will not be accepted under to QIP unless the application is accompanied by a certificate from the shipper to demonstrate the modified to remove lead and has been certified as lead-free by a reputable testing laboratory.

S. GENERAL OBSERVATION OF PERFORMANCE – PERFORMANCE MALFUNCTIONS

In evaluating the function or performance of a fireworks device, the technician may notice a performance characteristic that is not covered by any of the specific performance requirements but may, in the technician's judgement, pose a potentially dangerous or unsafe situation while the device is operating. It is the technician's responsibility to make a subjective determination whether the situation may present a risk of injury to the consumer and to report those situations to AFSL.

The technician should describe any hazardous performance in the "Remarks" section of the test sheet, and Intertek Testing Services must report the results immediately to AFSL for a thorough analysis of the problem and appropriate action required.

T. GENERAL CONDITION OF MERCHANDISE SAMPLED

In evaluating the overall condition of the Shipping Lot, the technicians must examine merchandise within each case from which a sample is taken for signs of damage from insect infestations, water damage, and the like. While making the observation of any contaminated lots or cases, first check the exterior of the carton for any signs of damage, water spots, mildew or rotting cardboard. After a cursory review of the exterior, open the carton and view the contents for signs of any mildew infestation, insect infestation or water damage.

Describe any abnormalities observed in the "Remarks" section of the test sheet. If the damage is limited to one or a few cartons, inform the warehouse attendant that the cartons must be segregated from the Shipping Lot. Then proceed with normal sampling. If the damage appears to be widespread throughout the Lot, reject the Lot for testing, noting the reason for doing so on the test report under "Remarks."

CHAPTER 3 -- LABELING REQUIREMENTS

As the final step in the testing program, the Test Team must review the label on the shipping carton, the individual item and its retail package, to determine whether it complies with all applicable requirements

A. SHIPPING CARTON LABELING

1. Requirements

The shipping carton for all fireworks evaluated under this program must bear the following labelling on the shipping carton:

- a. An orange, diamond shaped label bearing the letters "1.4, G". The word "EXPLOSIVE" may also appear on the label but is not required.
- b. The words "FIREWORKS, UN0336" which may appear on a stick-on label or may be printed directly on the shipping carton.
- c. The "UN" box certification markings. These markings also may appear as a stick-on label or may be printed directly on the box.

2. Evaluation Procedures

While the Technician is collecting samples for testing under the program, observe whether the shipping cartons have the required labels described above. Mark the test report form to indicate whether the boxes pass or fail these requirements. A sample of the required label shall be cut from the item as a record.

B. CAUTIONARY LABELING

CPSC has established specific cautionary labelling requirements for all consumer fireworks devices to assist the user in understanding how to handle, store, and operate the device safely [CPSC regulation 16 CFR 1500.14 (b)(7)] and 16CFR1500.83(a)(27). In addition to the cautionary labelling requirements established by CPSC, AFSL has adopted additional cautionary labelling statements for fireworks devices tested under this program. At the present time some manufacturers are using the minimum CPSC requirement and some manufacturers have begun using the more detailed AFSL requirement. In evaluating labelling under this program, consider a device to be in compliance with all applicable requirements if it bears the minimum CPSC requirement. After December 31, 1994, any device that does not bear the complete AFSL requirement will be considered in violation of the labelling requirements. Detail wording can be referred to the AFSL Standards (Appendix 3).

1. Requirements

a. Label Wording

Refer to the AFSL Standards for the required cautionary labelling for each type of device tested under this program. Be certain that the statement of hazard reflects the actual performance that you observed. If an item contains a report, the label must indicate so ("WITH REPORT"). If an item (other than a rocket) shoots into the air, the label must indicate so, etc.

The Labeling of a fireworks assortment's outer packaging must bear the language in 16 CFR 1500.83(a)(27)(iii). This label is acceptable only if the individual fireworks devices in the assortment have labels in compliance with all other Labeling requirements and the assortment contains only consumer fireworks.

b. Placement, Type Size, and Contrast

After determining that the correct wording is present, evaluate whether the cautionary labelling complies with the requirements for placement, type size, and contrast. [**CPSC regulation 16 CFR 1500.121**]. Check for proper placement of the label. Be certain that each "principal display panel" has a warning label on it. Check the type size, and check to make sure that type contains an adequate degree of contrast so that the label is readable.

NOTE: Evaluation of the labelling for fireworks is sometimes a complicated and tedious process. While it is important to ensure that the product meets the requirements in question, in some instances, the Technician may have to exercise his best judgement as to whether to fail a sample for a violation of the labelling requirements. There may be instances where the exact wording for the labelling as specified in the STANDARDS is not present but there is wording present that has the identical or very similar meaning to what is required. In such a case, the Technician is expected to make a subjective judgement as to whether the wording is similar enough that the consumer would fully understand the intended message. If so, the Technician should consider the label "in compliance" but note the difference on the test report.

There may also be situations where the required type size on a label is technically too small to meet the type size requirement, but the labelling is very readable, nevertheless. In such a case, the Technician also should consider the label "in compliance" but note the difference on the test report. If there is a question as to whether the sample should be considered "in compliance" despite minor deficiencies, contact AFSL for guidance prior to failing the sample.

CHAPTER 4 – REPORTING

A. COMPLETING TESTING REPORT

When all of the tests have been completed, review the Test Report Form to ensure that all applicable tests have been performed and the form has been completed correctly. Determine if the item complied or not complied. If the item is not in compliance check the "NC" in the top right hand corner of the Test Report Form to indicate that the sample is noncomplying. If the item is in compliance with all requirements, check the "CO" in the top right hand corner of the Test Report Form to indicate that the sample is complying. Be sure to record the serial number of the certification labels assigned to the complying sample.

Note: Only Certified Technicians are approved to lead a team to perform the testing and to sign the test report after completion. Technicians and Assistant Technicians may only assist the Certified Technician to carry out the test.

B. REVIEWING AND FILING TESTING REPORT

The Test Report form shall then be signed and dated by certified technician, reviewed by supervisor (who must also be classified as a certified technician in qualifications) or above. The report is distributed to the Shipper after data entry to the e-DATA BASE system. A copy of the item label will be attached together to the Test Report.

Appendix 4 contains specimen reports for each category of Fireworks testing under the program.

Appendix 9 – e DATA BASE is a web based data management system developed by Intertek Testing Service Shenzhen Ltd. for AFSL.

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CONSUMER 1.4G FIREWORKS CATEGORIES

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- Products printed in bold typeface are Category I items (or "High Priority" fireworks). These product categories are presently tested under the program, as of October 1, 1995.
 - Products printed in italic typeface are Category II items. These product categories are not presently tested under the program, as of October 1, 1995.
-

<u>Product Category Number</u>	<u>Product Category</u>	<u>Classification Code</u>
1	Combinations	
2	Firecrackers	[4]
3	Fountains	[6, 7, 8, 10, 11, 12, 18, 19, 46]
4	Helicopter, Missiles and Rockets	
5	Mine/Shell Devices - Single and Multi Tube	[20, 21]
6	Novelties	[26]
7	Party Poppers, <i>Snappers</i>, <i>Booby Traps</i>, Snakes and Toy Smoke Devices	[30, 31, 33, 34, 42]
8	Reloadable Tube Aerial Shell Devices	[22]
9	Roman Candles	[36, 37]
10	Sparklers	[2, 39, 40]
11	Spinners, including Jumping Jacks and Chasers	[14], [48]
12	Wheels	[44, 45]

Remark: Implementation History

	Description	Effective Date
1.	Firecrackers (FRCR) --- all types	April, 1994
2.	Stick Rockets (RCKT) --- all types	April, 1994
3.	Jumping Jacks Ground spinners (JMPJ)	April, 1994
4.	Missiles (MSSL) --- Fin-stabilised	April, 1994
5.	Mine and Shell Devices (MSDV) --- all types	April, 1994
6.	Roman Candles (RCDL) --- all types	April, 1994
7.	Reloadable Tube Aerial Shell Devices (RTAS)	April, 1994
8.	Fountains --- all types	Jan., 1997
9.	Helicopters --- all types	Jan., 1997
10.	Wheels --- al types	Nov., 1997
11.	Toy Smoke and Filter Device	Nov., 1997
12.	Ground Spinners (All)	Nov., 1997
13.	Snake	Sept., 1998
14.	Novelties	May, 1999
15.	Combinations	May, 1999
16.	12 Shells per retail package	July 15, 1999
17.	500 cases for max. case per lot	Nov.15, 1999
18.	No fire catching requirement for Snake	Nov. 15, 1999
19.	Fuse Burn Time enforcement for firecracker	Aug. 1, 2000
20.	Test Sparkler	Aug. 1, 2000
21.	Assortment Program - Pilot Run	Aug. 1, 2000
22.	Firecracker exemption on tube colour	Nov. 16, 2000
23.	Graphic on Reloadable Shells	Dec. 1, 2000
24.	Chemical Composition to 500 gm.	Dec. 1, 2000
	AFSL Standard New Edition - May 2001	May. 1, 2001
	Assortment Testing Program	
	Burn rate of firecracker <125 per second	Nov. 1, 2002
	Common Name for Sparkler, Snakes, Party Poppers, etc.	2002
	Abortive Policy Implement	Dec. 1, 2003
	Sequential fusing Requirement	Dec. 1, 2003
	Rice Hulls Policy	Feb. 15, 2004
	Sample size revised for FSSI, BATH, FATH	Feb. 23, 2004
	Assortment New Definition Policy	Mar. 1, 2004
	Small Assortment Policy	Mar. 2, 2004
	Sparkler Waving Test	May 1, 2004
	Art & Graphic Policy	Aug.1, 2004

Sampling Plan

A. SAMPLING PROCEDURES

Fireworks samples will be randomly selected from the lot by the technician with the assistance of factory or warehouse personnel arranged by the Shipper. Samples will be collected and tested in an appropriate test site by the technician from the opened cases, which are calculated from the square root of the total cases in the lot. Any decimal number raised from calculation should be round up to one case. All opened cases will then be sealed with Intertek Tape and marked with assigned lot number by technician to indicate its status.

Lots that are tested by the technician and found to pass all applicable requirements will have the AFSL label applied to each shipping case. This process will always be carried out under the supervision of the technician with the assistance of factory or warehouse personnel arranged by the Shipper.

B. RANDOM SAMPLES

In order to assure that the test result is representative of the Lot of merchandise, samples will always be collected at random. This means that technicians will open the appropriate number of cases, calculated by determining the square root of the Lot and opening the corresponding number of cases. The number of samples to be tested from each Lot is based on U.S. ANSI – ASQC Z1.4, Single Sampling Plan.

C. SAMPLE SIZE

The sample size for specific test requirements follows the criteria identified in TABLE A, below.

D. NOTES

1. When checking report weight of Firecrackers or Aerial Report, subject to there be failure of other parameters, it is allowable to check only 3 pieces of report as to provide reference data to Shippers. No Pass/Fail should be concluded on these criteria.
2. There are always particular situations where the sampling procedure is not easily being followed, guidelines of such particular handling are established in the **Appendix 3** too.

Table 1. Criteria, Special Inspection Level and Acceptable Quality Level

	<u>General Criteria</u>	<u>Level</u>	<u>AQL</u>
1	Long Fuse Burn Time	S-3	2.5
2	Short Fuse Burn Time	S-3	2.5
3	Fuse Side Ignition	S-1	2.5
4	Fuse Attachment	S-1	2.5
5	Bases Height Ratio	S-1	2.5
6	Base Attachment	S-1	2.5
7	Aerial Reports Weight, <100 mg. [1/2 S-3]	S-1	2.5
8	Pyrotechnic Composition	S-1	2.5 #
9	Pyrotechnic Leakage	5 cases	**
10	Aerial Effects, 5 meters high	S-3	2.5
11	Function but No effect	S-3	2.5
12	Fuse ignited but device not function	S-3	2.5
13	Burnout / Blowout	S-3	2.5
14	Flight Trajectory	S-3	2.5
15	Tip over during operation	S-3	2.5
16	Dimensions	S-1	2.5
17	Label	S-1	2.5
	<u>Specific Criteria</u>	<u>Level</u>	<u>AQL</u>
	Firecracker		
18	Report Weight for Firecrackers, <30 mg. [1/2 S-1]	S-1	2.5
19	Fuse Burn Time for Firecracker (For primary fuse and 1000 reports)	S-1	**
	Sky Rockets		
20	Rockets Sticks Attachment	S-3	2.5
21	Rockets Sticks Straightness	S-3	2.5
22	Rockets Sticks Rigidity	S-3	2.5
	Ground Spinners		
23	Erratic Performance	S-3	2.5
	Missiles		
24	18 degree Tip Angle Test	S-1	2.5
	Mine and Shells Devices		
25	18 degree Tip Angle Test	S-1	2.5
26	62 degree Tip Angle Test	S-4	**
27	Two-inch Foam Test	S-3	**
28	Dud within 10% shot	S-3	2.5
29	4 meters radius – For Mine only	S-3	2.5
	Roman Candles		
30	Spikes	S-1	2.5
31	4 inch Void Space	S-3	2.5
32	Number of Shots 10	S-3	2.5
	Reloadable Shells Devices		
33	22 degree Tip Angle Test	S-1	2.5
34	Reloadable Shell Number	S-1	2.5

Appendix 2

35	Launcher Tube Integrity Test	S-1	2.5
36	Reloadable Shell Tests – Dud	S-3	**
37	ONE piece Safety Fuse	S-3	**
38	Fuse Burn Time for Reloadable Shell	S-3	2.5*
	Fountains		
39	Handles <4 inches	S-1	2.5
40	Spikes	S-1	2.5
41	4 inch Void Space	S-3	2.5
	Helicopters		
42	18 degree Tip Angle Test	S-1	2.5
43	Wing/Fin Attachment	S-3	2.5
	Combinations		
44	Time between Effects	S-3	2.5
45	Fuse Location	S-1	2.5
	Wheels		
46	Radius of Flame	S-3	2.5
47	Nail/String Provided	S-1	2.5
48	Nail/ String Allows for Free Spinning Motion	S-3	2.5
49	Wheel Driver Attachment	S-3	2.5
	Snakes		
50	Performance	S-3	2.5
51	Arsenic Content Analysis	3 Samples	**
	Toys Smokes and Flitter Devices		
52	12 degree Tip Angle Test	S-1	2.5
53	External Flame	S-3	2.5
	Specialty		
54	12 degree Tip Angle Test	S-1	2.5
55	Primary Effect	S-3	2.5
	Sparklers		
56	Handle length	S-1	2.5
57	Handle rigidity	S-1	2.5
58	Slag and Effect	S-3	2.5

This table applies to the testing of homogeneous lots. Non-homogeneous lot shall be tested one level up. (i.e. Change S-3 to S-4)

The AQL is the percent defective with a 95% confident level.

* Any one fuse burn time less than 2 seconds or greater than 14 seconds will constitute a rejected lot.

** Any one failure within ANY sample size will cause the Lot to fail.

If the test result of first sample < 90% of limit, need not continue that particular test.

* * *

Table A: Sample Size of Fireworks (Ref: ANSI-ASQC Z1.4)

GENERAL INSPECTION LEVELS	SPECIAL INSPECTION LEVELS				LOT OR BATCH SIZE			
	I	II	III		S-1	S-2	S-3	S-4
	2	3	5	8	2	2	2	2
	9	15	2	2	2	2	2	2
	16	25	5	8	2	2	3	3
	26	50	8	13	2	3	3	5
	51	90	13	20	3	3	5	5
	91	150	20	32	3	3	8	8
	151	280	32	50	5	5	13	13
	281	500	50	80	5	5	20	20
	501	1200	80	125	5	5	32	32
	1201	3200	125	200	8	8	50	50
	3201	10000	200	315	8	8	80	80
	10001	35000	315	500	8	13	125	125
	35001	150000	500	800	8	13	200	200
	150001	500000	800	1250	8	13	315	315
	500001	over	1250	2000	8	13	500	500

Table B1: Single Sampling Plan for Normal Inspection

Lot or Batch Size			S-3	Acceptable Quality Levels (AQL)				
				1.0	1.5	2.5	4.0	6.5
			Ac	Ac	Ac	Ac	Ac	
2	to	8	2	↓	↓	↓	↓	0
9	to	15	2	↓	↓	↓	↓	0
16	to	25	3	↓	↓	↓	0	↑
26	to	50	3	↓	↓	↓	0	↑
51	to	90	5	↓	↓	0	↑	↓
91	to	150	5	↓	↓	0	↑	↓
151	to	280	8	↓	0	↑	↓	1
281	to	500	8	↓	0	↑	↓	1
501	to	1200	13	0	↑	↓	1	2
1201	to	3200	13	0	↑	↓	1	2
3201	to	10000	20	↑	↓	1	2	3
10001	to	35000	20	↑	↓	1	2	3
35001	to	150000	32	↓	1	2	3	5
150001	to	500000	32	↓	1	2	3	5
500001	and	over	50	1	2	3	5	7

Table B2: Single Sampling Plan for Normal Inspection,

Lot or Batch Size		Acceptable Quality Levels (AQL)			
		1.0	1.5	2.5	4.0
2	to	↑	↑	↑	↑
8	to	2	↑	↑	↑
9	to	2	↑	↑	↑
16	to	2	↑	↑	0
26	to	2	↑	↑	0
51	to	3	↑	0	↓
91	to	3	↑	0	↓
151	to	3	↑	↓	↑
281	to	3	↑	↓	↑
501	to	5	↓	↑	1
1200	to	5	↓	↑	2
3200	to	5	0	↓	2
10000	to	5	↓	↑	3
35000	to	5	↓	↑	3
150000	to	8	↑	1	5
500000	to	8	↑	1	5
500001	and	8	1	2	7
500001	over	8	1	2	7

Table C: Simplified Sampling Size Information for Shippers' application

Lot or Batch Size			Sample Size					
			62 degree tilt test	Reloadable Shell	Firecracker	Type A	Type B	Type C
2	to	150	5					
151	to	500	20	$5 + 60 = 65$	$5 \times 2 = 10$	$5 \times 2 = 10$	$5 + 5 = 10$	
501	to	1200	20					
1201	to	10000	32	$20 + 60 = 80$	$5 \times 2 = 10$	$20 \times 2 = 40$	$20 + 5 = 25$	$5 + 5 = 10$
10001	to	35000	50					
35001	to	150000	80					
150001	to	500000	80	$32 + 60 = 92$	$20 + 5 = 25$	$32 \times 2 = 64$	$32 + 5 = 37$	
500001	and	Over	125	$50 + 60 = 110$	$20 + 5 = 25$	$50 \times 2 = 100$	$50 + 5 = 55$	

Types (A) = Rockets, Roman Candles, Hand Held Fountains, Wheels and Helicopters, Missiles, Sparklers.
 Types (B) = Mine & Shells (200grams), Fountains(200grams), Combination, Ground Spinner, Smoke, Novelty.
 Types (C) = Mine & Shells (500grams), Fountains (500grams)

APPENDIX 3

DOCUMENT IS SUPPLIED UNDER SEPARATE COVER

AFSL CHINA FIREWORKS QUALITY IMPROVEMENT PROGRAM (QIP) APPLICATION

Shipper: _____ Tel: _____ Fax: _____ Contact Person: _____ Page ____ of ____

Location Contact Person : _____ Tel : _____ Desired Test Date : _____ Date Assigned : _____

Please use this form for a coming test arrangement and note the following:

- 1) Make your appointments with at least 3 working days in advance; 2) Make sure all goods have been fully packed upon our arrival; 3) Follow-up your appointment by a phone call to ensure that we received your message; 4) Re-fax this form for any amendment made.

Approved Lot ID # 批号	Model # 货号	Type 型号	Cases (Unit) 数量	Packing 包装	Product Name 产品名称	FID # 厂号	Product Location 厂址	Result 结果	Remark 备注

I CERTIFY THAT THE US IMPORTER SCHEDULED TO RECEIVE THE ABOVE REFERENCED SHIPPMENT IS A PARTICIPANT IN THE AFSL CHINA FIREWORKS QUALITY IMPROVEMENT PROGRAM AND THAT THE EX NUMBERS PROVIDED ARE CORRECT.

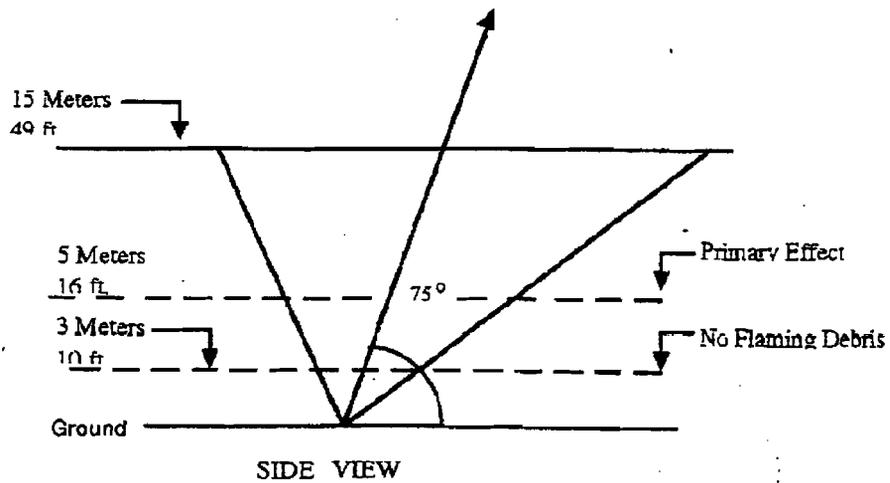
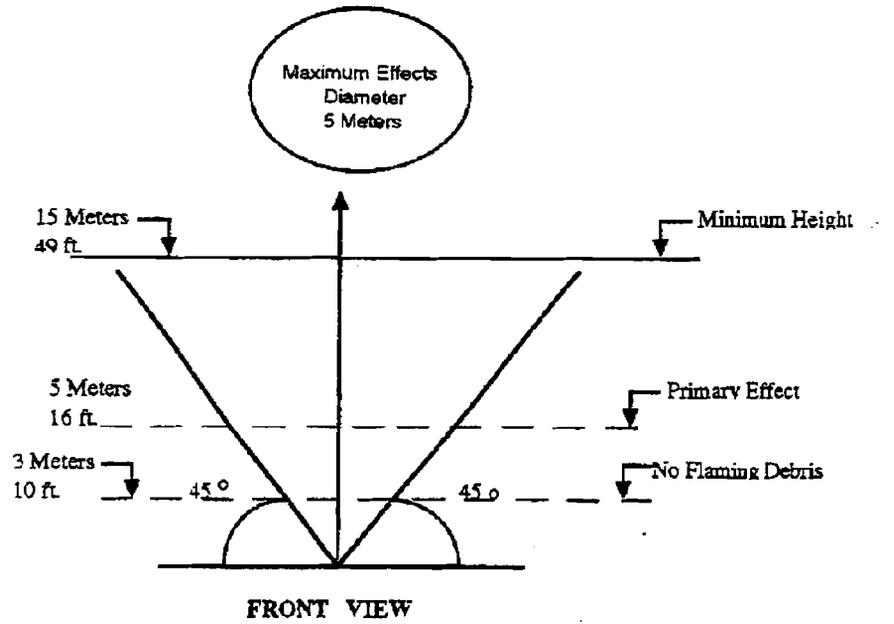
Requester Print Name

Requester Signature, Date

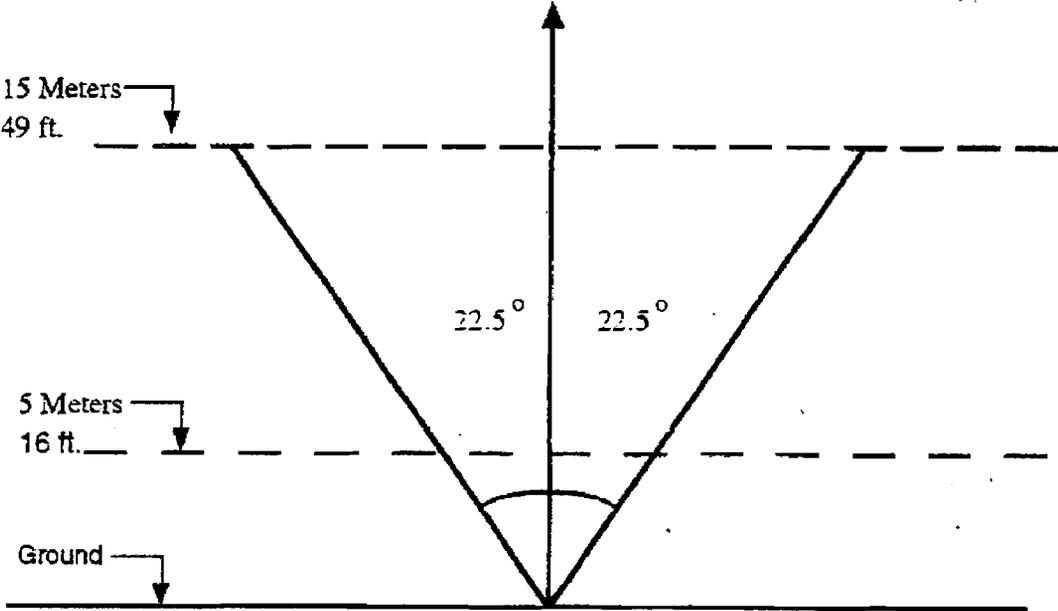
PLEASE FAX THE COMPLETED FORM TO ONE OF THE FOLLOWING **INTERTEK TESTING SERVICES OFFICES** CLOSE TO THE PRODUCT LOCATION (**GUANGZHOU: 020-85536526; HUNAN: 0731-3638382 OR BEIHAI: 0779-2069145**), INCORRECT OR INCOMPLETE INFORMATION MAY CAUSE UNNECESSARY DELAY OR RESULT IN A FAILURE TO APPROVE TESTING REQUEST.

Authorising Official, Date

SCHEMATIC OF TRAJECTORY REQUIREMENTS FOR SKYROCKETS



SCHEMATIC OF TRAJECTORY REQUIREMENTS FOR MISSILES AND HELICOPTERS



List of Registered Factory for Snake Manufacturing

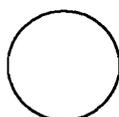
Date : February 6, 2006

FRP Code	Status	Name of Factory	Location	Contact Person	Fax
AFSL001P	Suspended	Yang Chun Fireworks Factory	Yang Chun, GuangDong	Mr. Yang Jin Fa	0662-7772201
AFSL002P	Valid	Jixiang Wanzai Export Fireworks Factory	Wanzai, Jixiang	Mr. Wang Wi Yi	0795-8862745
AFSL003P	Valid	Wanzai XinSheng Export Fireworks Factory	Wanzai, JiXiang	Mr. Wang Xin Pin	0795-8863345
AFSL004P	Valid	Wanzai HuangMao Export Fireworks Factory	Wanzai, Jixiang	Mr. Zhou Bao Cai	0795-8863038
AFSL005P	Valid	Wanzai HuangMao Xin Kun Fireworks Export Factory	Wanzai, Jixiang	Mr. Wang Shi Yong	0795-8869388

Testing of “Crossette” Stars

1. Objective : This procedure relates to stars that contain a solid core of explosive composition.
2. Definition : Crossette Star – Star with a break charge that splits the star and produce an audible effect.

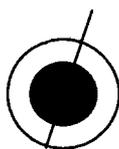
3. Diagram of Star



4. Analysis

- 4.1 Weigh mass of entire star, M_{star} , in mg.
- 4.2 Measure diameter of entire star, d_{star} in mm.
[note : volume of star = $4/3 \pi (d_{\text{star}} * 1/2)^3 = 4/3 \pi r_{\text{star}}^3$]
- 4.3 Carefully cut Star in half, using sharp cutting tool.

[note : Should look like :



- 4.4 Measure diameter of center core composition ($r = d/2$)

$$\text{Mass}_{\text{burst}} = \text{Mass}_{\text{entire star}} * V_{\text{core}} / V_{\text{star}} = \text{Mass}_{\text{star}} * r_{\text{core}}^3 / r_{\text{star}}^3$$

Crossette Star – report determination (break charge)

5. Calculation :

$$\text{Mass}_{\text{break charge}} = \text{Mass}_{\text{entire star}} * \text{radius}_{\text{core}}^3 / \text{radius}_{\text{entire star}}^3$$

6. Example :

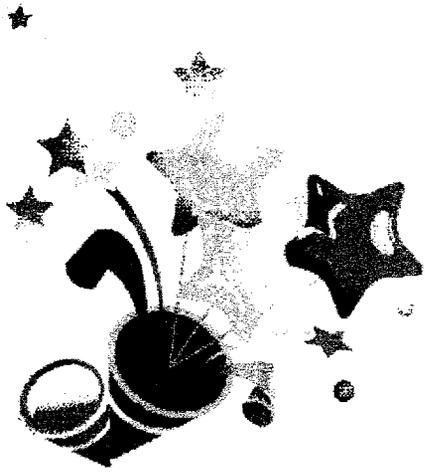
$$\begin{aligned} \text{Mass}_{\text{star}} &= 500 \text{ mg} \\ \text{Diameter}_{\text{star}} &= 8 \text{ mm}, \Leftrightarrow \text{radius} = 4 \text{ mm} \\ \text{Diameter}_{\text{star}} &= 4 \text{ mm}, \Leftrightarrow \text{radius} = 2 \text{ mm}. \end{aligned}$$

$$\begin{aligned} \text{Mass}_{\text{break charge}} &= 500 \text{ mg}, (23/43) = 500 * 8/64 \\ &= 62.5 \text{ mg} \# \end{aligned}$$

Value is less than 130 mg, so it passes.

E DATA BASE SYSTEM

Intertek eBase System 



ENTER >>



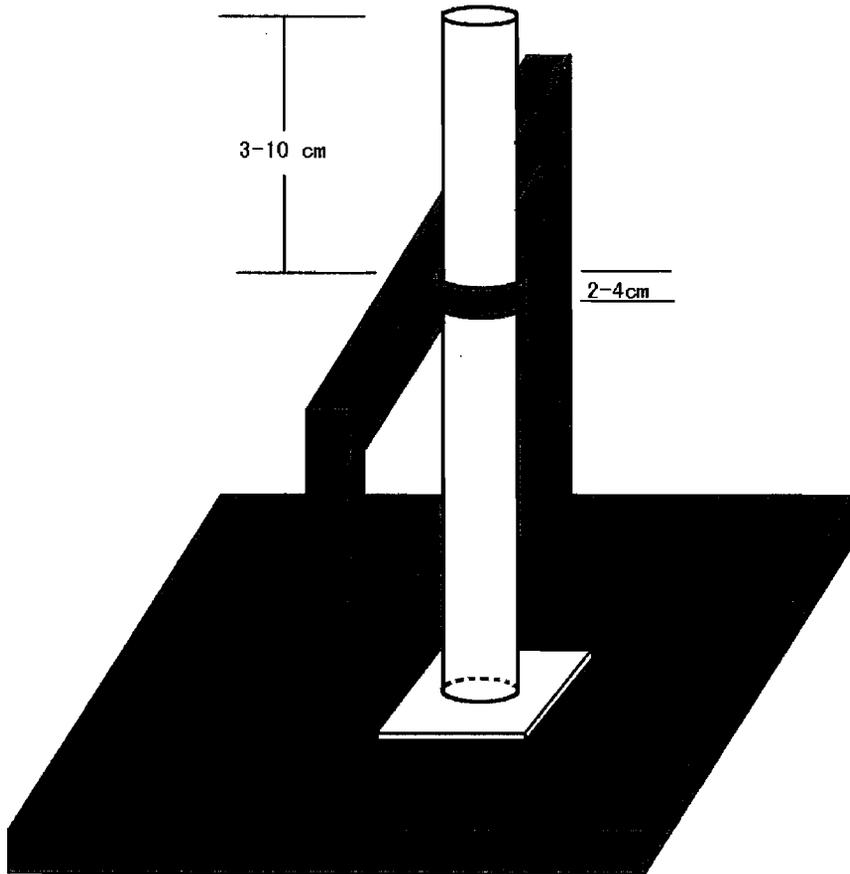
User ID:

Password:

Ok

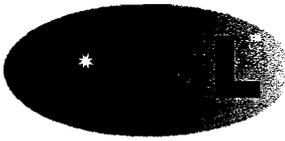
Change Pwd

Launch Tube Abuse Tester



**Comments provided on September 11, 2006 by the
American Fireworks Standards Laboratory on the
Advance Notice of Proposed Rulemaking issued
by the CPSC on July 11, 2006**

APPENDIX 4



American Fireworks Standards Laboratory

ABOUT THE STANDARDS ---

The American Fireworks Standards Laboratory (AFSL) is an independent, non-profit corporation established in 1989 by members of the fireworks industry to reduce the potential risks of injury associated with fireworks. AFSL appointed a Standards Committee to develop and maintain voluntary safety and quality Standards for all twelve classifications of 1.4G consumer fireworks. The Standards Committee is comprised of representatives from the fireworks industry, federal and state regulatory authorities, consumers, and technical experts.

Standards developed by the committee incorporate all performance and labeling requirements of the regulations for fireworks established by the U.S. Consumer Product Safety Commission and applicable regulations governing transportation, shipping and storage established by the Department of Transportation. Also, the Committee developed provisions above and beyond the federal regulations to further improve safety and provide good manufacturing practices for producing consistent, high quality products. Any product that complies with the AFSL Standards also meets all federal requirements.

The Standards Committee continuously monitors the Standards to assure that any modifications to federal regulations are incorporated. In addition, as product designs change and technology improves, the Committee reviews the Standards to assure that innovations in the manufacturing process do not compromise the safety of the product.

AFSL has established a testing and certification program for products manufactured in China to determine whether they are being produced in conformance with the Standards. Participation in the program by manufacturers as well as U.S. importers is voluntary.

AFSL has provided copies of the Standards to all factories that participate in the program to provide manufacturing guidelines. In addition, U.S. importers, their agents, or trading companies in China may request that fireworks be tested in China by an independent, internationally renowned testing laboratory retained by AFSL. A random sample taken from each shipping Lot is tested to the provisions of the applicable Standard. If the test indicates compliance with the AFSL Standard, a sticker bearing the AFSL registered service mark is applied to the shipping carton as proof of testing.

Because the testing program does not evaluate each item within the shipping Lot, the application of the AFSL mark to the shipping carton is not a guarantee that each item within the shipment complies with the Standards. However, the mark is an assurance that a randomly selected sample from the lot has been tested and met all requirements.

Any questions regarding the Standards contained in this document should be addressed to the AFSL office at 7316 Wisconsin Avenue, Suite 214, Bethesda, MD 20814; telephone: 301-907-9115; facsimile: 301-907-9117; e-mail: afslhq@afsl.org.

John D. Rogers
Executive Director

September 2006

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AFSL 101

**STANDARD FOR
COMBINATION ITEMS**

SEPTEMBER 2006 EDITION

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Chapter 4 SHIPPING

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STANDARD FOR COMBINATION ITEMS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of fireworks items that consist of significant Combinations of devices defined separately in other AFSL Standards.

NOTE: Incidental effects such as Comet tails or whistles are not considered to be significant for purposes of defining a Combination.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Base - The platform to which one or more tubes of a fireworks device are attached to provide a stable platform for the functioning of the item.

1-2.2 Blowout - The unintended release of a pressure effect from other than the intended orifice of a fireworks device.

1-2.3 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.4 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive Composition" definitions).

1-2.5 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

NOTE: The lift charge of an item subject to an AFSL Standard is not considered to be explosive composition.

1-2.6 Pyrotechnic Composition - A chemical mixture which on burning and without explosion produces visible displays, bright lights, whistles, or motion.

1-2.7 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.8 Side Ignition - The ignition of a fuse at a point other than at the tip when the side of the fuse is placed in direct contact with the glowing tip on a lighted cigarette.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage or loss of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.6 Items subject to this Standard must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.7 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-1.8 Limits for Chemical Composition Content

2-1.8.1 A component of a Combination item must not exceed the chemical composition limits defined for that component in the appropriate Standard.

2-1.8.2 Combination items consisting of several individual items must not exceed a total chemical composition content of 200 grams (7.25 ounces).

NOTE: Any Combination that consists of more than one tube where the tubes are securely attached to a single wood or plastic base, and the tubes are separated from each other on the base by a distance of at least 0.50 inches (12.7 mm) must not contain in excess of 500 grams (17.5 ounces) total chemical composition.

2-1.9 Fuse

2-1.9.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.9.2 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.9.3 For multi-effect or multi-tube items, timing between effects (or tubes) must not exceed 10 seconds, except that when a multi-effect device changes from a less active effect such as a Fountain effect to a more active effect such as a Mine, Shell, or Comet effect, the timing between effects must not exceed 3 seconds.

2-1.9.4 Exposed fuses, including connecting fuses between tubes, must resist side ignition for at least 3 seconds.

NOTE: Items requiring a restricted orifice for proper functioning and containing less than 6 grams (0.21 ounces) of pyrotechnic composition do not require a fuse that is resistant to side ignition.

2-1.9.5 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item.

2-1.9.6 The location of the fuse must be obvious or must be clearly identified on the exterior of the device.

2-1.9.7 Devices subject to this Standard must contain only one ignition fuse. Additional fuses, points of ignition, openings for fuse insertion, or points for ignition transfer are not permitted.

2-1.10 The performance of any Combination item must not exceed the performance limits for the individual component item as stated in the appropriate AFSL Standard for that item.

2-1.11 The pyrotechnic chamber of fireworks devices subject to this Standard must be constructed in a manner that allows functioning in a normal manner without burnout or blowout.

2-2 SPECIFIC REQUIREMENTS FOR AERIAL ITEMS

2-2.1 Flaming debris from aerial devices must extinguish at least 3 meters (9.75 feet) above the ground.

2-2.2 Reserved

2-3 SPECIFIC REQUIREMENTS FOR BASE ITEMS

2-3.1 The base or bottom of fireworks devices that are operated in a standing, upright position must have the minimum horizontal dimensions or the diameter of the base equal to at least one-third of the height of the device, including any base or cap affixed thereto, but excluding any protruding fuse.

2-3.2 In addition, any item designed to operate on a base must be able to pass a tilt test for stability (static test) appropriate for that item (see individual Standards).

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of business of the manufacturer, packer, distributor, or seller must appear on the label of each product.

3-1.3 The common or usual name of the product, such as "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G," must appear on the label of each product.

3-2 PRODUCT-SPECIFIC LABELING

3-2.1 Effects: Fountain and Ground Spinner

CAUTION
EMITS SHOWERS OF SPARKS
SPINS ON GROUND
FLAMMABLE

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 PLACE ON HARD, FLAT SURFACE.
 DO NOT HOLD IN HAND.
 LIGHT FUSE AND GET AWAY.

3-2.2 Effects: Fountain and Firecracker

**WARNING
EXPLOSIVE
EMITS SHOWERS OF SPARKS**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON LEVEL SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.3 Effects: Fountain and Mine and Shell (Single Tube)

**WARNING
EMITS SHOWERS OF SPARKS
SHOOTS FLAMING BALLS (AND REPORTS, if applicable)**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE.
DO NOT HOLD IN HAND.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

3-2.4 Effects: Fountain and Mine and Shell (Multiple Tube)

**WARNING
EMITS SHOWERS OF SPARKS
SHOOTS FLAMING BALLS (AND REPORTS, if applicable)**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD LEVEL SURFACE.
THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.

3-2.5 Effects: Helicopter and Ground Spinner

**WARNING
SPINS ON GROUND
EMITS FLAME AND SPARKS (WITH REPORT, if applicable)**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, FLAT, AND OPEN SURFACE WITH FUSE POINTING UP.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.6 Effects: Ground Spinner and Firecracker

**WARNING
EXPLOSIVE
SPINS ON GROUND, EMITS FLAME AND SPARKS**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND OR THROW FIRECRACKERS.
REMOVE FROM PACKAGING AND UNROLL BEFORE USE.
PLACE ON HARD, FLAT SURFACE.
LIGHT FUSE AND GET AWAY.
NEVER ATTEMPT TO RELIGHT A FUSE.
NEVER ATTEMPT TO LIGHT FIRECRACKERS IN A CLOSED CONTAINER.
NEVER CARRY FIRECRACKERS IN CLOTHING.

3-2.7 Effects: Fountains and Missiles without Report (Single Tube)

WARNING
EMITS SHOWERS OF SPARKS
FLAMMABLE MISSILE

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, OPEN SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS MISSILE TRAVELS AT HIGH SPEEDS AND
CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

3-2.9 Effects: Ground Spinners and Helicopters without Report

WARNING
SPINS ON GROUND
EMITS FLAME AND SPARKS
SHOOTS UPWARD

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, FLAT, AND OPEN SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.8 Effects: Ground Spinners and Mine-and-Shell Devices without Report (Multiple Tubes)

WARNING
SPINS ON GROUND
SHOOTS FLAMING BALLS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
NEVER HAVE ANY PART OF YOUR BODY OVER
THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE
THE DEVICE.
PLACE UPRIGHT AND USE ONLY ON CONCRETE,
ASPHALT, OR OTHER HARD, LEVEL SURFACE.
THIS ITEM MAY TIP OVER IF USED ON GRASS OR
OTHER UNEVEN SURFACES AND SERIOUS INJURY
COULD RESULT.

3-2.10 Effects: Wheels and Fountains

CAUTION
SPINS ON GROUND
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON LEVEL SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.11 Effects: Strobes and Firecrackers

WARNING
EXPLOSIVE
EMITS FLASHES OF LIGHT

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON GROUND.
DO NOT HOLD IN HAND OR THROW
FIRECRACKERS.
LIGHT FUSE AND GET AWAY.
NEVER ATTEMPT TO RELIGHT A FUSE.
NEVER ATTEMPT TO LIGHT FIRECRACKERS IN
A CLOSED CONTAINER.
NEVER CARRY FIRECRACKERS IN CLOTHING.

3-2.12 Effects: Smoke and Firecrackers

**WARNING
EXPLOSIVE
EMITS SMOKE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON GROUND.
DO NOT HOLD IN HAND OR THROW
FIRECRACKERS.
LIGHT FUSE AND GET AWAY.
NEVER ATTEMPT TO RELIGHT A FUSE.
NEVER ATTEMPT TO LIGHT FIRECRACKERS IN
A CLOSED CONTAINER.
NEVER CARRY FIRECRACKERS IN CLOTHING.

protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are

AFSL 102

STANDARD FOR COMETS, MINES, AND SHELLS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 20 - Comets, Mine, and Shell Devices, Single Tube

Classification 21 - Comets, Mine, and Shell Devices, Multiple Tube

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STANDARD FOR COMETS, MINES, AND SHELLS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of a class of Comets, Mines, and Shells designed to fire various visual and audible effects into the air. The finished unit ordinarily consists of a single fully assembled, non-reloadable tube or a number of fully assembled, non-reloadable tubes on a common base.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Base - The platform to which one or more tubes of a fireworks device are attached to provide a stable launching platform.

1-2.2 Black Powder - A mixture of potassium nitrate, sulfur and charcoal intended to produce a pyrotechnic effect.

1-2.3 Black Powder Equivalent - A mixture containing potassium nitrate and non-metallic fuel. The use of any other mixture as a break charge requires empirical test data demonstrating that the mixture is equivalent in performance to black powder.

1-2.4 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.5 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.6 Break Charge - The interior charge which, when ignited by the time fuse, breaks apart an Aerial Shell at the top of its climb and ignites the pyrotechnic effect(s).

1-2.7 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive Composition" definitions).

1-2.8 Comet - A hard pellet or disc of pyrotechnic composition that emerges from the launch tube already ignited and that leaves a trail of sparks until consumed.

1-2.9 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

NOTE: The lift charge of an item subject to this Standard is not considered to be explosive composition.

1-2.10 Lift Charge (Propellant) - Chemical composition consisting of black powder or equivalent that is used to propel one or more visible or audible aerial effects into the air.

1-2.11 Mine - A fireworks device designed to produce a low-level aerial effect where the effects are propelled into the air by the lift charge.

1-2.12 Plug - The non-flammable material pressed or otherwise firmly affixed to the bottom of a Shell or Mine launch tube and intended to prevent blowout at the bottom of the tube.

1-2.13 Propellant - See "Lift Charge" above.

1-2.14 Pyrotechnic Composition - A chemical mixture which on burning and without explosion produces visible displays, bright lights, whistles, or motion.

1-2.15 Report - A loud noise or "bang."

1-2.16 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.17 Sequential - Exhibits a clear audible and visual separation of firings between tubes of a multiple tube device.

1-2.18 Shell - An aerial projectile designed to be propelled into the air by the lift charge (propellant), wherein, at the peak of flight, a small bursting charge "breaks" the Shell and creates a display of stars, reports, or other effects.

1-2.19 Side Ignition - The ignition of a fuse at a point other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.20 Simultaneous - The lack of a clear audible and visual separation of firings between tubes of a multiple tube device.

1-2.21 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS FOR COMETS, MINES, AND SHELLS

2-1.1 The construction of the item, including launch tubes and shell casings when present, must be of such composition and design that no sharp fragments are produced upon functioning.

2-1.2 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.3 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A**.

2-1.4 Tubes

2-1.4.1 The tube intended for launching an aerial effect must be constructed of material that will not produce sharp fragments upon functioning and that is sufficiently rigid to retain its dimensions during transportation, handling, and normal operation.

2-1.4.2 Tubes must be constructed of material that will allow the item to function without burnout or blowout.

2-1.4.3 Tubes must be securely attached to the base so as not to separate or come loose during transportation, handling, or normal operation

2-1.4.4 Multiple-tube items must remain intact during functioning, with no separation of tubes.

NOTE: Exterior tubes containing multiple launching tube inserts are considered to be packaging.

2-1.4.5 Insert tubes with break charges must not contain pressed clay plugs, separators, or any other hard internal components

capable of acting as a projectile when the insert bursts.

2-1.5 Bases

2-1.5.1 Bases must be made of material that will not break during transportation, handling, or normal operation.

2-1.5.2 Bases must remain firmly attached to the item during transportation, handling, and normal operation.

2-1.5.3 The base or bottom of fireworks devices that are operated in a standing upright position must have the minimum horizontal dimensions or the diameter of the base equal to at least one-third of the height of the device, including any base or cap affixed thereto, but excluding any protruding fuse.

2-1.6 Plugs

2-1.6.1 The base plugs of individual tubes must be made of clay or other non-flammable material.

2-1.6.2 The plugs must be securely installed in the launch tubes.

2-1.6.3 The material and construction of the plugs must resist breakage or separation during transportation, handling, and normal use, and must not produce sharp fragments if a shell bursts prematurely in the tube.

2-1.7 Fuse

2-1.7.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.7.2 The location of the fuse must be obvious or must be clearly identified on the exterior of the device.

2-1.7.3 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.7.4 Exposed fuses (both lead-in and connecting) must resist side ignition for at least 3 seconds.

2-1.7.5 For multiple-effect or multiple-tube items, the timing between effects (or tubes) must not exceed 10 seconds.

2-1.7.6 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item or other fuse components.

2-1.7.7 The lead fuse on any item containing a projectile with a gross weight exceeding 25 grams (0.9 ounces) must enter the body of the launch tube through the side, near the base.

NOTE: Mines are not considered to be projectiles.

2-1.7.8 Devices subject to this Standard must contain only one ignition fuse. Additional fuses, points of ignition, openings for fuse insertion, or points for ignition transfer are not permitted.

2-1.7.9 All tubes on a base must be fused so that the tubes fire sequentially. If the fusing pattern includes division or branching, it must be designed to prevent two or more tubes from firing simultaneously.

2-1.7.10 The lead (initiating) fuse must be long enough to extend at least 2.5 centimeters (1 inch) outside the body of the item.

2-1.8 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.9 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other food.

2-1.10 The device must be assembled and packaged so as to prevent damage to the item during transportation, handling, and normal operation.

2-1.11 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR MULTIPLE-TUBE SHELLS OR COMETS

2-2.1 Shells or Comets intended to produce visual or audible effects must not contain more than 40 grams (1.4 ounces) of chemical composition per tube (including reports, break charge, and effects).

2-2.2 Break Charge

2-2.2.1 The break charge of individual Shells must consist of black powder or equivalent.

2-2.2.2 The break charge of individual Shells having an outside diameter of greater than 2.5 cm (1 inch) must not consist of more than 25% by weight of the chemical composition of the Shell, or 10 grams (0.35 ounces), whichever is less.

2-2.2.3 The break charge of individual Shells having an outside diameter of 2.5 cm (1 inch) or less must not consist of more than 50% by weight of the chemical composition of the Shell, or 10 gram (0.35 ounces), whichever is less.

2-2.3 Explosive components of Shells intended to produce reports must not contain more than 130 mg (2 grains) of explosive composition per report.

2-2.4 Lift charge (propellant) must not exceed 12 grams (0.4 ounces) per tube.

2-2.5 Any Shell device consisting of more than one tube must not contain in excess of 200 grams (7.2 ounces) total chemical composition.

NOTE: Any Shell or Comet device consisting of more than one tube where the tubes are securely attached to a single wood or plastic base and the tubes are separated from each other on the base by a distance of at least 12.7 mm (0.5 inches), must not contain in excess of 500 grams (17.5 ounces) total chemical composition.

2-3 SPECIFIC REQUIREMENTS FOR SINGLE-TUBE SHELLS AND COMETS

2-3.1 Single-tube Shells and Comets intended to produce visual or audible effects must not contain more than 60 grams (2.11 ounces) of total chemical composition (including reports, break charge and lift charge) per tube.

2-3.2 Break Charge

2-3.2.1 The break charge of individual Shells must consist of black powder or equivalent.

2-3.2.2 The break charge of individual Shells having an outside diameter of greater than 2.5 cm (1 inch) must not consist of more than 25% by weight of the chemical composition of the Shell, or 10 grams (0.35 ounces), whichever is less.

2-3.2.3 The break charge of individual Shells having an outside diameter of 2.5 cm (1 inch) or less must not consist of more

than 50% by weight of the chemical composition of the Shell, or 10 grams (0.35 ounces), whichever is less.

2-3.3 Explosive components of Shells intended to produce reports must not contain more than 130 mg (2 grains) of explosive composition each.

2-3.4 Lift charge (propellant) must not exceed 20 grams (0.7 ounces) per tube.

2-4 SPECIFIC REQUIREMENTS FOR SINGLE- AND MULTIPLE-TUBE MINES

2-4.1 Single-and multiple-tube Mines intended to produce visual or audible effects must not contain more than 40 grams (1.4 ounces) of chemical composition (including reports) per tube.

2-4.2 Explosive components of Mines intended to produce reports must not contain more than 130 grams (2 grains) of explosive composition each.

2-4.3 Any Mine consisting of more than one tube must not contain more than 200 grams (7.2 ounces) total chemical composition.

NOTE: Any Mine device consisting of more than one tube where the tubes are securely attached to a single wood or plastic base and the tubes are separated from each other on the base by a distance of at least 12.7 mm (0.5 inches) must not contain in excess of 500 grams (17.5 ounces) total chemical composition.

Chapter 3 PERFORMANCE

3-1 GENERAL STABILITY REQUIREMENTS FOR COMETS, MINES, AND SHELLS

3-1.1 Multiple-tube devices subject to this Standard that have any tube measuring 3.8 cm

(1.5 inches) or more inside diameter must withstand a minimum tilt angle of 60 degrees when tested in accordance with the procedure in **Appendix D**.

3-1.2 Single-tube devices and multiple-tube devices that have tubes measuring less than 3.8 cm (1.5 inches) must remain upright when tilted 18 degrees from horizontal against their shortest base dimension.

3-1.3 Any multiple-tube Aerial Shell or Comet with any tube inside diameter of greater than 2.54 cm (1 inch) must not tip over when shot on a 2-inch thick medium density polyurethane foam pad.

3-2 SPECIFIC PERFORMANCE REQUIREMENTS FOR SHELLS AND COMETS

3-2.1 When fired in accordance with label instructions, Shells and Comets must be ejected in a near-vertical path.

3-2.2 The primary effect(s) must take place at or near the peak of flight, at a height of not less than 6 meters (20 feet).

3-2.3 The primary effects must extinguish at least 3 meters (9.75 feet) above the ground.

NOTE: Effects produced as part of the lift function, such as Comet tails produced upon ignition and whistles or audible effects produced as part of the lift function, are not considered primary effects.

3-2.4 Flaming debris must extinguish at least 3 meters (9.75 feet) above the ground.

NOTE: See **APPENDIX E** for a diagram of the trajectory provision of Mines and Shells.

3-3 SPECIFIC PERFORMANCE REQUIREMENTS FOR MINES

3-3.1 The width of the effect for Mines must not exceed a 4-meter (13-foot) radius.

NOTE: See **APPENDIX E** for a diagram of trajectory of Mines and Shells.

3-3.2 The explosive composition of a single Firecracker included in the device must not exceed 50 milligrams exclusive of the Firecracker fuse.

Chapter 4 LABELING

4-1 GENERAL REQUIREMENTS

4-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s) and instructions for proper use.

4-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

4-1.3 The name and place of business of the manufacturer, packer, distributor, or seller must appear on the label of each product.

4-1.4 The common or usual name of the product, such as “Consumer Fireworks UN0336” or “Consumer Fireworks 1.4G,” must appear on the label of each product.

4-2 PRODUCT-SPECIFIC LABELING

4-2.1 Single-Tube Devices without Report (Classification 20)

WARNING
SHOOTS FLAMING BALLS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.2 Single-Tube Devices with Report (Classification 20)

WARNING
SHOOTS FLAMING BALLS AND REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.3 Multiple Tube Devices without Report (Classification 21)

WARNING
SHOOTS FLAMING BALLS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD, LEVEL SURFACE. THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.4 Multiple Tube Device with Report (Classification 21)

WARNING
SHOOTS FLAMING BALLS AND REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD, LEVEL SURFACE. THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.5 Single Tube Devices that Shoot Whistles in Air with Report

WARNING
SHOOTS WHISTLE IN AIR AND REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE. NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.6 Single Tube Devices that Shoot Whistles in Air without Report

WARNING
SHOOTS WHISTLE IN AIR

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE. NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.7 Multiple-Tube Devices that Shoot Whistle in Air without Report (no specific classification - use 20 or 21 as appropriate)

**WARNING
FLAMMABLE
SHOOTS WHISTLE IN AIR**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD, LEVEL SURFACE. THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.8 Multiple-Tube Devices that Shoot Whistle in Air With Report (no specific classification - use 20 or 21 as appropriate)

**WARNING
FLAMMABLE WITH REPORT
SHOOTS WHISTLE IN AIR**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD LEVEL SURFACE. THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4- 2.9 Single-Tube Devices that Shoot Inert Components (e.g., streamers, confetti, flags) into Air without Secondary Pyrotechnic Effects (e.g., break charge that scatters the effects)

**WARNING
FLAMMABLE
SHOOTS CONFETTI INTO AIR (or: STREAMERS, FLAGS, etc., depending on the effects that are present)**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT ON HARD, SMOOTH SURFACE. NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4- 2.10 Multiple-Tube Devices that Shoot Inert Components (e.g., streamers, confetti, flags) into Air without secondary pyrotechnic effects (e.g., break charge that scatters the effects)

**WARNING
FLAMMABLE
SHOOTS CONFETTI (or STREAMERS, FLAGS, etc.) INTO AIR**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE UPRIGHT AND USE ONLY ON CONCRETE, ASPHALT, OR OTHER HARD LEVEL SURFACE. THIS ITEM MAY TIP OVER IF USED ON GRASS OR OTHER UNEVEN SURFACES AND SERIOUS INJURY COULD RESULT.
NEVER HAVE ANY PART OF YOUR BODY OVER THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE THE DEVICE.

4-2.11 Roman Candle Barrages with Spike

WARNING
SHOOTS FLAMING BALLS WITH REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
NEVER HAVE ANY PART OF YOUR BODY OVER
THE DEVICE WHEN LIGHTING THE FUSE.
LIGHT FUSE AND GET AWAY.
NEVER RELIGHT A FUSE THAT FAILS TO IGNITE
THE DEVICE
STICK SPIKE END IN GROUND AND POINT
AWAY FROM PEOPLE OR FLAMMABLE MATERIAL.
THIS DEVICE MAY TIP OVER IF SPIKE IS NOT
SECURELY INSERTED INTO GROUND AND
SERIOUS INJURY COULD RESULT.

5-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

5-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 5 SHIPPING

5-1 GENERAL REQUIREMENTS

5-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

5-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

AFSL 103

**STANDARD FOR
FIRECRACKERS**

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCT:

Classification 4 - Firecrackers

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STANDARD FOR FIRECRACKERS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the traditional category of fireworks designed to produce only a single, small report at ground level. The unit of sale normally consists of several items with fuses braided together (strings) and packaged as a unit, but may be individually fused, single units in various types of packaging.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive Composition" definitions).

1-2.2 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

1-2.3 Primary Fuse - That portion of a Firecracker fuse that serves as the initial ignition point for a braided string of Firecrackers.

1-2.4 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.5 Report - A loud noise or bang.

1-2.6 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.7 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS FOR FIRECRACKERS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.6 The explosive composition for a single Firecracker must not exceed 50 milligrams (exclusive of the fuse).

2-1.7 Firecrackers must not contain any pyrotechnic composition other than the explosive composition designed to produce a single report.

2-1.8 The Firecracker tube must not catch fire as a result of operation.

2-1.9 Firecrackers must not be capable of ignition by friction.

2-1.10 The finished item must be assembled and packaged so as to prevent damage to the item during transportation, handling, and normal operation.

2-1.11 The location of the fuse must be obvious or be clearly identified on the exterior of the devices.

2-1.12 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR PACKAGES OF BRAIDED FIRECRACKERS (STRINGS)

2-2.1 Fuses on Firecracker strings must include a primary fuse (which may be integral).

2-2.2 The fuse burn time from ignition of the tip of the primary fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

NOTE: Fuses for Firecracker strings are not required to resist side ignition.

2-2.3 Firecracker devices containing more than 100 Firecrackers, including braided

strings of Firecrackers, must be fused in a manner that provides for only sequential ignition of the individual Firecrackers; sequential ignition is defined at a rate that does not exceed 125 individual Firecracker ignitions per second.

2-2.4 The functioning of individual units in the device or distinctive components thereof must be at a rate that is reasonably constant and uniform.

2-3 SPECIFIC REQUIREMENTS FOR FIRECRACKERS DESIGNED TO BE SOLD AS SINGLE INDIVIDUALLY FUSED UNITS (EVEN THOUGH PACKAGED AS MULTIPLE UNITS)

2-3.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-3.2 Exposed fuses must resist side ignition for at least 3 seconds.

2-3.3 The fuse must be securely attached to the item so that it will support double the weight of the item without separation from the item.

2-3.4 Individual Firecrackers with an outside diameter greater than ¼ inch must be individually marked "Consumer Fireworks, 1.4G."

2-3.5 The fuse burning time from ignition of the tip of the primary fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Packages of Firecrackers must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of business of the manufacturer, packer, seller, or distributor must appear on the label of each product.

3-1.4 The common or usual name of the product, such as "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G," must appear on the label of each product.

3-2 PRODUCT-SPECIFIC LABELING FOR FIRECRACKERS

3-2.1 Retail Packages for all Firecrackers and Individual Firecrackers with a casing that exceeds 9.5 mm (3/8 inch) outside diameter or 50 mm (2 inches) in length

**WARNING
EXPLOSIVE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND OR THROW
FIRECRACKERS.
PLACE PACK ON GROUND.
LIGHT FUSE AND GET AWAY.
NEVER ATTEMPT TO RELIGHT A FUSE.
NEVER ATTEMPT TO LIGHT FIRECRACKERS IN A
CLOSED CONTAINER.
NEVER CARRY FIRECRACKERS IN CLOTHING.

3-2.2 Individual Firecrackers (casings greater than 6.3 mm [1/4 inch] but not more than 9.5 mm [3/8"] outside diameter or greater than 38 mm [1-1/2 inches] in length but not more than 2" (50 mm) in length)

**WARNING: EXPLOSIVE
CAREFULLY READ OTHER CAUTIONS ON
PACKAGE**

NOTE: Firecrackers with individual casings equal to or less than 6.4 mm (1/4 inch) O.D. or 38 mm (1-1/2 inches) in length are not required to bear cautionary labeling on the individual casing.

3-2.3 Individually fused Firecracker with an outside diameter greater than 1/4 inch must bear following identification.

Consumer Fireworks 1.4G

3-2.4 Firecracker Rolls

**WARNING
EXPLOSIVE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND OR THROW
FIRECRACKERS.
REMOVE FROM PACKAGING AND UNROLL BEFORE
USE.
PLACE PACK ON GROUND.
LIGHT FUSE AND GET AWAY.
NEVER ATTEMPT TO RELIGHT A FUSE.
NEVER ATTEMPT TO LIGHT FIRECRACKERS IN A
CLOSED CONTAINER.
NEVER CARRY FIRECRACKERS IN CLOTHING.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks imported into the United States must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, Appendix C is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

AFSL 104

STANDARD FOR FOUNTAINS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 6 - Base Fountains, Single Tube

Classification 7 - Base Fountains - Multiple Tube

Classification 8 - Cone Fountains

Classification 10 - Handle Fountains

Classification 11 - California Candles

Classification 12 - Spike Fountains

Classification 18 - Handle Torches

Classification 19 - Base Torches

Classification 46 - Base Whistles

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STANDARD FOR FOUNTAINS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the traditional category of Fountains designed to produce showers of various colored sparks. Whistles, smoke, and crackling effects may also be included as part of the overall fountain effect. The unit of sale usually consists of a fully assembled single-container unit.

1-1.2 Fountain-type devices that contain reports, Ground Spinners, and comparable effects are subject to the AFSL Standard for Combination devices.

1-1.3 This Standard applies to devices intended primarily for use by the general public.

1-1.4 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.5 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Base - The platform to which one or more tubes of a fireworks device are attached to provide a stable launching platform.

1-2.2 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.3 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.4 California Candle - A hand-held tube containing pyrotechnic composition which emits showers of sparks when ignited.

1-2.5 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive Composition" definitions).

1-2.6 Crackle - Spark-like bursts accompanied by a popping or snapping sound, produced by granules or flakes of pyrotechnic composition.

1-2.7 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.8 Plug - The non-flammable material pressed or otherwise firmly affixed to the bottom of the pyrotechnic chamber of a Fountain and intended to prevent failure of the assembly in a hazardous manner.

1-2.9 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.10 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.11 Torch - A cylindrical tube containing pyrotechnic composition that produces a colored flame upon ignition.

1-2.12 Whistle - A small-tube device that produces a shrill noise as a result of the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.6 Fountains must be assembled so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.7 Fountains must be constructed of material that will allow the item to function without burnout or blowout.

2-1.8 Fuse

2-1.8.1 The fuse used as the lead into the body of the item must be only safety fuse

or other fuse that has been protected to resist side ignition.

2-1.8.2 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.8.3 Exposed fuses must resist side ignition for at least 3 seconds.

2-1.8.4 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item.

2-1.8.5 For multi-effect or multi-tube items, the timing between effects (or tubes) must not exceed 10 seconds.

2-1.8.6 The location of the fuse must be obvious or must be clearly identified on the exterior of the Fountain.

2-1.8.7 The connecting fuse between tubes must resist side ignition for at least 3 seconds.

2-1.8.8 Devices subject to this Standard must contain only one ignition fuse. Additional fuses, points of ignition, openings for fuse insertion, or points for ignition transfer are not permitted.

2-1.9 Limits for Pyrotechnic Composition Content

2-1.9.1 Hand-held Fountains must not contain more than 75 grams (2.6 ounces) total of pyrotechnic composition.

2-1.9.2 Single-tube Fountains must not contain more than 75 grams (2.6 ounces) total of pyrotechnic composition.

2-1.9.3 Cone Fountains must not contain more than 50 grams (1.8 ounces) total of pyrotechnic composition.

2-1.9.4 Multiple-tube Fountains must not contain more than 200 grams (7.2 ounces) total of pyrotechnic composition.

NOTE: Any Fountain device consisting of more than one tube where the tube is securely attached to a single wood or plastic base, and the tubes are separated from each other on the base by a distance of at least 0.50 inches (12.7 mm) must not contain in excess of 500 grams (17.5 ounces) total chemical composition.

NOTE: For multiple-tube Fountains, the maximum content of pyrotechnic composition per tube is 75 grams (2.6 ounces).

2-1.10 Fountains must have a firmly installed plug.

2-1.11 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR TUBE AND CONE ITEMS

2-2.1 Bases must be made of material that will not break during transportation, handling, or normal operation.

2-2.2 Bases must remain firmly attached to the item during transportation, handling, and normal operation.

2-2.3 The base or bottom of a tube or cone Fountain must have the minimum horizontal dimensions or the diameter of the base equal to at least one-third of the height of the device including any base or cap affixed thereto but excluding any protruding fuse.

2-2.4 Any tube or cone Fountain must remain upright when tilted 12 degrees from the horizontal against its shortest base dimension.

2-3 SPECIFIC REQUIREMENTS FOR HANDLE AND SPIKE ITEMS

2-3.1 Spikes or handles of these items must be securely attached or be an integral part of the item.

2-3.2 These items must have adequate provisions to prevent expulsion of the plug or flame through the handle.

2-3.3 Any handle area (including spikes) must be free of pyrotechnic composition.

2-3.4 Attached handles must have an exposed length of at least 10.2 centimeters (4 inches).

2-3.5 The distance from the bottom of the plug to the external blunt end of the spike must be at least 10.2 centimeters (4 inches) with at least 5.1 centimeters (2 inches) exposed.

2-3.6 Spikes must have a blunt tip, not less than 3.2 millimeters (1/8 inch) in cross-section.

2-3.7 Spikes and handles must be constructed of materials that do not produce sharp fragments when the item operates (or malfunctions).

2-3.8 Spikes must be constructed of a material that allows the device to be mounted in the ground.

Chapter 3 PERFORMANCE

3-1 LIMIT OF VISUAL EFFECTS

3-1.1 Visual effects of base and spike Fountains must not extend beyond a 5-meter (16.4-foot) diameter circle at ground level.

3-1.2 Visual effects of base and spike Fountains must not extend beyond 5 meters (16.4 feet) in height.

3-1.3 Visual effects of hand-held Fountains must not extend beyond a 2 meters (6.6 feet) diameter.

3-1.4 Visual effects of hand-held Fountains must not extend beyond 2 meters (6.6 feet) in length.

3-1.5 The pyrotechnic composition must not produce a continuous flame longer than 0.5 meters (20 inches).

NOTE: Sparks produced as part of the effect are not considered to be continuous flame.

3-1.6 Sparks or other pyrotechnic effects must not contact the user while the device is operated in accordance with cautionary labeling instructions.

Chapter 4 LABELING

4-1 GENERAL REQUIREMENTS

4-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

4-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness,

prominence, and minimum type size requirements for cautionary labels.

4-1.3 The name and place of business of the manufacturer, packer, seller, or distributor must appear on the label of each product.

4-1.4 The common or usual name of the product, such as “Consumer Fireworks UN0336” or “Consumer Fireworks 1.4G,” must appear on the label of each product.

4-2 PRODUCT-SPECIFIC LABELING FOR FOUNTAINS

4-2.1 Base Fountains, Single- or Multiple-Tube, and Cone Fountains (Classifications 6, 7, 8)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON LEVEL SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

4-2.2 Fountains with Spikes (Classification 12)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
STICK FIRMLY IN GROUND IN AN UPRIGHT POSITION.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

4-2.3 Hand-Held Fountains
(Classification 10)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
HOLD IN HAND - POINT AWAY FROM BODY,
CLOTHING, AND FLAMMABLE MATERIAL.
LIGHT FUSE.

4-2.6 Base Torch (Classification 19)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE UPRIGHT ON LEVEL GROUND.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

4-2.4 California Candles
(Classification 11)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
HOLD IN HAND AT BOTTOM OF TUBE.
POINT AWAY FROM BODY SO THAT NEITHER END
POINTS TOWARD BODY.
LIGHT FUSE.

4-2.7 Base Whistle Devices That Operate
on the Ground (Classification 46)

CAUTION
FLAMMABLE

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

4-2.5 Handle Torches (Classification 18)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
HOLD IN HAND - POINT AWAY FROM BODY,
CLOTHING, AND FLAMMABLE MATERIAL.
LIGHT FUSE.

4-2.8 Smoke Fountains – Hand Held

CAUTION
FLAMMABLE

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
HOLD IN HAND AT BOTTOM OF TUBE.
POINT AWAY FROM BODY, CLOTHING, OR
OTHER FLAMMABLE MATERIAL.
LIGHT FUSE.

4-2.9 Fountains - Bottle-Rocket Type

**CAUTION
EMITS SHOWERS OF SPARKS**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
STICK FIRMLY IN GROUND IN AN UPRIGHT
POSITION.
REMOVE CAP TO EXPOSE FUSE. (or: REMOVE CAP
FOR LIGHTING.)
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 5 SHIPPING

5-1 GENERAL REQUIREMENTS

5-1.1 All consumer fireworks imported into the United States must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

5-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

5-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

5-1.4 These items must be securely packaged for shipping in such a way that they are

AFSL 105

STANDARD FOR GROUND SPINNERS AND CHASERS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 14 - Ground Spinners

Classification 48 - Chasers

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- 3-2 Product-Specific Labeling

Chapter 4 SHIPPING

- 4-1 General Requirements

STANDARD FOR GROUND SPINNERS AND CHASERS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the category of items designed to operate on the ground by spinning motion or by random movement. Ground Spinners generally produce a shower of colored sparks while spinning. Chasers frequently produce whistles and reports while moving randomly on the ground.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.2 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.3 Chaser - A variety of fireworks designed to move erratically along the ground with a whistling effect.

1-2.4 Chemical Composition - All pyrotechnic and explosive composition contained

in a fireworks device (see also "Pyrotechnic Composition" and "Explosive" definitions).

1-2.5 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles or motion.

1-2.6 Plug - The non-flammable material pressed or otherwise firmly affixed to the pyrotechnic chamber of certain fireworks items intended to prevent failure of the assembly in a hazardous manner.

1-2.7 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.8 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.9 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A**.

2-1.6 Report(s), if present must perform at ground level, at or below 0.5 meters (1.6 feet.)

2-1.7 Ground Spinners must not contain reports.

2-1.8 Items meeting this Standard must not project flaming balls or glowing fragments.

NOTE: Uniform showers of sparks are not considered to be flaming effects.

2-1.9 Ground Spinners and Chasers must be assembled so as to prevent damage during transportation, handling, and normal operation.

2-1.10 Fuse

2-1.10.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.10.2 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.10.3 Exposed fuse must resist side ignition for at least 3 seconds.

NOTE: Items such as Ground Spinners that require a restricted orifice for proper functioning and contain less than 6 grams of chemical composition per unit do not require a fuse that is resistant to side ignition.

2-1.10.4 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item.

2-1.10.5 For multi-effect or multi-tube items, the timing between effects (or tubes) must not exceed 10 seconds.

2-1.10.6 The location of the fuse must be obvious or must be clearly identified on the exterior of the items.

2-1.11 Limits for Chemical Composition Content

2-1.11.1 Ground Spinners and Chasers must not contain more than 20 grams (0.7 ounces) total of chemical composition per pack or string.

2-1.11.2 Explosive components of Chasers must not contain more than 50 milligrams of explosive composition per report.

2-1.12 Limits for Performance

2-1.12.1 Ground Spinners must not rise more than 1 meter (3.3 feet) into the air during functioning.

2-1.12.2 Ground Spinners must function within an area not exceeding 10 meters (33 feet) in diameter.

2-1.13 Chasers must not travel more than 10 meters in any direction from the point of ignition and must not rise more than 0.5 meters (1.6 feet) during functioning.

2-1.14 The pyrotechnic chamber in fireworks devices subject to this Standard must be constructed in a manner that allows functioning in a normal manner without burnout or blowout.

2-1.15 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of business of the manufacturer, distributor, packer, or seller must appear on the label of each product.

3-1.4 The common or usual name of the product, such as "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G," must appear on the label of each product.

3-2 PRODUCT SPECIFIC LABELING

3-2.1 Ground Spinners
(Classification 14)

**CAUTION
SPINS ON GROUND
EMITS FLAME AND SPARKS**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD FLAT SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.2 Chasers with Report
(Classification 48)

**WARNING
FLAMMABLE. EXPLODES**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, FLAT SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.3 Chasers without Report

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, FLAT SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks imported into the United States must comply with certain

regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

AFSL 106

STANDARD FOR SPECIALTY ITEMS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 26 - Specialty Items

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STANDARD FOR SPECIALTY ITEMS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of small items that contain relatively small amounts of chemical composition and which are designed to produce limited visual, audible or motion effects.

NOTE: Items that consist of significantly different effects (such as showers of sparks and aerial effects) will be considered under the AFSL Standard for Combination Items.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-2 DEFINITIONS

1-2.1 Base - The platform to which one or more tubes of a fireworks device are attached to provide a stable platform for functioning of the item.

1-2.2 Blowout - The release of a pressure effect from other than the intended orifice of a fireworks device.

1-2.3 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.4 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic

Composition" and "Explosive Composition" definitions).

1-2.5 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

NOTE: The lift charge of an item subject to an AFSL Standard is not considered to be explosive composition.

1-2.6 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.7 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.8 Side Ignition - The ignition of a fuse at a point other than at the tip when the side of the fuse is placed in direct contact with the glowing tip on a lighted cigarette.

1-2.9 Specialty Item - A fireworks item that resembles in physical form articles commonly recognized as appealing to or intended for use by children. This includes, but is not limited to, devices that resemble cartoon characters, toys, vehicles, boats, and animals and that are designed to produce limited visible, audible, or motion effects.

Note: Items having multiple effects that are not considered appealing to or intended for use by children may be tested as another AFSL category such as Combinations, etc.

1-2.10 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage or loss of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A**.

2-1.6 Items subject to this Standard must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.7 Explosive components of any item subject to this Standard must not contain more than 50 milligrams of chemical composition per report.

2-1.8 Fuse

2-1.8.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.8.2 Exposed fuse must resist side ignition for at least 3 seconds.

NOTE: Items that require a restricted orifice for proper functioning and contain less than 6 grams (0.2 ounces) of pyrotechnic composition do not require a fuse that is resistant to side ignition.

2-1.8.3 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.8.4 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 8 ounces (227 grams), or double the weight of the item, whichever is less, without separation from the item.

2-1.8.5 For multi-effect or multi-tube items, timing between effects (or tubes) must not exceed 5 seconds.

2-1.8.6 The location of the fuse must be obvious or be clearly identified on the exterior packaging of the item.

2-1.9 Performance

2-1.9.1 Effect propelled from a Specialty Item must not travel an initial distance in the air greater than 2 meters in any direction.

2-1.9.2 The item must not catch fire as a result of operation.

2-1.10 The pyrotechnic chamber of a fireworks device subject to this Standard must be constructed in a manner to allow functioning in a normal manner without burnout or blowout.

2-1.11 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-1.12 Limits for Chemical Composition Content

2-1.12.1 Specialty Items must not contain more than 20 grams (0.7 ounces) of total chemical composition.

2-1.12.2 Total chemical composition per individual tube of an item subject to this Standard must not exceed 2 grams (0.07 ounces).

2-2 SPECIFIC REQUIREMENTS FOR BASE ITEMS

2-2.1 The base or bottom of devices that are operated in a standing or upright position must have the minimum horizontal dimension or the diameter of the base equal to at least one-third of the height of the device including any base or cap affixed thereto, but excluding any protruding fuse.

2-2.2 In addition, any item designed to operate on a base must remain upright when tilted 12 degrees from horizontal against its shortest base dimension.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

3-1.3 The name and place of business of the manufacturer, packer, distributor, or seller must appear on the label of each product.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.4 The common or usual name of the product must appear on the label of each product. For snakes or glow worms that are exempt from classification as explosives (See Appendix C II), the common or usual name must be: "Snakes" for snakes, "Glow Worms" for glow worms. For snakes and glow worms that are not exempt from classification as explosives and all other items subject to this Standard, the common or usual name must be "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G."

3-2 PRODUCT-SPECIFIC LABELING

3-2.1 Boat-Like Devices Designed to Operate on Water

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE BOAT ON WATER.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.2 Gun Ships, Aircraft Carriers, and Similar Devices that Operate on the Ground and Shoot Helicopters into Air

WARNING
EMITS SHOWERS OF SPARKS
SHOOTS UPWARD

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, LEVEL SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

3-2.3 Tanks, Cars, Motorcycles And Similar Devices that Shoot Reports, Flaming Pellets, Etc.

CAUTION
MOVES ON GROUND
EMITS FLAME AND SPARKS
 (or: **WARNING**
SHOOTS FLAMING PELLETS AND REPORTS, if applicable)

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 DO NOT HOLD IN HAND.
 PLACE ON HARD, LEVEL SURFACE.
 LIGHT FUSE AND GET AWAY.

3-2.4 Strobes

CAUTION
FLAMMABLE
EMITS FLASHES OF LIGHT

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 DO NOT HOLD IN HAND.
 PLACE ON HARD, LEVEL SURFACE.
 LIGHT FUSE AND GET AWAY.

3-2.5 Aerial and explosive devices must bear the signal word "WARNING" rather than "CAUTION."

3-2.6 Crackling Ball

CAUTION
EMITS CRACKLING SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 DO NOT HOLD IN HAND.
 LAY ON GROUND.
 LIGHT FUSE AND GET AWAY.

3-2.7 Cars with Whistle

CAUTION
MOVES ON GROUND
EMITS WHISTLE, FLAME, AND SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 PLACE ON HARD, LEVEL SURFACE.
 DO NOT HOLD IN HAND.
 LIGHT FUSE AND GET AWAY.

NOTE: The preceding labels are applicable for some common Specialty Items. Labeling for other Specialty Items will be different, depending on the function of the device. For advice on labeling for devices not covered above, contact the AFSL office.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks imported into the United States must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture and physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

AFSL 107

STANDARD FOR PARTY, TRICK, AND TOY SMOKE DEVICES

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 30 - Snakes

Classification 31 - Snappers

Classification 33 - Booby Traps

Classification 34 - Party Poppers

Classification 42 - Toy Smoke Devices

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- 2-2 Specific Requirements for Toy Smoke Devices
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Chapter 3 LABELING

- 3-1 General Requirements
- 3-2 Product-Specific Labeling

Chapter 4 SHIPPING

- 4-1 General Requirements

STANDARD FOR PARTY, TRICK, AND TOY SMOKE DEVICES

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the category of small items frequently used as party items. The unit of sale usually consists of a number of individual items boxed or packaged as a unit.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.2 Booby Trap - A small plastic or paper item containing a small amount of friction-sensitive chemical composition. String protruding from both ends of the device is pulled to ignite it.

1-2.3 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.4 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic

Composition" and "Explosive Combination" definitions).

1-2.5 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

1-2.6 First Fire - The initial burst of flame that results from the ignition of pyrotechnic material used as a primer for the internal smoke composition. First fire appears after ignition of the primary fuse and before the generation of smoke.

1-2.7 Party Popper - Small plastic or paper item containing a small amount of chemical composition that is friction sensitive. A string or trigger protruding from the device is usually pulled to ignite it, producing a small report and a shower of paper and/or cloth novelties.

1-2.8 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible or brilliant displays, bright lights, whistles, or motion.

1-2.9 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.10 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.11 Snapper - Small paper-wrapped item containing a small amount of chemical composition coated on small bits of sand. When dropped the device produces a small report.

1-2.12 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN**2-1 GENERAL REQUIREMENTS**

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.6 Items meeting this Standard must not produce flaming debris.

2-1.7 Items subject to this Standard must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.8 Items subject to this Standard must produce only visual and audible effects.

2-1.9 Limits for Chemical Composition Content.

2-1.9.1 Party poppers must not contain more than 16 milligrams total of chemical composition per unit.

NOTE: For Party Poppers not regulated as an explosive for transportation purposes (see **Appendix C, II**), the chemical composition is limited to potassium chlorate and red phosphorous.

2-1.9.2 Booby traps must not contain more than 16 milligrams of chemical composition per unit.

2-1.9.3 Booby traps must be packaged in an inner package that contains not more than 12 units.

2-1.9.4 Snappers must not contain more than 1.0 milligrams of chemical composition per unit.

NOTE: For Snappers not regulated as an explosive for transportation purposes (see **Appendix C, II**) chemical composition is limited to silver fulminate coated on small bit of sand or gravel.

2-1.9.4 Toy Smoke Devices must not contain more than 100 grams (3.6 ounces) of chemical composition per unit.

NOTE: For Smoke Devices not regulated as an explosive for transportation purposes (See **Appendix C, II**), the chemical composition is limited to 5 grams and must be packaged in a cork or cardboard casing. The chemical composition is limited to potassium nitrate and sulphur for white smoke and combinations of potassium chlorate, sulphur, sugar, and organic dyes for colored smoke. All units containing potassium chlorates must also contain an equal amount of a bicarbonate, such as sodium bicarbonate.

2-1.9.5 Snakes (and glow worms) must not contain more than 2 grams of chemical composition per unit.

NOTE: For snakes (and glow worms) not regulated as an explosive for transportation purposes (See **Appendix C, II**), the chemical composition is limited to ammonium perchlorate, nitrated pitch, asphaltum, and carbonaceous materials.

2-1.10 Items subject to this Standard must not have the shape and color or bear a name that resembles banned hazardous fireworks, such as M-80 Salutes, Silver Salutes, Cherry Bombs, etc.

NOTE: Use of such names in conjunction with the word "brand" and the name of the classification, where all components of the name (i.e., name, brand, and classification) are prominent, is acceptable under this Standard.

2-1.11 The pyrotechnic chamber of items subject to this Standard must be constructed so as to allow functioning in a normal manner without burnout or blowout.

2-1.12 Fuse

2-1.12.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

NOTE: Items requiring a restricted orifice for proper functioning and that contain less than 6 grams (0.23 ounces) of pyrotechnic composition do not require a fuse that is resistant to side ignition.

2-1.12.2 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.12.3 Exposed fuses must resist side ignition for at least 3 seconds.

2-1.12.4 The entire fuse must be securely attached to the item so that it will support

either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item.

2-1.12.5 For multi-effect or multi-tube items, the timing between effects (or tubes) must not exceed 10 seconds.

2-1.12.6 The location of the fuse must be obvious or be clearly identified on the exterior of the device.

2-1.13 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR TOY SMOKE DEVICES

2-2.1 Toy Smoke Devices must not have plastic components in contact with their pyrotechnic composition.

2-2.2 Toy Smoke Devices must be constructed so that they will neither burst nor produce external flame upon ignition.

NOTE 1: Burning fuse and first fire upon ignition are not considered to be external flame.

NOTE 2: Small brief or mild bursts of flame accompanying smoke production may not exceed 25% of the total smoke production time of the device.

2-2.3 First fire in Toy Smoke Devices must not exceed 25% of the total operating time.

2-2.4 Items subject to this Standard must produce a uniformly fine effect with no slag or other molten particles that are large enough to have the potential to cause burns.

2-3 SPECIFIC REQUIREMENTS FOR PARTY POPPERS

2-3.1 Inserts in Party Poppers must consist only of soft paper or cloth.

2-3.2 Inserts in Party Poppers must not be capable of ignition during normal operation of the item and must resist ignition after operation.

2-4 SPECIFIC REQUIREMENTS FOR BASE ITEMS

2-4.1 The base or bottom of devices that are operated in a standing or upright position must have the minimum horizontal dimension or the diameter of the base equal to at least one-third of the height of the device including any base or cap affixed thereto but excluding any protruding fuse.

2-4.2 In addition, any item designed to operate on a base must remain upright when tilted 12 degrees from horizontal against its shortest base dimension.

2-5 SPECIFIC PACKAGING REQUIREMENTS FOR ITEMS NOT REGULATED AS AN EXPLOSIVE FOR TRANSPORTATION PURPOSES (SEE APPENDIX C II)

2-5.1 Snappers not regulated as a explosive for transportation purposes must be packaged in an inner package that contains no more than 50 Snappers with sawdust or other impact absorbing material.

2-5.2 Party Poppers not regulated as an explosive for transportation purposes must be packaged in an inner packaging that contains not more than 72 devices.

2-5.3 Smoke Devices not regulated as an explosive for transportation purposes must be packaged in an inner packaging that contains no more than 72 devices.

2-5.4 Snakes (and glow worms) must be packaged in an inner packaging that contains no more than 25 devices.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of the manufacturer, packer, distributor, or seller must appear on the label of the product.

3-1.4 The common or usual name of the product must appear on the label of each product. For Smoke Devices, Party Poppers, and Snappers that are exempt from classification as explosives (See **Appendix C II**), the common or usual name must be: "Smoke Devices" for Smoke Devices, "Party Poppers" for Party Poppers, and "Snappers" for Snappers. For all other Smoke Devices, Party Poppers, and Snappers, the common or usual name must be "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G."

3-2 PRODUCT-SPECIFIC LABELING

3-2.1 Party Poppers - Bottle Type (Classification 33)

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
DO NOT POINT EITHER END TOWARD FACE OR
OTHER PERSON.
HOLD IN HAND, JERK STRING.

3-2.2 Party Popper - Pistol Type
(Classification 34)

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
DO NOT POINT EITHER END TOWARD FACE OR
OTHER PERSON.
HOLD IN HAND - PULL TRIGGER SHARPLY.

3-2.3 Snappers (Classification 31)

CAUTION

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT PUT IN MOUTH.
THROW ON GROUND.

3-2.4 Booby Traps (Classification 33A)

**CAUTION
FLAMMABLE
EXPLODES WHEN STRINGS ARE PULLED**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
DO NOT HOLD CLOSE TO FACE.
HOLD IN HAND, JERK ENDS OF STRING.

3-2.5 Snakes (Classification 30)

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT PUT IN MOUTH.
PLACE ON GROUND.
LIGHT PELLET.

3-2.6 Smoke Balls, Toy Smoke, and
Flitter Devices (Classification 42)

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE ON GROUND.
LIGHT FUSE AND GET AWAY.

3-2.7 Canister-Type Smoke Devices with
Pull String [**double check label**]

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
GRASP FIRMLY IN HAND AT BASE OF TUBE.
POINT AWAY FROM PEOPLE OR FLAMMABLE
MATERIAL.
PULL STRING SHARPLY.
PLACE ON GROUND AND GET AWAY.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

AFSL 108

STANDARD FOR RELOADABLE TUBE AERIAL SHELLS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 22 - Reloadable Aerial Shells

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STANDARD FOR RELOADABLE TUBE AERIAL SHELLS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of a class of Shells designed to fire various visual and audible effects into the air from a reloadable tube. The finished unit consists of an assembled tube and base unit with a number of individually fused Shells, packaged together.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Base - The platform to which one or more tubes of a fireworks device are attached to provide a stable launching platform.

1-2.2 Black Powder - A mixture of potassium nitrate, sulfur, and charcoal intended to produce a pyrotechnic effect.

1-2.3 Black Powder Equivalent - A mixture containing potassium nitrate and non-metallic fuel. The use of any other mixture as a break charge requires empirical test data demonstrating that the mixture is equivalent in performance to black powder.

1-2.4 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.5 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.6 Break Charge - The interior charge which, when ignited by a flame from the timed fuse, breaks apart an Aerial Shell at the top of its climb and ignites the pyrotechnic effect.

1-2.7 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive Composition" definitions).

1-2.8 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

NOTE: The lift charge of an item subject to this Standard is not considered to be explosive composition.

1-2.9 Lift Charge (Propellant) - Unpressed granular chemical composition, consisting of black powder or equivalent, which is used to propel one or more visible or audible aerial effects into the air.

1-2.10 Primary Effect - A major effect a fireworks device is designed to produce, such as a report in a Firecracker, shower of sparks in a Fountain, an aerial flaming ball for a Shell or Mine, etc. This is distinguished from effects such as an audible whistle, Comet tail, or an audible effect produced as part of the lift function.

1-2.11 Plug - The non-flammable material pressed or otherwise firmly affixed to the bottom of a Shell launch tube, intended to prevent blowout or failure of the base assembly in a hazardous manner.

1-2.12 Propellant - See "Lift Charge" above.

1-2.13 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.14 Report - A loud noise or "bang."

1-2.15 Retail Package - A package suitable for sale as a unit to the public that complies with the requirements of this Standard and that is fully enclosed by cardboard, heavy paper, plastic, or a combination of these materials. When multiple packages of Reloadable Shells are contained in an outer package, each inner package will be treated as a separate retail package and must comply with all of the provisions of this Standard.

1-2.16 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.17 Sequential - Exhibits a clear audible and visual separation of firings between tubes of a multiple-tube device.

1-2.18 Shell - An aerial projectile designed to be propelled into the air by the lift charge (propellant), wherein at the peak of flight, a small bursting charge "breaks" the Shell and creates a display of stars, reports, or other effects.

1-2.19 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.20 Simultaneous - Exhibits no clear audible and visual separation of firings between tubes of a multiple-tube device.

1-2.21 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item, including launch tubes and Shell casings, must be of such composition and design that no sharp fragments are produced upon functioning.

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling or normal operation.

2-1.3 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.4 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.5 Launch Tubes

2-1.5.1 The tube intended for launching an aerial effect must be constructed of material that will not produce sharp fragments upon functioning or premature ignition of a Shell in the tube.

2-1.5.2 The launch tube must be constructed of material that will allow the item to function in a normal manner without burnout or blowout.

2-1.5.3 The launch tube must be constructed of material that is sufficiently rigid to retain its dimensions during transportation, handling, and normal operation.

2-1.5.4 The launch tube must be securely attached to the base so as not to separate or come loose during transportation, handling, or normal operation.

2-1.5.5 The launch tube must be able to withstand at least 2 times the intended number of uses without burnout, blowout, separation from the base, or other malfunction.

2-1.5.6 The launcher tube including its base, packed in a reloadable shell kit must be capable of withstanding the explosion of any individual shell in the kit, without fragmenting, when the shell is inserted in the tube upside down and ignited.

2-1.6 Bases

2-1.6.1 Bases must be made of material that will not break or shatter during transportation, handling, or normal operation.

2-1.6.2 Bases must remain firmly attached to the item during transportation, handling, and normal operation.

2-1.6.3 The base or bottom of fireworks devices subject to this Standard must have the minimum horizontal dimensions or the diameter of the base equal to at least one-third of the height of the device including any base but excluding any protruding fuse.

2-1.6.4 The base/tube assembly must not provide a source of ignition during use.

2-1.7 Fuse

2-1.7.1 Fuse used as the lead into the Shell must be only one-piece safety fuse or

other fuse that has been protected to resist side ignition.

2-1.7.2 The fuse must be long enough to extend at least 5 centimeters (2 inches) outside the launch tube.

2-1.7.3 The fuse must be sufficiently rigid so as to not fall back into the launch tube.

2-1.7.4 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.7.5 The exposed fuse must resist side ignition for at least 3 seconds.

2-1.7.6 The entire fuse must be securely attached to the Shell so that it will support either the weight of the Shell plus 227 grams (8 ounces), or double the weight of the Shell, whichever is less, without separation from the Shell.

2-1.7.7 The location of the fuse must be obvious or must be clearly identified on the exterior of the device.

2-1.8 Requirements for Shells

2-1.8.1 The Shell must be constructed of materials that do not produce sharp fragments as a result of operation.

2-1.8.2 The shape of the shell must not increase the risk of binding in the launch tube.

2-1.8.3 The outside diameter of Shells must not exceed 44.5 mm (1.75 inches).

2-1.8.4 Shells must not contain pressed clay plugs, separators, or any other hard internal components capable of acting as projectiles when the Shell bursts.

2-1.8.5 The wall thickness of any reports must be sufficient to prevent simultaneous explosions.

2-1.8.6 Each Shell must include an orienting loop that is securely attached to the top of the Shell adequate to maintain correct Shell orientation and fuse attachment. The use of a Shell wrapper or other means of securely maintaining correct Shell orientation is also permitted. Tape by itself is not sufficient to meet this requirement.

2-1.8.7 Individual Shells that are of cylindrical or other non-spherical shape must bear the statement "THIS END UP" along with an arrow indicating the direction in which the shell should be placed inside the tube.

2-1.9 Limits of Chemical Composition

2-1.9.1 Shells must not contain more than 60 grams (2.1 ounces) of total chemical composition (including reports, break charge, lift charge, and effects) per Shell.

2-1.9.2 The break charge of individual Shells must not consist of more than 25% by weight of the chemical composition of the Shell or 10 grams (0.4 ounces), whichever is less.

2-1.9.3 The maximum quantity of lift charge (propellant) in any Shell must not exceed 20 grams.

2-1.9.4 The lift charge (propellant) must consist of Black Powder or equivalent.

2-1.9.5 Explosive components of Shells intended to produce reports must not contain more than 2 grains (130 mg) of explosive composition per report.

2-1.10 The finished item must not be designed or packaged in such a manner that it could be confused with candy or food.

2-1.11 The device must be assembled and packaged so as to prevent damage during transportation, handling, and normal operation.

2-1.12 Requirements for Shell Design

2-1.12.1 The Shell must not contain artwork, nose cones, fins, or other ornamentation that could cause the item to resemble a finished fireworks device.

2-1.12.2 The Shell exterior must be a single uniform color material, such as brown Kraft-paper type or other uniform single-color finish, without any design on the exterior of the Shell. No color decorations are permitted.

2-1.12.3 The Shell may bear a name or description of the effects produced, provided that the name or description is printed in dark blue or black type on white background without a border, in a type size not to exceed 8/64 inch.

2-1.12.4 The Shell may bear the name of the manufacturer or distributor, or the brand name of the item, provided the name or brand name is printed in dark blue or black type on white background without a border, in a type size not to exceed 8/64 inch. No other artwork, logos, or graphics are permitted.

2-1.13 Retail Packaging

2-1.13.1 The retail package must not contain more than 12 Shells.

2-1.13.2 The retail package must not contain more than 400 grams of total chemical composition including lift charges.

2-1.13.3 Each retail package must contain at least one launcher tube.

2-1.14 Items subject to this Standard must not bear a name or bear graphics suggesting a use of

the product that is inconsistent with the cautionary labeling instructions.

2-2 REQUIREMENTS FOR DEVICES WITH MULTIPLE LAUNCHER TUBES

2-2.1 Devices subject to this Standard containing multiple launcher tubes mounted on a base and that have any tube measuring 1.5 inches (3.8 cm) or more inside diameter must withstand a minimum tilt angle of 60 degrees when tested in accordance with the procedures in **Appendix D**.

2-2.2 The Shells must be fused in such a manner that the Shells fire sequentially and not together.

2-2.3 Multiple-tube reloadable devices with any tube inside diameter of greater than 1 inch (2.54 cm) must not tip over when shot on a 2-inch thick medium-density polyurethane foam pad.

Chapter 3 PERFORMANCE

3-1 STABILITY

3-1.1 The launcher assembly, containing one Shell, must remain upright when tilted 22 degrees from vertical against its shortest base dimension.

3-2 SHELLS

3-2.1 When fired in accordance with label instructions, Shells must be ejected in a near-vertical path.

3-2.2 When fired in accordance with label instructions, the minimum burst height must be 15 meters (49 feet).

3-2.3 Primary effects must extinguish at least 5 meters (16 feet) above the ground.

NOTE: Effects such as whistles, Comet tails, or audible effects produced as part of the lift function are not considered primary effects.

3-2.4 Flaming debris must be extinguished at least 3 meters (9.75 feet) above the ground.

NOTE: See **Appendix F** for schematic of trajectories and performance for Reloadable Tube Aerial Shell devices.

Chapter 4 LABELING

4-1 GENERAL REQUIREMENTS

4-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

4-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

4-1.3 The name and place of business of the manufacturer, packer, seller, or distributor must appear on the label of each product.

4-1.4 The launcher tube must have a full caution label on the tube over or under the name of the device on the principal display panel(s) with the text parallel to the base.

4-1.5 Each individual Shell must be labeled in accordance with Section 4-3 of this Standard.

4-1.6 The common or usual name of the product, such as "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G," must appear on the label of each product.

4-2.4 Cylindrical or Non-Spherical-Shaped Reloadable Shell Devices with Report

4-2 SPECIFIC LABELING FOR LAUNCHER TUBES AND RETAIL PACKAGES

4-2.1 Spherical-Shaped Reloadable Shell Devices without Report

4-2.4 Cylindrical or Non-Spherical-Shaped Reloadable Shell Devices with Report

WARNING
SHOOTS FLAMING BALLS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE. UNWRAP LONG FUSE ON BALL. PUT SHELL INTO TUBE WITH FLAT END DOWN AND WITH FUSE EXTENDING OUT OF TUBE. DO NOT HOLD IN HAND. LIGHT FUSE AND GET AWAY.

WARNING
SHOOTS FLAMING BALLS WITH REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE. UNWRAP LONG FUSE ON SHELL. PUT SHELL INTO TUBE WITH ARROW POINTING UP AND WITH FUSE EXTENDING OUT OF TUBE. DO NOT HOLD IN HAND. LIGHT FUSE AND GET AWAY.

4-2.2 Spherical-Shaped Reloadable Shell Devices with Report

4-3 SPECIFIC LABELING FOR INDIVIDUAL SHELLS

WARNING
SHOOTS FLAMING BALLS WITH REPORTS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE. UNWRAP LONG FUSE ON BALL. PUT SHELL INTO TUBE WITH FLAT END DOWN AND WITH FUSE EXTENDING OUT OF TUBE. DO NOT HOLD IN HAND. LIGHT FUSE AND GET AWAY.

The following label must appear on the bottom half of the Shell in a type size meeting AFSL type size requirements for the Shell. **NOTE:** The full warning label must not appear on the individual Shells.

4-3.1 Shells without Report

WARNING
SHOOTS FLAMING BALLS

SEE ADDITIONAL CAUTIONS ON LAUNCHER TUBE AND BOX.

4-2.3 Cylindrical or Non-Spherical-Shaped Reloadable Shell Devices without Report

4-3.2 Shells with Reports

WARNING
SHOOTS FLAMING BALLS

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE. UNWRAP LONG FUSE ON SHELL. PUT SHELL INTO TUBE WITH ARROW POINTING UP AND WITH FUSE EXTENDING OUT OF TUBE.

WARNING
SHOOTS FLAMING BALLS WITH REPORTS

SEE ADDITIONAL CAUTIONS ON LAUNCHER TUBE AND BOX.

4-3.3 The following label must appear on the top half of the Shell directly above the cautionary label.

MUST BE USED IN LAUNCHER TUBE

NOTE: Section 2-1.8.7 requires that individual Shells that are of cylindrical or other non-spherical shape must bear the statement “THIS END UP” along with an arrow indicating the direction in which the Shell should be placed inside the tube. See the following diagram:



NOTE: For shells packaged in a retail box containing both spherical shaped and cylindrical shaped shells, all shells in the retail package must bear the required labeling for cylindrical shaped shells.

4-4 SPECIFIC LABELING FOR BOX INSERT

4-4.1 In addition to the appropriate cautions indicated on the product label, the following cautionary information must be clearly printed on a single page and placed in the display package on top of the contents:

4-4.1.1 Spherical Shaped Reloadable Shell Devices

WARNING

SHOOTS FLAMING BALLS (WITH REPORTS, if present)

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE. UNWRAP LONG FUSE ON BALL. PUT SHEL INTO TUBE WITH FLAT END DOWN AND WITH FUSE EXTENDING OUT OF TUBE. DO NOT HOLD IN HAND. LIGHT FUSE AND GET AWAY.

Safety Practices for Handling and Use

Always wear eye protection when using this device. Never use a Shell or launcher that has been wet or damaged. Always make sure the area overhead is free from obstructions and that no spectators or flammable materials are within a 40 foot circle. Never force a Shell into the launch tube. Never load more than one Shell at a time into launch tube. Always light the fuse only on the tip. Never have any part of your body over the device when lighting the fuse. After lighting the fuse, immediately move at least 20 feet away from the launcher. Never relight a fuse that fails to ignite the device. Always wait at least 30 seconds between loading Shells. Never ignite the Shell outside the launch tube. Never take the Shell apart.

4-4.1.2 Cylindrical or Non-spherical Shaped Reloadable Shell Devices

WARNING**SHOOTS FLAMING BALLS (WITH REPORTS, if present)**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 PLACE LAUNCHER UPRIGHT ON HARD, SMOOTH SURFACE.
 UNWRAP LONG FUSE ON BALL.
 PUT SHELL INTO TUBE WITH ARROW POINTING UP AND WITH FUSE EXTENDING OUT OF TUBE.
 DO NOT HOLD IN HAND.
 LIGHT FUSE AND GET AWAY.

Safety Practices for Handling and Use

Always wear eye protection when using this device.
 Never use a Shell or launcher that has been wet or damaged.
 Always make sure the area overhead is free from obstructions and that no spectators or flammable materials are within a 40 foot circle.
 Never force a Shell into the launch tube.
 Never load more than one Shell at a time into launch tube.
 Always light the fuse only on the tip.
 Never have any part of your body over the device when lighting the fuse.
 After lighting the fuse, immediately move at least 20 feet away from the launcher.
 Never relight a fuse that fails to ignite the device.
 Always wait at least 30 seconds between loading Shells.
 Never ignite the Shell outside the launch tube.
 Never take the Shell apart.

of the United States Code should be consulted for complete information.

5-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

5-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

5-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 5 SHIPPING**5-1 GENERAL REQUIREMENTS**

5-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49

AFSL 109

**STANDARD FOR ROMAN
CANDLES**

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 37 - Roman Candles with Spikes and Roman Candles without Spikes

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STANDARD FOR ROMAN CANDLES

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the traditional category of Roman Candles, consisting of a tube containing several alternating layers of compacted black powder and effects such as stars and reports. The unit of sale usually consists of several individual items boxed or packaged together, but may be single units.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Ball - A "star" expelled from a Roman Candle (see definition for "Star").

1-2.2 Blowout - The unintended release of a pressure effect from other than the intended orifice of a fireworks device.

1-2.3 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.4 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic

Composition" and "Explosive Composition" definitions).

1-2.5 Explosive Composition - Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect in a fireworks device.

1-2.6 Propellant - Chemical composition, consisting of black powder or equivalent, which is used to propel one or more visible or audible aerial effects into the air.

1-2.7 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.8 Plug - The non-flammable material pressed or otherwise firmly affixed to the bottom of a Roman Candle and intended to prevent blowout or expulsion of the spike.

1-2.9 Report - A loud noise or "bang."

1-2.10 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.11 Star - A small pellet of compressed pyrotechnic composition that is projected into the air from Roman Candles and other types of fireworks and that burns in the air, producing various visual effects.

1-2.12 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.13 Throat - The barrel of a Roman Candle through which the effects pass.

Chapter 2 PRODUCT DESIGN**2-1 GENERAL REQUIREMENTS FOR ROMAN CANDLES**

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning.

2-1.2 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.3 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.4 The pyrotechnic chamber in Roman Candles must be constructed in a manner that allows normal functioning in a normal manner without burnout or blowout, including expulsion of any spike.

2-1.5 Plugs

2-1.5.1 The pyrotechnic chamber must have a plug adequate to prevent blowout or expulsion of any spike from the bottom of the candle.

2-1.5.2 The plugs of individual tubes must be made of clay or other non-flammable material.

2-1.5.3 The plugs must be securely installed in the tubes.

2-1.5.4 The material and construction of the plugs must resist breakage or separation during transportation, handling, and normal use, and must not produce sharp fragments if an effect bursts prematurely in the tube.

2-1.5.5 The minimum required total distance between the bottom of the pyrotechnic chamber and the bottom of the tube must be at least 4 inches (10.2 cm).

2-1.6 Fuse

2-1.6.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.6.2 The location of the fuse must be obvious or must be clearly identified on the exterior of the candle.

2-1.6.3 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 12 seconds.

2-1.6.4 Exposed fuse must resist side ignition for at least 3 seconds.

2-1.6.5 For multi-effect or multi-tube items the timing between effects (or tubes) must not exceed 10 seconds.

2-1.6.6 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces), or double the weight of the item, whichever is less, without separation from the item.

2-1.7 Limits of Chemical Composition

2-1.7.1 Roman Candles must not contain more than 20 grams (0.7 ounces) of chemical composition per tube.

2-1.7.2 Any individual unit in a Roman Candle must not contain more than 5 grams of chemical composition.

2-1.7.3 Explosive components of Roman Candles intended to produce reports must not contain more than 130 mg (2 grains) of explosive composition per report.

2-1.8 Roman Candles must contain at least 5 and not more than 10 shots each.

2-1.9 All Roman Candles within one retail package must contain an equal number of shots.

2-1.10 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling or normal operation.

2-1.11 Reports, if present, must take place in the air at least 3 meters (9.75 feet) from the launch point.

2-1.12 Roman Candles must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.13 Reserved.

2-1.14 The pyrotechnic composition must not produce a continuous external flame longer than 0.5 meters (20 inches) during operation.

NOTE: Sparks are not considered to be continuous flame.

2-1.15 The finished item must not be designed or packaged in such a manner that it could be confused with candy or food.

2-1.16 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR SPIKES

2-2.1 Roman Candles are permitted to have a spike suitable for mounting in the ground.

Spikes must be securely attached or be an integral part of the item.

2-2.2 External spike length must be at least 5 centimeters (2 inches).

2-2.3 There must not be any chemical composition between the bottom of the pyrotechnic chamber plug and the external end of the spike.

2-2.4 Spikes must have a blunt tip and must be not less than 3.2 millimeters (1/8 inch) in diameter.

2-2.5 The minimum required total distance from the bottom of the plug to the external blunt end of the spike must be at least 4 inches (10.2cm).

2-2.6 Spikes must be constructed of a material that allows the device to be mounted in the ground.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

2-1.2 The name and place of business of

WARNING
SHOOTS FLAMING BALLS

DO NOT HOLD IN HAND.
 USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 BURY TUBE HALFWAY IN SAND OR SOIL AND
 POINT AWAY FROM PEOPLE AND FLAMMABLE
 MATERIAL.
 LIGHT FUSE AND GET AWAY.

3-2.4 Roman Candles without Spikes and with Report (Classification 37)

3-2.1 Roman Candles with Spikes and without Report (Classification 37)

WARNING
SHOOTS FLAMING BALLS

DO NOT HOLD IN HAND.
 USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 STICK SPIKE END IN GROUND AND POINT AWAY
 FROM PEOPLE OR FLAMMABLE MATERIAL.
 LIGHT FUSE AND GET AWAY.

WARNING
SHOOTS FLAMING BALLS WITH REPORT

DO NOT HOLD IN HAND.
 USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 BURY TUBE HALFWAY IN SAND OR SOIL AND
 POINT AWAY FROM PEOPLE OR FLAMMABLE
 MATERIAL.
 LIGHT FUSE AND GET AWAY.

3-2.2 Roman Candles with Spikes and with Report (Classification 37)

WARNING
SHOOTS FLAMING BALLS WITH REPORT

DO NOT HOLD IN HAND.
 USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 STICK SPIKE END IN GROUND AND POINT AWAY
 FROM PEOPLE OR FLAMMABLE MATERIAL.
 LIGHT FUSE AND GET AWAY.

3-2.5.1 Roman Candle with Launcher Tube

WARNING
SHOOTS FLAMING BALLS WITH REPORT

DO NOT HOLD IN HAND.
 USE ONLY UNDER CLOSE ADULT SUPERVISION.
 FOR OUTDOOR USE ONLY.
 PLACE ROMAN CANDLE INSIDE LAUNCH TUBE
 SUPPLIED WITH PACKAGE .
 MAKE SURE LAUNCH TUBE IS PUSHED FIRMLY IN
 GROUND.
 POINT AWAY FROM PEOPLE OR FLAMMABLE
 MATERIAL.
 LIGHT FUSE AND GET AWAY.

3-2.3 Roman Candles without Spikes and without Report (Classification 37)

3-2.5.2 Cautionary Label for Roman
Candle Launcher Tube

ROMAN CANDLE LAUNCH TUBE

DO NOT HOLD LAUNCH TUBE IN HAND.
USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PUSH SPIKE FIRMLY INTO SOFT GROUND.
MAKE SURE LAUNCH TUBE WILL NOT FALL OVER.
CAREFULLY READ THE WARNING ON EACH
INDIVIDUAL ROMAN CANDLE BEFORE USE.
PLACE ROMAN CANDLE INSIDE LAUNCH TUBE.
POINT AWAY FROM PEOPLE OR FLAMMABLE
MATERIAL.
LIGHT FUSE AND GET AWAY.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packing, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

AFSL 110

STANDARD FOR SKY ROCKETS, MISSILES, AND HELICOPTERS

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 16 - Helicopters

Classification 24 - Missiles

Classification 38 – Sky Rockets

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STANDARD FOR SKY ROCKETS, MISSILES, AND HELICOPTERS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of a class of Sky Rockets, Missiles, and Helicopters designed to be launched overhead, producing visual or audible effects near the peak of trajectory. The unit of sale usually consists of several fully assembled units packaged together.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.2 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.3 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device. (See also "Pyrotechnic Composition" and "Explosive" definitions).

1-2.4 Explosive Composition - Any chemical compound or mixture, the primary

purpose of which is to function by explosion, producing an audible effect in a fireworks device.

1-2.5 Helicopter - A tube containing chemical composition with a propeller or blade attached. Upon ignition the device spins rapidly and rises into the air.

1-2.6 Missile - A device similar to a Sky Rocket in size, composition, and effect that uses fins rather than a stick for launching, guidance, and stability.

1-2.7 Primary Visual or Audible Effect(s) - The major effect(s) for a fireworks device, such as a report, a shower of sparks, or an aerial flaming ball. The lift function of the motor (propellant) is not considered to be a primary effect.

1-2.8 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.9 Report - A loud noise or "bang."

1-2.10 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.11 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.12 Sky Rocket - A tube containing chemical composition with a wooden stick attached for guidance and stability. Upon ignition the device rises into the air and may produce a burst of color and/or sound at or near the height of flight.

Chapter 2 PRODUCT DESIGN**2-1 GENERAL REQUIREMENTS FOR SKY ROCKETS, MISSILES, AND HELICOPTERS**

2-1.1 These items must be constructed of materials that do not produce sharp fragments when the item functions.

2-1.2 These items must be constructed without sharp edges or sharp points.

2-1.3 The pyrotechnic chamber in devices subject to this Standard must be constructed in a manner that allows normal functioning without burnout or blowout.

2-1.4 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.5 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.6 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A**.

2-1.7 The total amount of chemical composition for Rockets, Missiles, or Helicopters, including propellant, primary, and any other effects, must not exceed 20 grams (0.7 ounces).

2-1.8 For devices subject to this Standard that are manufactured with a primary effect comprised of a Shell with a diameter greater than 1 inch, the break charge of the device must not contain more than 25% of the total chemical composition inside the Shell or 5 grams, whichever is less. For devices as subject to this Standard that are manufactured with a primary effect comprised of a Shell with a diameter smaller

than 1 inch, the break charge of the device must not contain more than 50% of the total chemical composition inside the Shell or 5 grams, whichever is less.

2-1.9 Explosive components of Rockets, Missiles or Helicopters intended to produce reports must not contain more than 2 grains (130 mg) of explosive composition each.

2-1.10 Report charges must be designed to prevent simultaneous explosion.

2-1.11 Flight stabilizing features such as sticks, wings or fins must be securely attached to the items so as to prevent them from being damaged or detached during transportation, handling, and normal operation.

2-1.12 Fuse

2-1.12.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

NOTE: Items that require a restricted orifice for proper functioning and contain less than 6 grams of pyrotechnic composition do not require a fuse that is resistant to side ignition.

2-1.12.2 The location of the fuse must be obvious or be clearly identified on the exterior of the device.

2-1.12.3 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.12.4 Exposed fuse must resist side ignition for at least 3 seconds.

2-1.12.5 The entire fuse must be securely attached to the item so that it will support the weight of the item plus 227 grams (8 ounces)

or double the weight of the item, whichever is less, without separating from the item.

2-1.13 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other food.

2-1.14 Devices subject to this Standard must be assembled and packaged so as to prevent damage during transportation, handling, and normal operation.

2-1.15 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR ROCKETS

2-2.1 The flight stabilizing stick on rockets must be straight and rigid to provide a direct and stable flight, must remain straight and rigid, and must remain attached to the drivers so as to prevent the stick from being damaged or detached during transportation, handling, and normal operation.

2-2.2 Reserved

2-3 SPECIFIC REQUIREMENTS FOR MISSILES

2-3.1 The base or bottom of a Missile must have the minimum horizontal dimension of the base (i.e. the fins) equal to at least one-third of the height of the device including any base or cap affixed thereto.

2-3.2 Missiles must remain upright when tilted 18 degrees from the horizontal against their shortest base dimension.

2-4 SPECIFIC REQUIREMENTS FOR HELICOPTERS

2-4.1 Helicopters must have the top clearly marked for proper functioning.

2-4.2 Reserved

Chapter 3 PERFORMANCE

3-1 GENERAL REQUIREMENTS FOR ROCKETS, MISSILES, AND HELICOPTERS

3-1.1 Primary effects, visual or audible, must take place at or near the peak of the trajectory of the device.

3-1.2 Primary effects must be extinguished within 5 meters (16 feet) of the ground.

NOTE: The lift function of the motor (the propellant) is not considered to be a primary effect.

3-1.3 Flaming debris from the device must be extinguished above 3 meters (10 feet) from the ground.

3-1.4 The ignited device, when launched according to the instructions, must reach a height of not less than 15 meters (49 feet).

3-1.5 The effects of the device must not extend beyond 5 meters (16 feet) in any direction perpendicular to the path of the device.

NOTE: Helicopters without primary visual or audible effects (stars or reports) are exempt from the minimum height requirements. The lift charge (propellant) is not considered to be a primary effect.

3-2 SPECIFIC REQUIREMENTS FOR SKY ROCKETS

3-2.1 The flight direction of Sky Rockets must be predictable within 45 degrees on either side of the direction of launch.

NOTE: See Figure 1 of **Appendix G** for a schematic diagram of the trajectory requirement for Sky Rockets.

3-2.2 Reserved

3-3 SPECIFIC REQUIREMENT FOR MISSILES AND HELICOPTERS

3-3.1 The flight direction of Missiles and Helicopters launched straight overhead must be within 22-1/2 degrees in any direction from the vertical up to the minimum height of 15 meters (49 feet).

NOTE: See Figure 2 of **Appendix H** for a schematic diagram of trajectory requirements for Missiles and Helicopters.

3-3.2 Reserved

Chapter 4 LABELING

4-1 GENERAL REQUIREMENTS

4-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use on the principal display panel(s) of the item.

4-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by typography, layout or color with any other printed or graphic matter on the label.

4-1.3 The name and place of business of the manufacturer, packer, distributor, or seller must appear on the label of each product.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

4-1.4 The common or usual name of the product, such as “Consumer Fireworks UN0336” or Consumer Fireworks 1.4G,” must appear on the label of each product.

4-2 PRODUCT-SPECIFIC LABELING

4-2.1 Bottle Rocket - Individual motor tubes which are 3/8 inch or less in O.D. and 3 inches or less in length must bear the following labeling on each individual Rocket’s motor tubes.

4-2.1.1 Bottle Rocket with Report (Individual Rocket)

WARNING
FLAMMABLE WITH REPORT
 CAREFULLY READ CAUTIONS ON PACKAGE

4-2.1.2 Bottle Rocket without Report (Individual Rocket)

WARNING
FLAMMABLE
 CAREFULLY READ CAUTIONS ON PACKAGE

4-2.1.3 Package Label of Bottle Rocket with Report

WARNING
FLAMMABLE ROCKET WITH REPORT

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
PLACE IN WOODEN TROUGH OR IRON PIPE AT 75-DEGREE ANGLE POINTING AWAY FROM PEOPLE AND FLAMMABLE MATERIAL.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS ROCKET TRAVELS AT HIGH SPEEDS AND CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

4-2.2.1 Sky Rocket with Report (Classification 38)

WARNING
FLAMMABLE ROCKET WITH REPORT

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
PLACE IN WOODEN TROUGH OR IRON PIPE AT 75-DEGREE ANGLE POINTING AWAY FROM PEOPLE AND FLAMMABLE MATERIAL.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS ROCKET TRAVELS AT HIGH SPEEDS AND CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

4-2.1.4 Package Label of Bottle Rocket without Report

WARNING
FLAMMABLE ROCKET

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
PLACE IN WOODEN TROUGH OR IRON PIPE AT 75 DEGREE ANGLE POINTING AWAY FROM PEOPLE AND FLAMMABLE MATERIAL.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS ROCKET TRAVELS AT HIGH SPEEDS AND CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

4-2.2.2 Sky Rocket without Report (Classification 38)

WARNING
FLAMMABLE ROCKET

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
PLACE IN WOODEN TROUGH OR IRON PIPE AT 75-DEGREE ANGLE POINTING AWAY FROM PEOPLE AND FLAMMABLE MATERIAL.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS ROCKET TRAVELS AT HIGH SPEEDS AND CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

4-2.2 Sky Rockets – Individual motor tubes which are greater than 3/8 inch in O.D. and more than 3 inches in length must bear the following labeling on each individual rocket’s motor tubes.

4-2.3 Missiles

4-2.3.1 Missile with Report (Classification 24)

WARNING
FLAMMABLE MISSILE WITH REPORT

USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY.
PLACE ON HARD, OPEN SURFACE.
DO NOT HOLD IN HAND.

Chapter 5 SHIPPING

4-2.3.2 Missile without Report
(Classification 24)

WARNING
FLAMMABLE MISSILE

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, OPEN SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
THIS MISSILE TRAVELS AT HIGH SPEEDS AND
CAN TRAVEL LONG DISTANCES.
MISUSE MAY RESULT IN INJURY OR FIRE.

4-2.3.3 Missile with Launcher Stand

WARNING
FLAMMABLE
SHOOT UPWARD

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT HOLD IN HAND.
PLACE LAUNCHER STAND ON HARD, OPEN
SURFACE.
LIGHT FUSE AND GET AWAY.
DO NOT FIRE WITHOUT LAUNCHING STAND.

4-2.4 Helicopters

4-2.4.1 Helicopter with Report
(Classification 16)

WARNING
EMITS SHOWERS OF SPARKS WITH REPORT

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, OPEN SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

4-2.4.2 Helicopter without Report
(Classification 16)

WARNING
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE ON HARD, OPEN SURFACE.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.

5-1 GENERAL REQUIREMENTS

5-1.1 All consumer fireworks imported into the United States must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Codes should be consulted for complete information.

5-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

5-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

5-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

AFSL 111

STANDARD FOR HAND-HELD SPARKLING DEVICES

SEPTEMBER 2006 EDITION

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 2 – Dipped Sticks

Classification 39 – Sparklers – Wood Sticks

Classification 40 – Sparklers – Wire Sticks

Classification 41 – Morning Glories

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- 2-2 Specific Requirements for Wire Sparklers
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Chapter 3 LABELING

- 3-1 General Requirements
- 3-2 Product-Specific Labeling

Chapter 4 SHIPPING

- 4-1 General Requirements

STANDARD FOR HAND-HELD SPARKLING DEVICES

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the traditional category of hand held items (such as Dipped Sticks, Sparklers, and Morning Glories) consisting of a spark-producing pyrotechnic composition, either coated on a wire, wood, or bamboo stick, or contained in a tube which is consumed during functioning and typically attached to a stick. The unit of sale normally consists of a number of individual items boxed or packaged as a unit.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as "Specialty Items" in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also "Pyrotechnic Composition" and "Explosive" definitions).

1-2.2 Crackle - Spark-like bursts accompanied by a popping or snapping sound, produced by granules or flakes of pyrotechnic composition.

1-2.3 Pyrotechnic Composition - A chemical mixture that, on burning and without

explosion, produces visible displays, bright lights, whistles, or motion.

1-2.4 Slag - A mass of molten particles generated by the burning of pyrotechnic material during the function of a fireworks device. Individual sparks produced as an intended effect of a device are not considered slag.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling, or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage or loss of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A**.

2-1.6 The pyrotechnic composition of items subject to this Standard must not produce a continuous flame beyond that required to sustain the effect.

2-1.7 Items subject to this Standard must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.8 Reserved.

2-1.9 Limits for Pyrotechnic Composition Content

2-1.9.1 Hand-held sparking devices which contain any chlorate must not contain more than 4 grams of pyrotechnic composition each, of which not greater than 15 percent (600mg.) is potassium, sodium or barium chlorate.

2-1.9.2 Hand-held sparking devices which contain any perchlorate must not contain more than 5 grams (0.18 ounces) of pyrotechnic composition each.

2-1.9.3 Hand-held-sparking devices that do not contain chlorate or perchlorate must not contain more than 100 grams (3.6 ounces) of pyrotechnic composition each.

NOTE: For hand-held sparking devices exempt from classification as explosives, the chemical composition is limited to a combination of barium nitrate, potassium chlorate, potassium perchlorate, aluminium, magnesium, iron filings, and dextrine. No pure magnesium is permitted.

2-1.10 Items subject to this Standard must produce only visual and crackle effects.

2-1.11 The ignition temperatures of items subject to this Standard must be sufficiently high that the item cannot be ignited by sparks from another hand-held sparking device.

2-1.12 The pyrotechnic composition must produce a uniform display with no slag or other molten particles having the potential to cause burns or fires.

2-1.13 Spark residues from hand-held sparking devices must be non-toxic and not physically injurious if ingested.

2-1.14 Handles

2-1.14.1 Items having a length of 25 centimeters (10 inches) or less overall, must have a handle at least 7.5 centimeters (3 inches) long.

2-1.14.2 Items having a length of more than 25 centimeters (10 inches) but less than 50 centimeters (20 inches) overall, must have a handle at least 10 centimeters (4 inches) long.

2-1.14.3 Items having a length of 50 centimeters (20 inches) or greater overall, must have a handle at least 15 centimeters (6 inches) long.

2-1.15 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-1.16 Hand-held sparking devices exempt from classification as explosives (see **Appendix C II**) must be packaged in an inner packaging that contains no more than 8 devices.

2-2 SPECIFIC REQUIREMENTS FOR WIRE SPARKLERS

2-2.1 The wire ends must be formed, fused, or otherwise treated to eliminate sharp wire edges or burrs.

NOTE: The normal square-cut end of wires greater than 0.63 millimeter (0.025 inch) is considered acceptable.

2-2.2 When the Sparkler is operated horizontally, the wire must be adequate to prevent

droop of the spent Sparkler by more than 50% of the length of the pyrotechnic coating.

2-2.3 When a Sparkler is waved in a horizontal motion through an arc of 90 degrees at a speed of two full cycles per second while functioning, the wire must not break or result in pieces of burning composition significantly larger than sparks falling from the wire.

2-3 SPECIFIC REQUIREMENTS FOR DIPPED STICKS OR SPARKLERS WITH WOODEN OR BAMBOO STICKS

2-3.1 Wooden or bamboo sticks must be treated or coated in such a manner that they will not continue to burn as a result of operation.

2-3.2 When a Dipped Stick or Sparkler is waved in a horizontal motion through an arc of 90 degrees at a speed of two full cycles per second while functioning, the wooden or bamboo stick must not break or result in pieces of burning composition significantly larger than sparks falling from the stick.

2-3.3 When the Dipped Stick or Sparkler is operated horizontally, the stick must be adequate to prevent droop of the spent device by more than 50% of the length of the pyrotechnic coating.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s) and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by

typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of business of the manufacturer, distributor, packer, or seller must appear on the label of each product.

3-1.4 The common or usual name of the product must appear on the label of each product. For hand held sparkling devices that are exempt from classification as explosives (See **Appendix C II**), the common or usual name must be: "Sparklers." For all other hand held sparkling devices, the common or usual name must be "Consumer Fireworks UN0336" or "Consumer Fireworks 1.4G."

3-2 PRODUCT-SPECIFIC LABELING

3-2.1 Hand-Held Sparkling Devices - Wire Stick (Classification 40)

<p>CAUTION FLAMMABLE</p> <p>USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. DO NOT TOUCH GLOWING WIRE. HOLD IN HAND WITH ARM EXTENDED AWAY FROM BODY. KEEP BURNING END OR SPARKS AWAY FROM WEARING APPAREL OR OTHER FLAMMABLE MATERIAL. HOLD AND LIGHT ONLY ONE SPARKLER AT A TIME. AFTER USE PLACE WIRE IN WATER.</p>

3-2.2 Hand-Held Sparkling Devices - Wood Stick and Morning Glories (Classifications 39 and 41)

**CAUTION
FLAMMABLE**

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
DO NOT TOUCH HOT WOOD.
HOLD IN HAND WITH ARM EXTENDED AWAY
FROM BODY.
KEEP BURNING END OR SPARKS AWAY FROM
WEARING APPAREL OR OTHER FLAMMABLE
MATERIAL.
HOLD AND LIGHT ONLY ONE DEVICE AT A TIME.
AFTER USE PLACE WOOD IN WATER.

protected from moisture or physical damage during transportation and so that there is no risk of any of the contents escaping from the shipping case.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks imported into the United States must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are

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STANDARD FOR WHEELS

SEPTEMBER 2006 Edition

THIS STANDARD INCLUDES SPECIFICATIONS FOR THE FOLLOWING PRODUCTS:

Classification 44 - Wheels - Axle

Classification 45 - Wheels - String

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Chapter 3 LABELING

- 3-1 General Requirements
- 3-2 Product-Specific Labeling

Chapter 4 SHIPPING

- 4-1 General Requirements

STANDARD FOR WHEELS

Chapter 1 GENERAL

1-1 INTRODUCTION

1-1.1 This Standard applies to the manufacture of the traditional category of Wheel-like items, which are designed to spin on an axle or string and produce various effects. The unit of sale usually consists of a small number of individual Wheels boxed or packaged together but may be single units.

1-1.2 This Standard applies to devices intended primarily for use by the general public.

1-1.3 This Standard enables manufacturers to produce fireworks devices in accordance with applicable United States requirements for labeling, composition, and performance.

1-1.4 This Standard excludes items that are defined as “Specialty Items” in Section 1-2.9 of the Standard for Specialty Items.

1-2 DEFINITIONS

1-2.1 Blowout - The unintended release of a pressure effect from other than the intended orifice of the device.

1-2.2 Burnout - The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device.

1-2.3 Chemical Composition - All pyrotechnic and explosive composition contained in a fireworks device (see also “Pyrotechnic Composition” and “Explosive Composition” definitions).

1-2.4 Driver - The propellant tube(s) attached to Wheels to “drive” or cause the device to spin.

1-2.5 Plug - The non-flammable material pressed or otherwise firmly affixed to the bottom of the pyrotechnic chamber of a fireworks device and intended to prevent failure of the assembly in a hazardous manner.

1-2.6 Pyrotechnic Composition - A chemical mixture that, on burning and without explosion, produces visible displays, bright lights, whistles, or motion.

1-2.7 Safety Fuse - A fuse consisting of a thread-wrapped black powder train that has been coated with a water-resistant material.

1-2.8 Side Ignition - The ignition of a fuse at other than the tip when the side of the fuse is placed in direct contact with the glowing end of a burning cigarette.

1-2.9 Slag - A mass of molten particles generated by the burning of pyrotechnic material during the functioning of a fireworks device. Individual sparks produced as an intended effect of a device are not considered slag.

1-2.10 Whistle - A small-tube device that produces a shrill noise resulting from the burning of pyrotechnic composition.

Chapter 2 PRODUCT DESIGN

2-1 GENERAL REQUIREMENTS

2-1.1 The construction of the item must be of such composition and design that no sharp fragments are produced upon functioning (or malfunctioning).

2-1.2 The finished item must not be impact sensitive or have a risk of premature ignition or explosion during transportation, handling or normal operation.

2-1.3 The finished item must not be designed or packaged in such a manner that it could be confused with candy or other foods.

2-1.4 The construction of the item must be adequate to prevent leakage of the chemical composition at any time.

2-1.5 The chemical composition of the item must not contain prohibited substances except as trace impurities.

NOTE: Prohibited substances are listed in **Appendix A.**

2-1.6 Wheels must not contain reports.

2-1.7 Wheels must be assembled and packaged so as to prevent damage to the items during transportation, handling, and normal operation.

2-1.8 Driver tubes must be constructed of material that will allow the item to function without burnout or blowout.

2-1.9 Wheel drivers must be attached well enough to remain in place during transportation, handling, and normal operation.

2-1.10 Fuse

2-1.10.1 The fuse used as the lead into the body of the item must be only safety fuse or other fuse that has been protected to resist side ignition.

2-1.10.2 The fuse burning time from ignition of the tip of the fuse to ignition of the device must be at least 3 seconds but not more than 9 seconds.

2-1.10.3 Exposed fuse must resist side ignition for at least 3 seconds.

NOTE: Items that require a restricted orifice for proper functioning and contain less than 6 grams (0.2 ounces) of pyrotechnic composition do not require a fuse that is resistant to side ignition.

2-1.10.4 The entire fuse must be securely attached to the item so that it will support either the weight of the item plus 227 grams (8 ounces) or double the weight of the item, whichever is less, without separation from the item.

2-1.10.5 For multi-effect or multi-tube items, the timing between effects (or tubes) must not exceed 10 seconds.

2-1.10.6 The location of the initiating fuse must be obvious or must be clearly identified on the exterior of the device.

2-1.11 Limits for Pyrotechnic Composition Content

2-1.11.1 Individual drivers must not contain more than 60 grams (2 ounces) total of pyrotechnic composition.

2-1.11.2 Wheels must not contain more than 200 grams (7.2 ounces) total of pyrotechnic composition each.

NOTE: Wheels for which EX Numbers were obtained prior to February 1, 1998 are permitted to have not more than 240 grams total pyrotechnic composition.

2-1.12 The radius of the flame from an operating Wheel must not exceed 1 meter (39 inches) when measured from the center of the axle to the outside edge of the flame.

NOTE: Sparks are not considered to be flame effects.

2-1.13 The pyrotechnic composition must produce a uniform display with no slag or other molten particles which have the potential to cause burns or fires.

2-1.14 Items subject to this Standard must not bear a name or bear graphics suggesting a use of the product that is inconsistent with the cautionary labeling instructions.

2-2 SPECIFIC REQUIREMENTS FOR AXLE-TYPE WHEELS

2-2.1 Nails or other suitable fasteners must be provided for axle-type Wheels.

2-2.2 The nail or other fastener must allow free spinning of the Wheel while at the same time securely positioning the Wheel during operation.

2-2.3 Axles must remain securely attached to the device during transportation, handling, and normal operation.

2-3 SPECIFIC REQUIREMENTS FOR STRING-TYPE WHEELS

2-3.1 String-type Wheels must have a securely attached string so that the string remains attached to the device during normal operation.

2-3.2 Reserved.

Chapter 3 LABELING

3-1 GENERAL REQUIREMENTS

3-1.1 Individual items must bear cautionary labeling giving a signal word, statement of hazard(s), and instructions for proper use.

3-1.2 All cautionary labeling must be located prominently and in the English language in conspicuous and legible type in contrast by

typography, layout or color with any other printed or graphic matter on the label.

NOTE: See **Appendix B** for specific details regarding placement, conspicuousness, prominence, and minimum type size requirements for cautionary labels.

3-1.3 The name and place of business of the manufacturer, packer, distributor, or seller must appear on the label of each product.

3-1.4 The common or usual name of the product, such as “UN0336 Consumer Fireworks” or “Consumer Fireworks 1.4G” must appear on the label of each product.

3-2 PRODUCT-SPECIFIC LABELING

3-2.1 Axle-type Wheels (Classification 44)

<p>CAUTION EMITS SHOWERS OF SPARKS</p> <p>USE ONLY UNDER CLOSE ADULT SUPERVISION. FOR OUTDOOR USE ONLY. ATTACH SECURELY BY MEANS OF A NAIL THROUGH THE HOLE. DO NOT HOLD IN HAND. LIGHT FUSE AND GET AWAY. BE SURE THAT THE AREA WHERE THE WHEEL WILL SPIN SPARKS IS CLEAR OF SPECTATORS AND COMBUSTIBLE MATERIALS.</p>

3-2.2 String-type Wheels (Classification 45)

CAUTION
EMITS SHOWERS OF SPARKS

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
ATTACH STRING TO OBJECT SO THAT ITEM HANGS
FREELY.
DO NOT HOLD IN HAND.
LIGHT FUSE AND GET AWAY.
BE SURE THAT THE AREA WHERE THE WHEEL
WILL SPIN SPARKS IS CLEAR OF SPECTATORS AND
COMBUSTIBLE MATERIALS.

any of the contents escaping from the shipping case.

Chapter 4 SHIPPING

4-1 GENERAL REQUIREMENTS

4-1.1 All consumer fireworks must comply with certain regulations promulgated by the United States Department of Transportation. These regulations govern approval of fireworks for shipment, construction and testing of their shipping containers, and the marking and labeling of the containers.

NOTE: See **Appendix C** for a summary of these requirements. However, **Appendix C** is only a summary and not a complete discussion. Title 49 of the United States Code should be consulted for complete information.

4-1.2 Product design, packaging, and case packing must produce a finished shipping case in which simultaneous explosion of all the items does not result from ignition of one item in the shipping case.

4-1.3 The package must not be so difficult to open that the contents might be damaged as a result of opening.

4-1.4 These items must be securely packaged for shipping in such a way that they are protected from moisture or physical damage during transportation and so that there is no risk of

Appendix A : PROHIBITED and PERMITTED CHEMICALS

TABLE I : Prohibited Chemicals

The following chemicals are prohibited in consumer fireworks:

- (a) Arsenic sulfide, arsenates, or arsenites
- (b) Boron
- (c) Chlorates, except:
 - (1) In colored smoke mixtures in which an equal or greater weight of sodium bicarbonate is included.
 - (2) In Party Poppers.
 - (3) In those small items (such as Ground Spinners) wherein the total powder content does not exceed 4 grams of which not greater than 15 percent (or 600 mg) is potassium, sodium, or barium chlorate.
 - (4) In Firecrackers.
- (d) Gallates or gallic acid
- (e) Lead and lead compounds (including red lead oxide)
- (f) Magnesium (magnesium/aluminum alloys, called magnalium, are permitted).
- (g) Mercury salts
- (h) Phosphorus (red or white), except that red phosphorus is permissible in caps and Party Poppers,
- (i) Picrates or picric acid
- (j) Thiocyanates
- (k) Titanium, except in particle size greater than 100 mesh
- (l) Zirconium

TABLE II: Permitted Chemicals

Standard Fireworks Chemicals

Chemical	Typical Use
Aluminium	Fuel
Ammonium Perchlorate	Oxygen Donor
Antimony	Fuel
Antimony Sulfide	Fuel
Barium Carbonate	Neutralizer
Barium Nitrate	Oxygen Donor
Barium Sulfate	Oxygen Donor
Bismuth Oxide	Oxygen Donor
Boric Acid	Neutralizer
Calcium Carbonate	Neutralizer
Calcium Sulfate	Oxygen Donor
Carbon or Charcoal	Fuel
Copper Metal	Color Agent
Copper Oxide	Oxygen Donor, Color Agent
Copper Salts (except Copper Chlorate)	Color Agent
Dextrine	Fuel/Binder
Hexamethylenetetramine (Hexamine)	Fuel
Iron and Iron Alloys (eg. ferro/titanium)	Fuel
Iron Oxide	Oxygen Donor
Magnalium (Magnesium/Aluminum)	Fuel
Magnesium (in display fireworks and theatrical pyrotechnics only)	Fuel
Magnesium Carbonate	Neutralizer
Magnesium Sulfate	Oxygen Donor
Nitrocellulose - see Miscellaneous Compounds	
Nitrocellulose based lacquers	Binder
Phosphorus, Red	Fuel
Potassium or Sodium Benzoate	Whistle
Potassium Bichromate (Potassium Dichromate), not to exceed 5% of formulation	Oxygen Donor
Potassium Chlorate	Oxygen Donor
Potassium Hydrogen Phthalate	Whistle
Potassium Nitrate	Oxygen Donor
Potassium Perchlorate	Oxygen Donor
Potassium Sulfate	Oxygen Donor
Silicon	Fuel
Sodium Bicarbonate (Sodium Hydrogen Carbonate)	Neutralizer
Sodium Nitrate	Oxygen Donor
Sodium Salicylate	Whistle
Sodium Salts (except Sodium Chlorate)	Color Agent
Sodium Sulphate	Oxygen Donor
Strontium Carbonate	Color Agent
Strontium Nitrate	Oxygen Donor
Strontium Salts (except Strontium Chlorate)	Color Agent
Strontium Sulfate	Oxygen Donor
Sulfur	Fuel
Titanium (particle size must not pass through 100 mesh sieve if 1.4G or 1.4S Fireworks)	Fuel

Miscellaneous Compounds:

Organic compounds (compounds such as lactose, shellac, red gum, chlorinated paraffin and polyvinyl chloride, consisting of some combination of carbon with hydrogen, oxygen and/or chlorine; nitrogen may be present if it accounts for less than 10% (by weight) of the compound.)

Nitrocellulose with not more than 12.6% nitrogen by mass, that meets the criteria for classification as a 4.1 Flammable Solid, is permitted as a propelling or expelling charge provided there is less than 15 grams of nitrocellulose per article.

Note: Exact chemical identity of each "Organic compound" must be included when submitting an Approval Application to DOT.

Appendix B : CAUTIONARY LABELING REQUIREMENTS FOR CONSUMER FIREWORKS

Each consumer fireworks device must bear a cautionary label to warn users of the potential risk of injury associated with the product and provide instructions for using the fireworks devices properly. In order to assist manufacturers in complying with the cautionary labeling requirements, AFSL incorporated into the AFSL Standards specific cautionary labeling for each category of 1.4G consumer fireworks. A copy of the Standards is available to AFSL members at no charge and to non- AFSL members for a nominal charge.

In some instances, the AFSL caution labels differ somewhat from the labels published in the U.S. Consumer Product Safety Commission's (CPSC) regulations. The reason is that the AFSL Standards Committee added provisions to enhance the minimum requirements established by CPSC. Any label that complies with the AFSL provisions is considered by CPSC to be in compliance with the CPSC requirements as well.

I. LABEL WORDING

Every fireworks device must bear a cautionary label that typically includes the following elements:

A. A Signal Word. This is designed to attract the user's attention that the information is important and should be read. Typically the signal word will be either "**WARNING**" or "**CAUTION**". The signal word "**WARNING**" typically is used for items that present the potential for more serious injuries. It normally is required on any item that explodes, produces a report, or shoots a projectile into the air. Included are Rockets, Missiles, Helicopters, Reloadable Tube Devices, Comets, Mines and Shells, Roman Candles, and Firecrackers.

Items that pose a less severe potential hazard require the "**CAUTION**" statement of hazard. Included are such items as Fountains, novelty items, Sparklers, Smoke Devices, Party Poppers, etc.

The signal word must be in larger, more prominent type size than other cautions such as the statement of hazard and instructions for use.

B. Statement of Hazard. The statement of hazard is designed to warn the user of the specific aspect of the item's operation that may result in the potential for injury. A statement of hazard includes statements such as: "**FLAMMABLE,**" "**SHOOTS FLAMING BALLS WITH REPORTS,**" "**SPINS ON GROUND,**" "**EMITS SHOWERS OF SPARKS,**" etc.

C. Instructions for Use. Instructions for use provide the product user with appropriate information as to how the product should be operated and precautions that should be taken

to avoid potential injuries associated with the product. Normally, the instructions for use will include the following statements:

USE ONLY UNDER CLOSE ADULT SUPERVISION.
FOR OUTDOOR USE ONLY.
PLACE UPRIGHT ON LEVEL SURFACE (or other
appropriate instructions for placing the item for ignition).
DO NOT HOLD IN HAND (except for hand-held items).
LIGHT FUSE AND GET AWAY.

Other statements to be included in the caution label will depend on the type of product and the manner in which it performs.

II. LABEL PLACEMENT

The signal word and statement of hazard must appear on each principal display panel of the fireworks item. In addition, each principal display panel must bear either the remaining cautionary labeling information or instructions to "Carefully Read Cautionary Statements on _____ [insert either side panel, rear panel or back panel, as appropriate]." In such a case, the full cautionary labeling statement, including signal word and statement of hazard required by the AFSL Standard for the product must appear on the referenced side, rear, or back panel.

"Principal display panel" (PDP) is defined as the portion of each item, and that portion of each retail package, that "bears the labeling designed to be most prominently displayed, shown, presented, or examined under conditions of retail sale." Therefore, a box-type item that has an item name and/or graphics prominently displayed on all four sides must bear a warning label on each side. If the name and/or graphics appear on only one panel, only that panel must bear a warning label. If an item has prominent graphics on one side panel without the product name, but has the product name without graphics in simple text on another panel, both panels could be considered principal display panels.

This interpretation also holds for the retail package. Note: If the retail package has a clear wrapper, and a complete warning label on an individual unit package is clearly legible through the wrapper, no additional warning label is required on the outside wrapper or package.

For cylindrical items, the PDP is interpreted to mean 40% of the total surface area of the cylinder, centered at the name of the item. If the warning label appears directly beneath the name of the item, there is no question as to compliance.

For unusually shaped devices, such as frogs, chickens, vases, etc., use the side that will be displayed for retail sale as the PDP.

III CONSPICUOUSNESS AND PROMINENCE

All cautionary labeling must appear in legible type which is in contrast with the background as well as with other printed matter on the item.

Color - Use an ink for the printing that contrasts well with the paper. For example, black letters on a dark blue background are not acceptable, whereas black or dark blue type on a white background should always be acceptable. The background for the warning label should be clear and free of any portion of the design, pictures, or other printed matter on the label.

Border - The signal word, statement of hazard, and the other cautionary information must be placed together within a square or rectangular area (with or without a border) on each PDP (of each item and each retail package). The caution label must be clearly separated from all other wording printed on the item.

Horizontal Placement - The warning label must be printed in lines parallel to the base of the item. ("Base" refers to the base on which the item rests when it is displayed for retail sale.) In those instances where the required cautionary labeling appears on a panel other than the principal display panel, the other cautionary information may appear in lines parallel to other printing on that panel, rather than parallel to the base. This parallel requirement does not apply to narrow-diameter cylinders, where the printing may run lengthwise on the cylinder.

IV. TYPE SIZE REQUIREMENTS

The proper, minimum type size to use for a warning label depends on the area of the PDP of the item. This area must be calculated for each item.

For square or rectangular items, the entire side or panel that bears the name of the item is the PDP. To calculate the PDP area, multiply the length of the base times the height of the item.

For triangular, hexagonal, or other geometric figures with rectangular panels, select the panel (or each panel) that bears the name of the item. Multiply the length of the side bearing the item name times the height of the item to determine the PDP areas.

For cylindrical items, PDP area is calculated by multiplying the height times the diameter times 1.26, $\text{PDP Area of Cylinder} = \text{Height} \times \text{diameter} \times 1.26$

For irregularly shaped items, you must use your best judgment to determine the PDP area. Contact the AFSL office if you have any questions.

Minimum Type Size

Once you have calculated the area of the PDP, use the table below to determine the minimum type size for the warning label. It is certainly permissible and advisable whenever possible to use a type size larger than the minimum. This might provide a "safety factor" should the printed type fall a little short of your specifications.

Minimum Type Size (in inches)			
Area of Principal Display Panel (square inches)	Signal Word	Statement of Hazard	Other Cautions
0 – 2	3 / 64	3 / 64	2 / 64
>2 – 5	4 / 64	3 / 64	3 / 64
>5 – 10	6 / 64	4 / 64	4 / 64
>10 – 15	7 / 64	6 / 64	4 / 64
>15 – 30	8 / 64	6 / 64	5 / 64
>30	10 / 64	7 / 64	6 / 64

V. EXCEPTIONS FOR VERY SMALL DEVICES

In cases where individual items are too small to accommodate the required cautions (and only in such cases), the required labeling may appear on the retail package in complying type size and placement, rather than on each item, provided that the entire, unbroken package is sold to the retail customer as a unit. Whenever possible, individual items must bear at least the signal word and statement of hazard, with "Carefully Read Instructions on Package" also printed on each item.

VI. SPECIAL LABELING FOR ASSORTMENT PACKAGES

Assortment packages containing a variety of fireworks categories or types must bear the following labeling on the assortment packaging. Requirements for placement, conspicuousness, type size, described above are applicable.

WARNING
THIS ASSORTMENT CONTAINS ITEMS THAT MAY BE HAZARDOUS IF MISUSED
AND SHOULD BE USED ONLY UNDER ADULT SUPERVISION.
IMPORTANT – READ CAUTIONS ON INDIVIDUAL ITEMS CAREFULLY.

Appendix C : SUMMARY OF U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS

I. SUMMARY OF REQUIREMENTS

This appendix contains a brief summary of DOT shipping regulations. For complete details, it is necessary to consult Title 49 of the United States Code. To assist you, each subject will contain the appropriate section number.

A. APPROVAL

Except for samples prepared in accordance with DOT regulations, no fireworks device or novelty may be offered for transportation or transported until it is classed and approved by DOT, and an approval number (EX number) is issued (49 CFR 173.56).

B. CLASSIFICATION

The proper shipping name for all fireworks is "Fireworks." Hazard classification, with minor exceptions is "1.4G" for consumer fireworks. The UN Number for consumer fireworks is "UN 0336."

C. PACKING GROUPS

Hazardous materials are assigned to a packing group for shipping purposes. All fireworks are in Packing Group II and boxes must be tested and certified accordingly (49 CFR 171.101)

D. MARKING AND LABELING

All shipping cartons must bear an orange diamond shaped hazard label (49 CFR 172.400[a] and 172.411). This must be placed near to and on the same surface as the proper shipping name (e.g., FIREWORKS UN0336) (see 49 CFR 172.301(a)). In addition, each package containing fireworks or the shipping papers must be marked with the EX number for each device in the package. If a package contains more than 5 different devices, only 5 of the applicable numbers need be displayed (49 CFR 172.304). Each package must also be marked with the name of the consignee or consignor unless the package is part of a truckload or freight container lot going from one consignor to one consignee.

E. GENERAL PACKAGING REQUIREMENTS(49 CFR 173.60, 178.516)

As stated above, fireworks are placed in Packing Group II and the packages for transporting such fireworks must be tested to meet the requirements for this group. Nails or staples must not penetrate the outer packaging and there must be no significant movement within the package. Explosives 1.4G may be packed in type 4G fiberboard cartons. Standards for 4G fiberboard cartons may be found in 49 CFR 178.516. Cartons must be coded to show type of box, maximum authorized gross weight, year the box was manufactured, etc. Specific instructions for such marking are found in 49 CFR 178.503. Fireworks must use Packing Method E-130 per the Explosives Table in 49 CFR 173.62.

This requires that "inner packagings" be used with all fireworks. Inner packagings may be fiberboard, paper sheets, plastic, or metal receptacles.

F. TESTING OF PACKAGING (49 CFR 178.601)

Responsibility for testing packaging rests with both the packaging manufacturer and the person who offers the fireworks for transportation, who is responsible for assembly and final closure. Testing includes a drop test, a stacking test, and a water-resistance test. Also, the packaging must be conditioned at controlled temperature and humidity for 24 hours prior to testing (49 CFR 176.602(d)).

G. RETESTING OF PACKAGING (49 CFR 601(e))

Retesting of packaging must be performed at certain intervals. For 4G fiberboard boxes with inner packaging, the interval is at least once every 24 months.

II. CERTAIN NOVELTIES, SPARKLERS, AND SMOKE DEVICES NOT REGULATED AS EXPLOSIVES FOR TRANSPORTATION PURPOSES.

A. APPROVED MATERIALS.

The U.S. Department of Transportation has determined that certain Novelties, Sparklers, and Smoke Devices are not regulated as explosives for transportation purposes, when such devices are manufactured and packaged in accordance with the provisions of the approval. The approval applies only to the transportation of such devices by surface modes. When transported by aircraft, they must be classed as "Flammable Solid," "Inorganic," "N.O.S. (Novelties, UN3178)." In order to qualify for the exemption, each item must be manufactured and packaged as follows:

(1) Snappers

Snappers are small, paper-wrapped items containing not more than 1.0 milligram of silver fulminate coated on small bits of sand or gravel. Snappers must be packaged in an inner package that contains no more than 50 Snappers with sawdust or other impact-absorbing material.

(2) Party Poppers

Party poppers are small devices with paper or plastic exteriors that are activated by means of friction (pulling a string or trigger). Upon activation, the device expels non-flammable paper streamers and/or other non-flammable novelties and produces a small report. Devices may not contain more than 16 milligrams (0.25 grains) of explosive composition. The chemical composition is limited to potassium chlorate and red phosphorus. Party Poppers must be packaged in an inner packaging which contains not more than 72 devices.

(3) Toy Smoke Devices

Smoke Devices are small devices made of cork or cardboard containing not more than 5 grams of pyrotechnic composition that produce a small cloud of smoke after activation. Smoke Devices are typically activated by means of a safety fuse. Smoke Devices must be constructed so that they will neither burst nor produce

excessive flame (excluding fuse and small but brief bursts of flame accompanying normal smoke production). Smoke Devices may not contain plastic in direct contact with the pyrotechnic composition, and Smoke Devices may not resemble, in color and configuration, banned fireworks devices, such as M-80 Salutes, Cherry Bombs, or Silver Salutes. The chemical composition consists of potassium nitrate and sulfur for white smoke and combinations of potassium chlorate, sulfur, sugar, and organic dyes for colored smoke. All mixtures containing potassium chlorates must also contain an equal amount of a bicarbonate, such as sodium bicarbonate. Smoke Devices must be packaged in an inner packaging that contains no more than 72 devices.

(4) Snakes, Glow Worms

Snakes are pressed pellets of pyrotechnic composition that contain not more than 2 grams of composition per article. Upon burning, snakes produce a snake-like ash that expands in length as the pellet is consumed. The chemical composition consists of ammonium perchlorate, nitrated pitch, asphaltum and carbonaceous materials, but snakes may not contain arsenic. Snakes must be packaged in an inner packaging which contains no more than 25 devices.

(5) Sparklers

Sparklers are devices that consist of a wire or wood dowel coated with pyrotechnic composition that produces a shower of sparks upon ignition. Sparklers that don't contain potassium chlorate or potassium perchlorate may have up to 100 grams of chemical composition per device. Sparklers that contain potassium chlorate or potassium perchlorate may have up to 5 grams of chemical composition per device. The chemical composition consists of a combination of barium nitrate, potassium chlorate, potassium perchlorate, aluminum, magnalium, iron filings, and dextrine. No pure magnesium is permitted. Sparklers must be packaged in an inner packaging that contains no more than 8 devices.

B. TESTING

All novelty devices must be tested for thermal stability. Each finished product in its inner packaging must be tested and shown to be thermally stable at 75 degrees centigrade for a minimum period of 48 hours.

C. PACKAGING

All novelty devices in their inner packaging must be packaged in strong outer packaging. The packages must conform with the requirements of Section 173.24. The maximum gross weight of any single package may not exceed 30 Kg.

D. MARKING REQUIREMENTS

Each package, and over pack if used, prepared under the provisions of this approval must be plainly marked "NOVELTIES, Not Regulated, Except when Transported by Air, when in Conformance with CA-0006014."

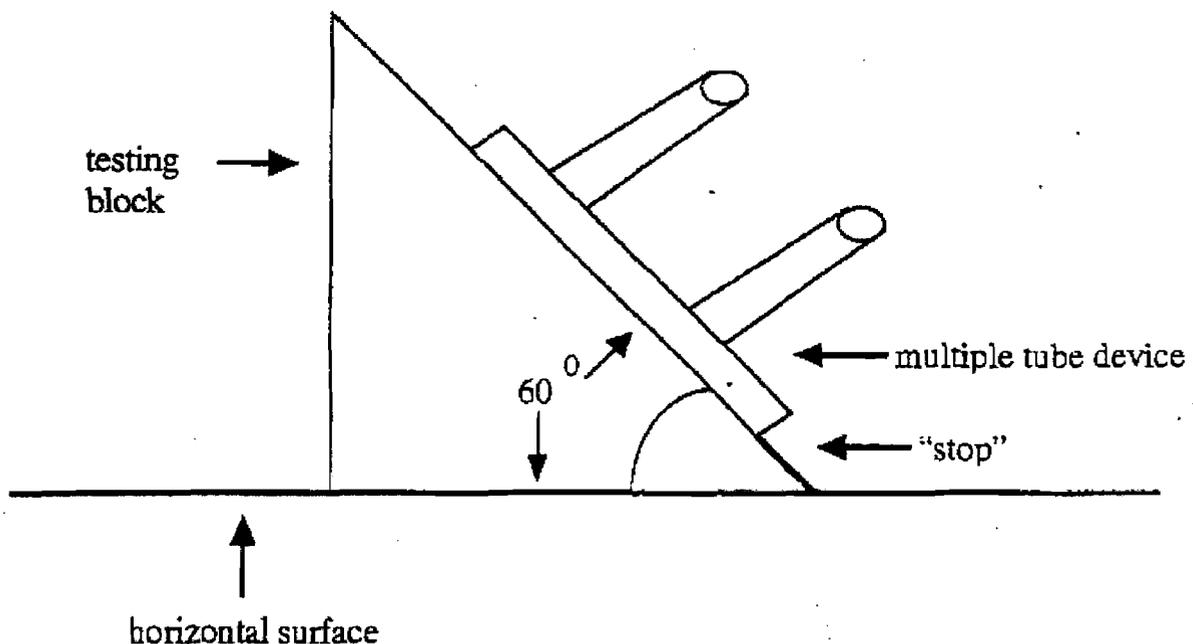
III. MODE OF TRANSPORTATION AUTHORIZED.

Motor vehicle, rail freight, cargo vessel, passenger aircraft* and cargo aircraft*.

Appendix D : TEST METHOD FOR MULTIPLE-TUBE FIREWORKS

(Mandated for certain items by 16 CFR Section 1507.12)

The device must be placed on a smooth surface that can be inclined to 60 degrees from the horizontal as shown below. The height and width of the inclined plane (not including the portion of the plane below the mechanical stop) must be at least 2.54 cm (1 inch) greater than the largest dimension of the base of the device to be tested. The test must be conducted on a smooth, hard surface that is horizontal as measured by a spirit level or equivalent instrument. The mechanical stop on the inclined plane must be 1.6 mm (1/16 inch) in height and perpendicular to the inclined plane. The stop must be parallel to the bottom edge of the inclined plane and so that no portion of the device to be tested or its base touches the horizontal surface. The device must not tip over when the plane is inclined to 60 degrees from the horizontal. The procedure must be repeated for each edge of the device.

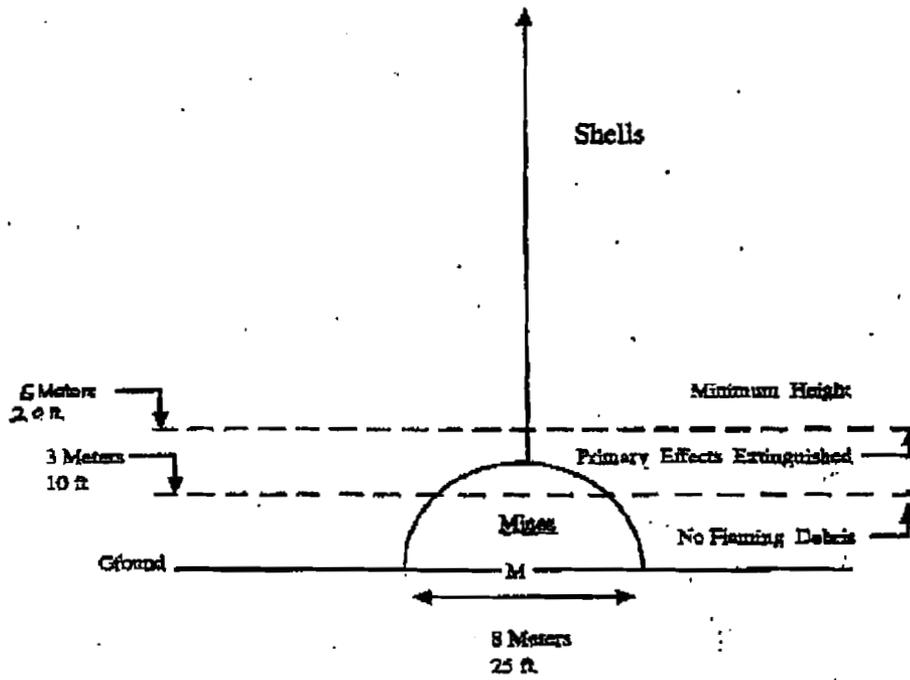


Side view of an apparatus or testing block for testing compliance with the 60-degree tilt angle Standard.

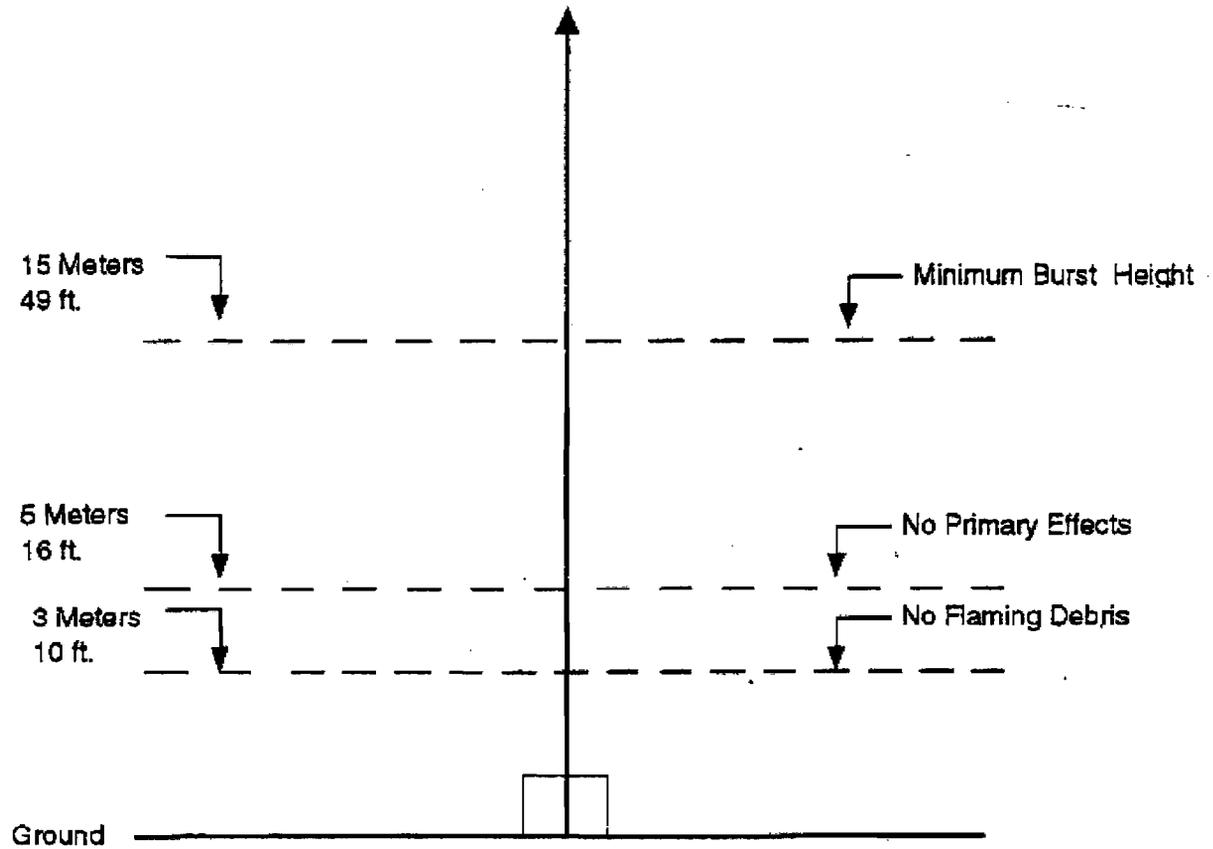
FEBRUARY 2005

APPENDIX E

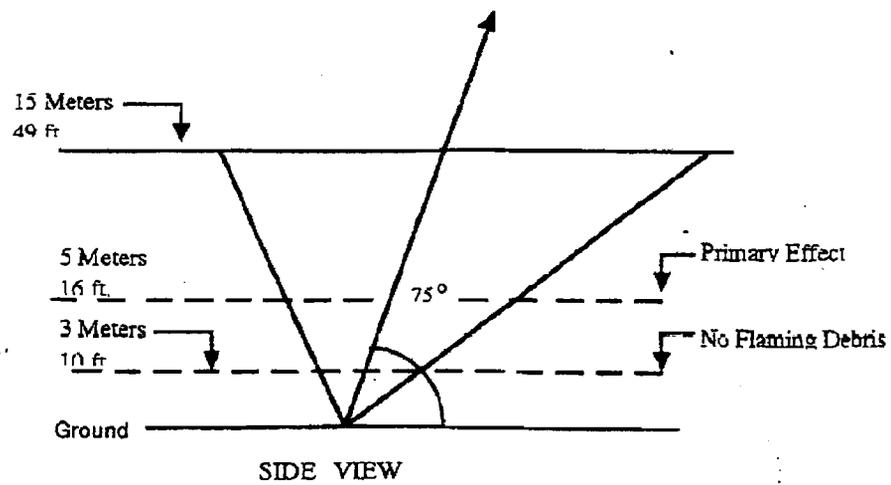
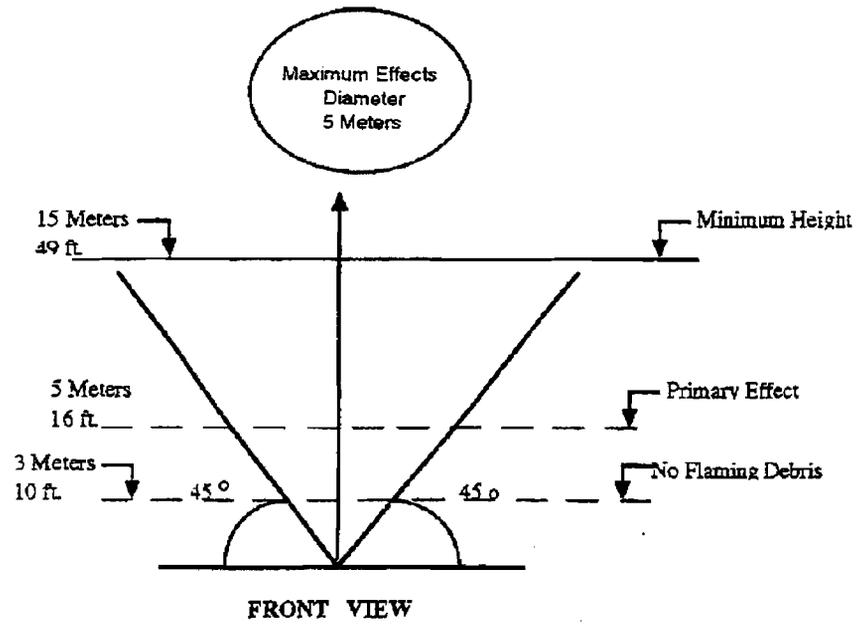
Appendix E : DIAGRAM FOR TRAJECTORY OF MINES AND SHELLS



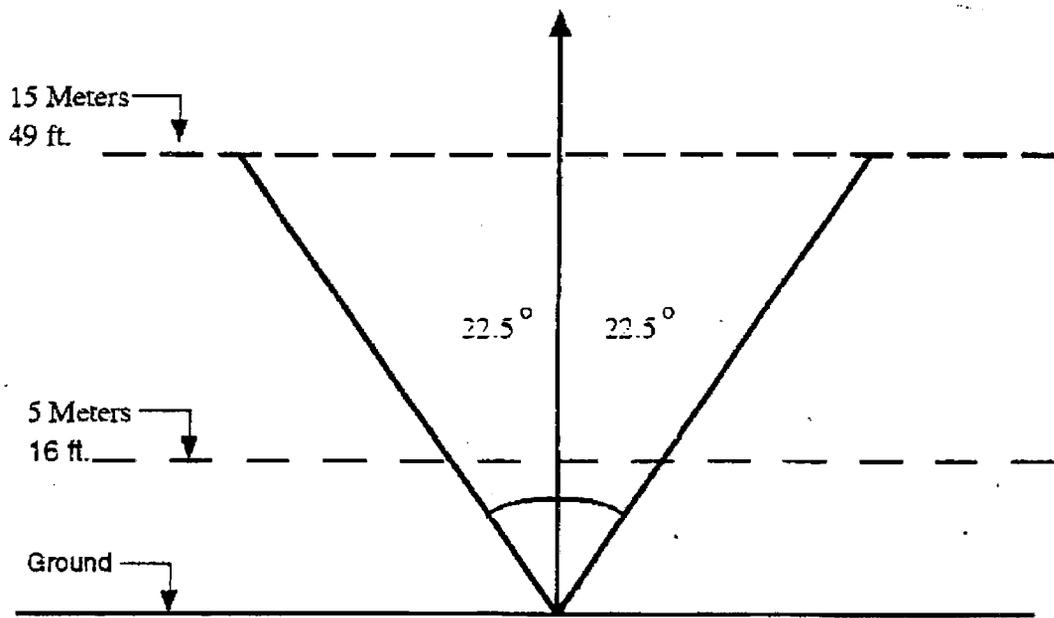
Appendix F: SCHEMATIC OF TRAJECTORY AND PERFORMANCE FOR RELOADABLE SHELLS



Appendix G : SCHEMATIC OF TRAJECTORY REQUIREMENTS FOR SKYROCKETS



Appendix H : SCHEMATIC OF TRAJECTORY REQUIREMENTS FOR MISSILES AND HELICOPTERS



Appendix I : RICE HULLS POLICY

Some Aerial Shell devices, including reloadable tube Aerial Shell devices, contain rice hulls included with the pyrotechnic composition contained in the Shell. Some factories coat or impregnate rice hulls in a manner that causes a significant amount of pyrotechnic composition to cling to the rice hulls even through the sieving process. The amount of pyrotechnic composition present in such instances is significant enough that the impregnated rice hulls would contribute to or enhance the force or effect of the Aerial Shell and therefore should be treated as part of the pyrotechnic composition.

Effective February 15, 2004, AFSL has established a policy with respect to how the rice hulls will be treated in determining the total pyrotechnic composition of the device, as follows:

A. If the rice hulls are not impregnated with a pyrotechnic composition and are either kept separate by a barrier from the pyrotechnic composition or are co-mingled with the chemical composition and are readily separable by means of a sieve from the pyrotechnic composition, they are not included in the weight of total pyrotechnic composition or break charge.

B. If the rice hulls are impregnated with a pyrotechnic composition, they will be considered part of the chemical composition as well as the break charge.

C. The use of any plant seed, such as soy beans, is not permitted in any fireworks device due to agricultural concerns.

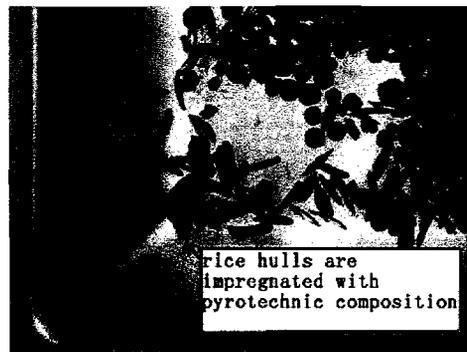
The term “readily separable” means that the rice hulls may be separated from pyrotechnic composition by the use a mesh sieve.

TESTING PROCEDURE

The determination whether rice hulls are impregnated or not impregnated will be made by visual observation by the technician. Photograph A below shows rice hulls that are not impregnated. Photograph B shows rice hulls that are impregnated. All chemical composition, including rice hulls, effect, etc., will be separated manually by mesh sieve (20-mesh). Relevant portions of charges will be counted either as pyrotechnic composition, effect, or break charge.



(A): Rice Hulls are NOT impregnated



(B): Rice Hulls are impregnated.

Appendix J : ASSORTMENTS

A FIREWORKS ASSORTMENT IS A PACKAGE –

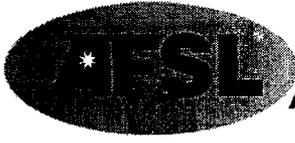
- **CONTAINING ITEMS FROM MORE THAN ONE AFSL FIREWORKS CATEGORY (e.g., Fountains, Rockets, Ground Spinners, Sparklers, etc.)**
- **CONTAINING MORE THAN 6 DIFFERENT VARIETIES OF A DEVICE IN ONE CATEGORY; EXCEPTION: 12 DIFFERENT VARIETIES OF RELOADABLE SHELLS**

For packages containing six or fewer different varieties of items within the same category, these packages will be tested as regular merchandise rather than assortments. Each variety within the package will be treated as a sub-sample subject to full testing under the applicable sampling plan.

A variety of an item includes (a) different sizes by dimension; (b) the presence or absence of “reports”; and (c) other substantially different effects such as stars and whistles. Minor variations in effects, such as different color stars, are not considered to be a different variety.

**Comments provided on September 11, 2006 by the
American Fireworks Standards Laboratory on the
Advance Notice of Proposed Rulemaking issued
by the CPSC on July 11, 2006**

APPENDIX 5



EXAMPLES OF AFSL STANDARDS THAT EXCEED CPSC REGULATIONS

The following are examples of safety-related provisions in AFSL's voluntary standards (the "Standards") that exceed the requirements of the CPSC regulations. In some instances, the additional provisions were designed to address emerging hazards or new products that were not identified when the CPSC regulations were established. Other provisions listed below were designed to provide a higher level of protection than the minimum requirements contained in the CPSC regulations. These examples are meant to be illustrative of the various types of additional requirements contained in the AFSL Standards. The list is not exhaustive and should not be interpreted as a selection of the most significant provisions of the AFSL standards.

- 1. Pyrotechnic composition limits.** When the CPSC regulations were first adopted in the 1970s, the amount of pyrotechnic composition contained in consumer fireworks devices was fairly limited, as were the effects produced. In more recent years, the trend in the industry has been to make the effect larger and longer in an effort to more closely emulate commercial fireworks displays. The CPSC regulations contain no limits on pyrotechnic composition, except for limits on the size of "reports" in firecrackers (50 milligrams) and aerial reports (130 milligrams). The AFSL Standards contain pyrotechnic composition limits for all categories of consumer fireworks devices which restrict the devices to a size that AFSL believes is reasonably safe for consumers to use under normal operating conditions.
- 2. Additional Stability Provisions to Prevent Tipover.** CPSC regulations require a 3-to-1 height-to-base ratio or a 12-degree tipover test for all fireworks, except large multiple tube aerial devices, which must meet a 60-degree tipover test. In addition to those requirements, AFSL has established an 18-degree tipover test requirement for more active devices and for items that are inherently more unstable, such as missiles. Under AFSL's Standards, reloadable shells must meet a 22-degree tipover test, due to their potential for severe injuries in the event of tipover. In addition to the CPSC's 60-degree tilt test, large multiple tube devices must pass a dynamic stability test using two-inch foam pads while operating. AFSL believes that, due to the severity of potential injuries when such devices tipover, a dynamic stability test is important to provide an additional level of protection for the consumer.
- 3. Flight Trajectory Provisions for Aerial Items.** One of the primary risks of injury associated with fireworks is devices that misfire and travel

sideways, presenting a potential for injuries to bystanders. The CPSC regulations do not address this potential risk. The AFSL Standards require that all aerial items must travel in a vertical or near-vertical path. AFSL applies a “45-degree cone” test to such items, and rejects any that travel outside the cone.

4. **Additional Blowout Provisions.** The CPSC regulations require that all items must meet a general provision prohibiting blowout or burnout of the devices. AFSL’s standards duplicate this requirement, but have added specific performance requirements for some of the more potentially dangerous items, such as reloadable shell devices. Such devices must meet a tube integrity test which requires each tube to withstand at least two times the number of shots (shells) that are packaged with it. Furthermore, reloadable shell tubes must withstand the explosion of one shell inside the tube without rupturing. These provisions were established by AFSL in response to a death that reportedly occurred when one of the devices malfunctioned, striking a small child.
5. **Hard Discs in Aerial Devices.** Recently, AFSL became aware that some factories were using hard discs as plugs in aerial devices, presumably to enhance the degree of the effect when the shells operate. The materials used included hard packed clay, sawdust with a binder, gypsum, and even concrete. This practice was brought to the attention of the Standards Committee by CPSC representatives on the Committee. AFSL responded by quickly amending its Standards to prohibit the use of such hard discs in aerial devices and has effectively eliminated their use by rejecting shipments containing such discs.
6. **Sparklers that Break or Drip Molten Particles.** Several years ago, CPSC reported a number of injuries to children due to sparklers that broke or that dripped molten particles while being used. At CPSC’s urging, AFSL established requirements to prevent the dripping of molten particles or slag, and to prevent sticks from breaking when the sparklers are waved in a horizontal motion. These provisions have not been addressed in the CPSC regulations.
7. **Flaming Debris from Aerial Devices.** Several of the AFSL Standards for devices that operate in the air contain provisions requiring all flaming debris from such devices to be extinguished before falling back to the ground. This addresses the potential for ground fires or fires on rooftops, and resulting injuries that are commonly reported during peak use periods.
8. **One-Piece Safety Fuse on Reloadable Shells.** In the early 1990’s, long after the CPSC regulations were established, reloadable tube aerial shells were introduced into the marketplace and rapidly became one of the most popular categories of fireworks devices. Unfortunately, a substantial

number of injuries, many of them severe injuries to the face, occurred with the devices. While CPSC adopted a limit on the size of shells (1.75 inches in diameter), a number of other aspects of the devices appeared to be contributing to the injuries, including (a) a two-piece fuse which tended to separate, leaving the quick match fuse which burned very rapidly. This caused the device to function before the consumer could move to a safe distance. AFSL requires a one piece safety fuse with a constant burn rate to ensure that fuses meet the 3 to 9 seconds fuse burn time.

9. **Fuse Burn Time for Firecrackers.** One of the commonly recognized injury patterns associated with firecrackers is burns due to the devices exploding in consumers' hands. The CPSC regulations contain no fuse burn time provisions for firecrackers, although all other devices must meet the 3 to 9 second fuse burn time provision. The AFSL Standard includes the 3 to 9 seconds fuse burn time for firecrackers and requires the lead fuse on firecracker strings to be made of safety fuse.

10. **Multiple Linked Fireworks Devices.** Within the past two to three years, companies began marketing fireworks devices with connector ports that allow the consumer to link an infinite number of individual items together with connector fuses. The intent was to create a display similar to commercial fireworks shows. The concern was that the linking systems were complicated for consumers to operate, creating a potential for improper connection of the devices. Furthermore, the duration of the display could create a potential for injury to the operator or bystanders should a malfunction occur. As a result, AFSL established requirements that prohibit connector ports, fuse insertion points or any other features that would allow linkage of more than one fireworks device.

Stevenson, Todd A.

From: Crawford, Brett A. [bcrawford@sonnenschein.com]
Sent: Monday, September 11, 2006 5:08 PM
To: Stevenson, Todd A.
Subject: FIREWORKS ANPR
Attachments: AFSL Comments on CPSC Fireworks ANPR - Sept 2006.pdf; AFSL Comments on Fireworks ANPR - Appendix 1 - Sept 2006.pdf; AFSL Comments on Fireworks ANPR - Appendix 2 - Sept 2006.pdf

On behalf of the American Fireworks Standards Laboratory (AFSL), please find attached AFSL's comments on the recent Advance Notice of Proposed Rulemaking (ANPR) issued by the Commission regarding the existing fireworks regulations.

Our submission includes a letter and five appendices. The letter and two appendices are attached to this email message as separate PDF files. We will send the remaining three appendices in a separate email to ensure that the attached files do not exceed your email system's capacity.

Please let us know if you have any difficulty receiving any of these six files.

We appreciate your consideration of our comments.

Best regards,

Brett Crawford
Sonnenschein Nath & Rosenthal LLP
1301 K Street, NW
East Tower, Suite 600
Washington, DC 20005
Phone: 202.408.9238
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<<AFSL Comments on CPSC Fireworks ANPR - Sept 2006.pdf>> <<AFSL Comments on Fireworks ANPR - Appendix 1 - Sept 2006.pdf>> <<AFSL Comments on Fireworks ANPR - Appendix 2 - Sept 2006.pdf>>

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9/12/2006

with respect to the transaction or matter addressed herein based on the reader's particular circumstances.

Stevenson, Todd A.

From: Crawford, Brett A. [bcrawford@sonnenschein.com]
Sent: Monday, September 11, 2006 5:10 PM
To: Stevenson, Todd A.
Subject: FIREWORKS ANPR
Attachments: AFSL Comments on Fireworks ANPR - Appendix 3 - Sept 2006.pdf; AFSL Comments on Fireworks ANPR - Appendix 4 - Sept 2006.pdf; AFSL Comments on Fireworks ANPR - Appendix 5 - Sept 2006.pdf

Attached please find the remaining three appendices to the comments of the American Fireworks Standards Laboratory (AFSL) regarding the ANPR issued by the Commission on the existing fireworks regulations. The letter from AFSL and the first two appendices were sent as attachments to a separate email.

Please let us know if you have any difficulty receiving any of the six PDF documents included in AFSL's submission.

Thank you for your consideration.

Best regards,

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<<AFSL Comments on Fireworks ANPR - Appendix 3 - Sept 2006.pdf>> <<AFSL Comments on Fireworks ANPR - Appendix 4 - Sept 2006.pdf>> <<AFSL Comments on Fireworks ANPR - Appendix 5 - Sept 2006.pdf>>

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Stevenson, Todd A.

From: myerspyro@aol.com**Sent:** Tuesday, September 12, 2006 1:44 AM**To:** Stevenson, Todd A.**Subject:** [Possibly SPAM (k):] - Fireworks ANPR - Found word(s) check out in the Text body

Dear CPSC,

I'm writing in response to the Fireworks ANPR on testing of 1.4G fireworks. Just a quick note to express my opinion. Please leave things as they are. We have a system that works, let's not break it. While injuries in number may be up, overall injuries ARE DOWN when you look at the amount of fireworks brought into the US. Please update your statistical modeling to include usage vs just looking at injuries. For example, flight safety may show one death per million miles of flying. This is a good statistic to look at, as it takes into account usage. However, if you were to use deaths in a year, that number may increase or decrease based on the global economy and how business is and the number of flights taken. A 10% increase in deaths flying may represent a 30% increase in the number of miles flown. In this case, we did not really have a problem or negative, as we actually had a decrease in the number of deaths based on usage.

We should allow testing by multiple bodies based on current CPSC requirements.

Thank You for your consideration

Kirk Myers

Check out the new AOL. Most comprehensive set of free safety and security tools, free access to millions of high-quality videos from across the web, free AOL Mail and more.

9/12/2006

Stevenson, Todd A.

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From: Charles P Weeth [chzweeth@pyro-pages.com]
Sent: Tuesday, September 12, 2006 12:37 AM
To: Stevenson, Todd A.
Subject: FIREWORKS ANPR

Introduction

My name is Charles P Weeth. I am an independent consultant and have been involved in the fireworks community for 22 years, mostly in the display fireworks and pyrotechnics special effects arenas.

I have served on the National Fire Protection Assoc (NFPA) Technical Committee on Pyrotechnics since 1988 and the NFPA Technical Committee on Special Effects since 2003.

My clients rely on me to assist and advise them with a number of regulatory and other issues related to the safe use of fireworks, including consumer fireworks.

I have researched and investigated numerous fireworks incidents around the world from minor injuries or property damage involving consumer fireworks to incidents involving all sorts of fireworks that resulted in significant property damage, serious injuries or death to serious explosions such as the M/V Hanjin Pennsylvania and the tragedy in Enschede, The Netherlands.

In 1996, I presented "An Analysis of the National Electronic Injury Surveillance System (NEISS) Estimates of Consumer Fireworks Related Injuries and the Interpretation, Reporting and Publicity by the U.S. Consumer Product Safety Commission (CPSC) and Non-profit Public Safety Organizations Based on those NEISS Estimates" at the 3rd International Symposium on Fireworks in Orlando, FL.

COMPLIANCE RATES

Until and unless there is a direct correlation between the compliance rates for imported consumer fireworks and the injury rates, any presumption the two are directly connected is premature. If the CPSC is to seriously consider any changes to the standards for consumer fireworks, it is essential that the non-compliance of specific types of consumer fireworks is directly connected to fireworks related injuries that are caused by the specific type of non-compliance.

This standard is high and only attainable if the CPSC conducts thorough follow-up investigations of fireworks related injuries. These investigations would require investigators have extensive firsthand experience with consumer fireworks as well as an understanding that many reports related to the injuries are suspect because of the issues related to the user's compliance with state and local ordinances to purchase and use consumer fireworks.

It is also essential to understand the compliance rates are a reflection of the sample method for checking imported fireworks, the methodology used by the CPSC to test the samples, as well as the standards themselves more than anything else.

The CPSC must take into account the changes in the sampling method when evaluating the changes in compliance rates. In particular the specific targeting of select items within a smaller sample of shipment and the actual randomness of the samples selected. Comparisons of compliance rates without a corresponding understanding of the sampling method would be incomplete and inaccurate.

INJURY ESTIMATES

Any comparison of the CPSC injury estimates from year to year without including the coefficient of variation (cv) for each year's estimate is virtually meaningless. The annual estimates almost always fall within the range of the previous year's cv, making any annual comparisons statistically insignificant.

The fireworks related injury estimates are an extrapolation based on a tiny sample set that is geographically and demographically skewed. NEISS hospitals in states that ban all consumer fireworks usually make up 4 of the top 5 states reporting fireworks related injuries, while states that permit sales of some or all consumer fireworks usually have significantly lower reports.

NEISS hospitals in New York typically reports more fireworks related injuries than other states. Urban hospitals generally report more fireworks related injuries than suburban or rural hospitals, raising further questions regarding the accuracy of the national estimates.

California, which has the largest population of all the states tracks all fireworks related injuries reported in all of their hospitals. The annual State Fire Marshal reports have far fewer incidents that the corresponding CPSC estimate for that population subset.

These anomalies has never been addressed or explained and raise serious questions related to the estimates for fireworks related injuries. They also significantly reduce the confidence in the NEISS estimates for estimates for fireworks related injuries.

The injury estimates also do not provide an accurate reflection on the injuries involving consumer fireworks. A large percentage of the reports, sometimes up to 40% each year, involve non-consumer fireworks including: forbidden explosive devices, illegal explosive devices, homemade or modified fireworks, display fireworks used by the general public without training, licenses or permits, and display fireworks manufactured/used by ATF licensees/permittees.

If the injuries involving non-consumer fireworks are removed from the survey sample, the remaining sample is so small that the corresponding cv would be so high, that there is virtually no way any reasonable degree of confidence can be attained by a national estimate.

FINAL COMMENTS

Notwithstanding the problems with the survey methods, the sample rates for compliance, etc.; any number of injuries involving any consumer product, especially injuries to children are serious, and deserve our time and attention. The CPSC and the fireworks industry must continue to work together to improve on a 30 year history of improved safety.

The CPSC reports indicate year after year that misuse by the end use is more likely to be the actual cause of a fireworks related injury more than anything else. Reviews of the reports of fireworks related injuries indicate that product quality is rarely involved, and even when it may be involved there are often other factors that often lead someone to blame the quality of the product rather than the use for the fireworks related injury, including but not limited to: the age of the user, the local or state ordinances pertaining to consumer fireworks purchase and use, the intent of the user (criminal vs. non-criminal), the state of mind of the user at the time (ie. under the influence), etc.

Misuses tends to drop off as the retail price of the product rises, something that has not been considered by the CPSC. This is an area that should be considered when analyzing the behaviors of users and the likelihood of misuse and mischief with consumer fireworks.

Overall, the quality of all consumer fireworks has improved significantly. The industry has made important strides to ensure compliance, however more can and should be done including updating the CPSC standards to reflect how the products are really used by real people, more specific and general personal and especially fire safety instructions, providing users with more detailed descriptions of product performance, etc.

The CPSC should also consider a thorough review with industry of the CPSC test criteria to ensure these accurately reflect real word use. Too often the test methodology are not reflective of how millions of people actually use consumers fireworks every year.

Also, the standards should always be under constant review to ensure they reflect the many changes to the consumer fireworks that are on the market as well as could be on the market. There are times the existing standards prevent innovation in product design and construction.

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