

**LOG OF MEETING**

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**SUBJECT: Review of Fireworks Standards by the American Fireworks Standards Laboratory (AFSL) Standards Committee**

**DATE OF MEETING: November 21/23, 1997**

**DATE OF LOG ENTRY: December 04, 1997**

**PERSON SUBMITTING LOG: Neal G. Gasser, Chemist, Division of Chemistry** *MLG*

**LOCATION: Ramada Inn, 8400 Wisconsin Avenue, Bethesda, MD, 20814**

**CPSC ATTENDEE: Neal G. Gasser, Chemist, Division of Chemistry  
Patrick M. Race, Compliance Officer, Division of Regulatory Management**

**NON-CPSC ATTENDEE(S):**

- John Rogers - Executive Director, AFSL
- Tom Scaman - President, Apollo Fireworks
- John Stringer - Drayton Insurance Brokers, Inc.
- Bob Fletcher - South Carolina Board of Pyrotechnic Safety
- Larry Brown - Washington Fireworks
- Dale Miller - Independent Consultant
- Don McCaulley - Independent Consultant

**SUMMARY OF MEETING:**

**Meeting Topics:**

- Revised copies of AFSL's "STANDARDS FOR CONSUMER FIREWORKS, August 1997", a summary of results for the "China Fireworks Quality Improvement Program" (QIP), a memo from John Rogers (Chairman, AFSL Standards Committee) to the AFSL Board of Directors pertaining to Standards Committee recommendations regarding changes in the QIP (Attachment), and a "Meeting Agenda" (Attachment) were handed out.
- AFSL is still planning to petition CPSC to amend the regulations to ban look alike firecrackers with the color and configuration of banned explosives.
- Under the "China Fireworks Quality Improvement Program", AFSL has begun to test the fuse burn time of primary fuses on single unit firecrackers.

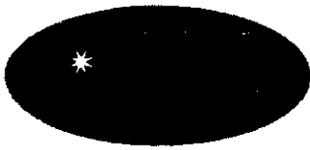


- During the first quarter of 1998, AFSL is planning to revise warning labels and begin implementation of the Factory ID Number requirement. AFSL believes that current labeling of products is insufficient because the "Brand Label Symbol" no longer identifies who the manufacturer is. China will be informed (AFSL's next newsletter) about AFSL's intention to incorporate a provision into their standards that will require Factory ID Numbers to be placed on each fireworks device. Fireworks manufacturers will receive letters regarding AFSL's intentions.
- Under the "China Fireworks Quality Improvement Program", AFSL has begun to test missiles for trajectory requirements. Rockets and helicopters are not tested for trajectory requirements.
- At the request of the AFSL Board of Directors, the Standards Committee produced a list of the provisions (Attachment) that are not currently being tested for under the "China Fireworks Quality Improvement Program" (QIP). The AFSL Executive Director will review the list, and present to the Board what provisions should be added to the testing program. AFSL stated that they will not be testing for prohibited chemicals as a routine test provision (only select chemicals as needed) under the QIP (cost prohibited).
- The Roman Candle Standard was discussed and a determination was made that additional testing (future date not established) was necessary to determine if the requirement for a spike and a 2-inch plug for all Roman Candles was necessary. A sub-committee was established.
- A small selection of helicopters were tested for flight trajectory. The committee concluded that additional testing was necessary to determine if helicopters should be tested for flight trajectory.
- Pyrotechnic composition weight issue (200 grams vs. 240 grams) pertaining to Wheel and Axle Devices was tabled until AFSL is able to contact John Conkling (APA) and discuss this issue.
- The Standards Committee examined an assortment of missiles. The missiles failed CPSC's 3:1 Height:Base Ratio Test, and failed AFSL's Eighteen Degree Tilt Block Test. The missiles failed between the range of 14 to 17 degrees. When the missiles were launched, many of the missiles failed the flight trajectory provision. The committee concluded that lowering the AFSL's Eighteen Degree Tilt Block Test to a Twelve Degree Tilt Block Test was not justified, and that the provision is unduly restrictive.
- The Standards Committee examined a small assortment of rockets, helicopters, and missiles, and concluded that an Anti-Flame Provision was probably not necessary, but that a larger assortment of rockets, helicopters, and missiles should be tested before a final decision was made.

### **Future Activities:**

- At the next AFSL Standards Committee meeting, the following product categories will be tested:
  - 1.) Missiles, Helicopters, and Rockets (Anti-Flame Provision)
  - 2.) Helicopters (Flight Trajectory Provision)
  - 3.) Roman Candles (Provision Requirements for a Spike, 2-inch Clay Plug, and Void Space Size)
  - 4.) Reloadable Tube Aerial Shell Devices (Packaging Provision pertaining to Six-Shots vs. Twelve-Shots per Tube)
- Pyrotechnic Composition Limit for Wheel Devices (200 grams vs. 240 grams)
- Review of Test Data to Determine Cause of Repeat Violations in AFSL's "China Fireworks Quality Improvement Program" (QIP)

### **Attachments**



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## MEMORANDUM

**To:** AFSL Board of Directors

**From:** John D. Rogers, Chairman  
AFSL Standards Committee

**Date:** January 9, 1997

**Subject:** **Standards Committee Recommendation to Include Certain Provisions of the AFSL Standards in the Testing Program**

As you are aware, the AFSL Standards Committee met on December 13 and 14, 1996 to review a reorganization of the AFSL Standards prepared by Dale Miller. During the meeting, the Standards Committee learned that a number of provisions of the existing AFSL standards presently are excluded from testing under the China Fireworks Quality Improvement Program (QIP).

The Committee wishes to convey to the Board its concern that not all provisions of the AFSL standards are incorporated into the testing program. The Committee requests that the Board direct the AFSL staff to begin testing to all provisions of the AFSL standards as soon as feasible.

The Committee believes that by not testing to all provisions of the AFSL standards, the level of safety which the standards provide to consumers is being diminished. Further, the Committee believes it is imprudent to certify products as complying with the AFSL standards when, in fact, adherence to all provisions is not being confirmed under the existing QIP.

Several specific provisions were addressed directly by the Committee. Following is a discussion of each:

**1) Firecrackers that Resemble Banned Explosive Devices.**

The existing AFSL Standard states that "Firecrackers designed to be typically sold as a single unit (even though packaged as multiple units) must not have the shape and color or bear a name that resembles banned 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 (Firecrackers), where all components of the name (i.e. 'name, brand and classification') are prominent, are acceptable under this standard."

The Committee believes very strongly, that the Board's decision not to require firecrackers tested under the program to meet this provision reduces the protection that the AFSL standard was designed to provide to consumers. Specifically, the Committee is concerned that the Board's decision to permit banned device look-alikes to be certified under the QIP increases the difficulty which federal, state, and local enforcement officials have in policing the marketplace for banned explosive devices. This in turn potentially increases the availability of such devices to consumers, thereby increasing the potential risk of serious injuries from banned explosives such as M-80's, etc.

The committee strongly encouraged the Board to act expeditiously to include the provision prohibiting such banned look - alike in the AFSL testing program. Further, the Committee requested that the Board consider submitting a petition to CPSC to amend the CPSC fireworks regulations to prohibit firecrackers that have the color and configuration of banned explosive devices such as M-80's, Silver Salutes, Cherry Bombs, etc.

**2) Provision Requiring Fireworks Devices to Bear the Name and Address of the Manufacturer on the Label of the Product.**

The CPSC statute, the Federal Hazardous Substances Act, Section 2(p)(1) requires that fireworks devices bear a label "(1) which states conspicuously (A) the name and place of business of the manufacturer, packer, distributor or seller." During the Standards Committee meeting, it was pointed out that the AFSL standards do not presently include such a provision.

The Committee believes that because the AFSL Standards are required to incorporate all provisions of the CPSC regulations applicable to fireworks, a provision requiring the name and address of the manufacturer, packer, distributor or seller should be incorporated into all AFSL standards. The Committee recommended that such a provision be included in each AFSL Standard and asked that the Board confirm this decision prior to the publication of the re-organized standards. Further, the Committee requested that the Board direct the AFSL staff to incorporate this provision into the testing program as expeditiously as feasible.

### **3) Fuse Burn Time for Single Unit Firecrackers.**

The Standard for Firecrackers (both braided strings and single unit items) requires that the fuse comply with the 3 to 9 second fuse burn time requirement. For braided strings, this requirement applies to the primary only). At the present time, this provisions is not being tested for under the QIP.

The Standards Committee recommended that the Board direct the staff to incorporate this provision into the testing program. Recognizing, however, that this may require a significant change in the manufacturing process, the Committee believes it would be advisable to phase in this provision. For example, the Committee believes the Board should direct the implementation of provision as quickly as feasible; however, allow a 6-month period where firecrackers that fail this provision are not rejected under the program.

### **4) Cautionary Labeling to Address the Potential Fire Hazard Associated with Certain Fireworks Devices, i.e. Fountains, Multiple Tube Mine, Shell, and Comet Devices.**

The Standards Committee discussed the need for a provision in each of the standards that would address the potential risk of fire resulting from casings that continue to burn after the pyrotechnic effects of the device are expended. In some instances, the Committee decided to add a provision to the specific Standard which states "The pyrotechnic chamber of the device must be constructed of material that will not continue to burn (flame) after the item functions."

In other instances, the Committee concluded that the potential fire hazard was not significant enough to warrant the inclusion of the above-referenced language in the standard; however, the Committee believes that the situation is serious enough to warrant the inclusion of a warning in the cautionary labeling for certain products, i.e. Fountains, Multiple tube mine and shell and comet devices,. As a result, the Committee recommended that the standards for these products be amended to include the statement "Soak with Water After Use" in the cautionary labeling for such products. The Committee believes that manufacturers could be directed to add the additional language at the next labeling printing.

### **5) Requirement for a Spike on all Roman Candles.**

The existing Standard for Roman Candles states that "All Roman Candles must be provided with a spike suitable for mounting in the ground." At the present time, this provision is not being tested for under the QIP.

The Committee recommends that the Board direct the staff to begin testing for compliance with this provision under the QIP as soon as feasible. The

Committee believes that Roman Candles that incorporate a spike are less likely to be hand-held by consumers during operation, thereby reducing the potential risk of injury associated with blowout of the devices during operation.

**6) Flight Trajectory Requirement for Rockets, Missiles, and Helicopters.**

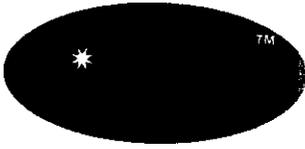
This standard requires that Sky Rockets, Missiles and Helicopters states that "The flight direction of sky rockets must be predictable within 45 degrees on either side of the direction of launch." and "The flight direction of missiles and helicopters launched straight overhead must be within 22 1/2 degrees in any direction from the vertical up to the minimum height of 15 meters." At the present time, the flight trajectory provision are not included in the testing program for rockets and helicopter devices.

The Standards Committee recommends that the Board direct the staff to incorporate the flight trajectory provisions for rockets and helicopters into the China testing program. The Committee believes that the provisions will reduce the potential for injuries from such products that fly parallel to the ground rather than in the intended vertical flight path.

**7) Other Provisions of AFSL Standards Not Included in Testing Program.**

The Standards Committee is aware that there are other provisions of the AFSL Standards, not addressed above, that presently are not being tested for under the China Testing Program. The Committee encourages the Board to direct the staff to review each AFSL standard and incorporate any such provisions into the testing program as quickly as feasible.

The Standards Committee appreciates the Board's consideration of these issues. If you have any questions, please contact John Rogers, Chairman of the Standards Committee.



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## AFSL STANDARDS COMMITTEE MEETING

*November* ~~January~~ 21 - 23, 1997

Ramada Inn, Bethesda, MD 20814

### AGENDA

- I. **Review of Objectives for Meeting.**
- II. ✓ **Review of recently re-published AFSL Standards** The Committee will review the recently published AFSL Standards.
- ✓ III. **Provisions of AFSL Standards not Presently Tested for under QIP.**  
The Committee will review the AFSL Standards and determine which provisions are presently not being tested for under the AFSL Testing Program. The Committee will then decide whether to renew its request to the Board that all AFSL provisions be tested for under the QIP.
- table* IV. **Review of Test Data to Determine Cause of Repeat Violations.** The Committee will review test data from the AFSL testing program in an effort to identify areas of specific products that need to be modified to increase compliance with the AFSL Standards.
- ✓ V. **Roman Candles – Requirement for Spike.** The Committee will review its recommendation to the Board that all Roman Candles must have a spike attached in order to facilitate sticking into ground. The board requested that the Committee re-consider its recommendation and consider whether the Canadian labeling standard for Roman Candles would adequately address the issue.
- ✓ VI. **Roman Candles – Requirement for 2-inch Plug.** The Committee will study Roman Candles to determine whether the requirement for a 2-inch plug is adequate to prevent the candle from expelling a spike through the bottom of the tube if a blowout occurs.
- ✓ VII. **Performance Requirements for Helicopters.** The Committee will consider helicopters should be subject to the flight trajectory requirements presently contained in the AFSL standard for Rockets, Missiles and Helicopters.
- VIII. **Pyrotechnic Composition Limit for Wheel Devices.** The Committee will consider the limit of 200 grams for wheel devices recently published in the AFSL Standards and determine whether the limit should be raised to 240 grams.

**IX. Exemption for Large Missiles from 18-degree Tilt Test.** The Committee will determine whether to Exempt Large Missiles from the 18-degree Tilt Test based on a determination that they do not pose the same tipover hazard as Smaller Missiles. The committee will test several varieties of large missiles to determine whether they meet the required tilt test and the potential for a reduction of the required angle.

**X. Anti-Flame Provision for Rockets, Missiles, and Helicopters.** The Committee will consider whether the Standard for Rockets, Missiles and Helicopters should include a provision stating that the device must be constructed of a material that will not continue to burn (flame) after the device functions. The Committee will test several varieties of rockets, missiles, and helicopters to determine whether they continue to burn after functioning.

**XI. Six-Shot Per Tube Limit for Reloadable Tube Aerial Shell Devices.** The Committee will consider whether to recommend that the six-shot per tube limit of the Reloadable Shell Standard should be amended to permit a larger number of shots per tube. The Committee will test and/or review test data for several varieties of Reloadable Shell Devices packaged with more than six shots per tube to determine whether the tubes are capable of withstanding the required number of shots. The Committee will consider at what intervals shots will be fired from the tubes.

**XII. Other Issues for Consideration.**

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## PROVISIONS NOT BEING TESTED UNDER QIP

### I. STANDARD FOR COMETS, MINES AND SHELLS

- a. 2-1-.1 Must Not produce Sharp Fragments when functioning.
- b. 2-1.3 No prohibited chemicals.
- c. 2-1.4.1 Tube must not produce sharp fragments.
- d. 2-1.4.4 Multiple tube tubes must not separate while functioning.
- e. 2-1.5.1 Bases must not break during transportation, handling or operation.
- f. 2-1.6.1 Tubes must have an effective plug at base.
- g. 2-1.6.2 Base plugs must be made of clay or other non-flammable material.
- h. 2-1.6.2 Plug must be securely installed.
- i. 2-1.6.4 Plugs must resist breakage or separation during transportation, handling use and must not produce sharp fragments if a shell breaks in tube.
- j. 2-1.7.1 Fuse used as the lead into the item must be safety fuse.
- l. 2-1.7.2 Location of fuse must be obvious or clearly identified.
- m. 2-1.7.5 Timing between effect must not exceed 10 seconds.
- n. 2-1.7.7 Lead fuse on items over 25 grams must enter tube through side near base.
- o. 2-1.7.8 Multiple tube items must function with only one ignition.
- p. 2-1.7.9 Tubes must fire sequentially.
- q. 2-1.7.10 Lead fuse must extend at least 1 inch outside body of device.
- r. 2-1.7.11 Fuse attachment must not adversely affect performance of device.
- s. 2-1.9 Must not be confused with candy or food.
- t. 2-1.10 Must be assembled to prevent damage during transportation, etc.
- u. 2-2.2.1 Break charge must consist of black powder or equivalent.
- v. 2-2.2.2 For items greater than 1 inch, break charge must not consist of more than 25% by weight or 10 grams, whichever is less.
- w. 2-2.2.3 For items with diameter of 1 inch or less, break charge must be less than 50% by weight, or 10 grams, whichever is less.
- x. 2-3.2.1 Break charge must be black powder or equivalent.
- y. 2-3.2.2 Single tube items one inch or larger, break charge not more than 25% or 10 grams.
- z. 2-3.2.3 Single tube items one inch or less, break charge must not consist of more than 50% by weight or 10 grams, whichever is less.
- aa. 2-3.4 Reports may not exceed 2 grains each.
- bb. 3-1.3.1 One inch foam test for tubes one inch or less.
- cc. 3-2.1 Near vertical flight path.
- dd. 3-2.2 Primary effect at peak of flight, not less than 5 meters.
- ee. 3.2.3 Primary effects must extinguish at 3 meters.

- ff. 3-2.4 Flaming debris extinguished at 3 meters.
- gg. 3-3.1 Effects not greater than 4 meters wide.
- hh. 4-1.3. Name and address of manufacturer, etc.

**Note: Appendix B-1 Should be Appendix D.**

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## **II. STANDARD FOR FIRECRACKERS.**

- a. 2-1.1 No sharp fragments.
- b. 2-1.2 Impact sensitive or premature ignition or explosion.
- c. 2-1.3 May not resemble candy or food.
- d. 2-1.4 Pyrotechnic leakage.
- e. 2-1.5 No prohibited chemicals.
- f. 2-1.7 No other pyrotechnic composition besides a single report.
- g. 2-1.8 Tube must not catch fire.
- h. 2-1.9 No ignition by friction.
- i. 2-1.10 Assembly must prevent damage during transportation, etc.
- j. 3-1.3 Name and place of manufacturer, etc.
- k. 4-1.2 Simultaneous explosion inside shipping case if one item ignites.
- l. 4-1.3 Package must not be so difficult to open that damage occurs.
- m. 4-1.4 Securely packaged to protect from moisture or physical damage during transportation.

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## **III. STANDARD FOR FOUNTAINS.**

- a. 2-1.1 No sharp fragments.
- b. 2-1.2 Impact resistance and no premature ignition.
- c. 2-1.3 Must not resemble candy or food.
- d. 2-1.5 No prohibited chemicals.
- e. 2-1.6 Assembly must prevent damage during transportation, etc.
- f. 2-1.8.5 Fuse attachment must not affect performance.
- g. 2-1.8.6 Ten seconds between effects.
- h. 2-1.8.7 Fuse must be obvious or clearly marked.
- i. 2-1.8.8 Connecting fuse between tubes must resist side ignition.
- j. 2-1.10 Must have plug.
- k. 2-2.1 Base must not break during transportation, etc.
- l. 2-3.2 Plug must not be expelled during operation.
- m. 2-3.3 Handle area must be free of pyrotechnic material.
- n. 2-3.7 No sharp fragments from spikes or handles.
- o. 3-1.1 to 3-1.5 Limits on visual effects.

- p. 4-1.3 Name and address of manufacturer.
- q. 5-1.1 to 5-1.4 General requirements for shipping.

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#### IV. STANDARD FOR GROUND SPINNERS.

- a. 2-1.1 Construction must produce no sharp fragments.
- b. 2-1.2 Impact sensitivity and premature ignition.
- c. 2-1.3. Must not resemble candy or food.
- d. 2-1.5 Prohibited chemicals.
- e. 2-1.7 Must not contain reports.
- f. 2-1.8 No flaming balls or glowing fragments.
- g. 2-1.9 Assembly must prevent damage.
- h. 2-1.10.5 Timing between effects must be 10 seconds.
- i. 2-1.10.6 Fuse attachment must not interfere with functioning.
- j. 2-1.10.7 Location of fuse obvious or identified.
- k. 2-1.12.2 Must function within 10 meters diameter.
- l. 3-1.2 Labeling in English.
- m. 3-1.3 Name and address on label.

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#### V. STANDARD FOR PARTY, TRICK AND TOY SMOKE DEVICES.

- a. 2-1.2 Impact sensitivity or premature ignition during shipping, etc.
- b. 2-1.6 Must not product flaming debris.
- c. 2-1.8 Only visible and audible effects that are small in magnitude and consistent with nature of item.
- d. 2-1.9.4 Toy smokes may not exceed 100 grams per unit.
- e. 2-1.12.5 Time between effects must not exceed 10 seconds.
- f. 2-1.12.6 Fuse must be obvious or clearly marked.
- g. 2-1.12.7 Fuse attachment must not affect performance.
- h. 2-2.4 Uniform effect with no slag or molten particles.
- i. 2-4.3.5 Ten seconds between effects.
- j. 3-1.3 Name and address of manufacturer.

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#### VI. REQUIREMENTS FOR RELOADABLE TUBE AERIAL SHELLS

- a. 2-1.1 Construction must produce no sharp fragments.
- b. 2-1.2 Impact sensitivity and premature ignition.

- c. 2-1.4 Prohibited chemicals.
- d. 2-1.5.1 Tube must produce no sharp fragments upon functioning.
- e. 2-1.5.3 Tube must be sufficiently rigid.
- f. 2-1.6.1 Base must not break during transportation, use, etc.
- g. 2-1.6.4 Base must not ignite during operation.
- h. 2-1.7.2 Fuse must extend 2 inches outside tube.
- i. 2-1.7.3 Fuse sufficiently rigid not to fall back into tube.
- j. 2-1.7.7 Fuse attachment must not affect performance.
- k. 2-1.7.8 Location of fuse must be obvious or identified.
- l. 2-1.8.1 Shell must not produce sharp fragments.
- m. 2-1.8.2 Shape of shell must not cause binding.
- n. 2-1.8.8 Lift charge must be black powder or equivalent.
- o. 2-1.8.10 Wall thickness of reports must prevent simultaneous explosion.
- p. 2-1.8.11 Shell must include orienting loop.
- q. 2-1.9 Must not resemble candy or food.
- r. 2-1.10 Assembly must prevent damage during shipping, etc.
- s. 3-2.2 Minimum burst height must be 15 meters above ground.
- t. 3-2.3 Primary effects above 15 meters.
- u. 3.2.4 No flaming debris below 3 meters.
- v. 4-1.2 Cautionary labeling in English.
- w. 4-1.3 Name and address on label.
- x. 4-1.6 Shell must not have artwork or appear to be usable outside tube.
- y. 5-1 No shipping requirements on checklist.

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## VII. STANDARD FOR SKY ROCKETS, MISSILES AND HELICOPTERS.

### A. Requirements for Missiles.

- a. 2-1.1 Sharp Fragments.
- b. 2-1.2 No sharp edges or points.
- c. 2-1.4 Impact sensitivity.
- d. 2-1.6 No prohibited chemicals.
- e. 2-1.9 Report design must prevent simultaneous explosion.
- f. 2-1.11.2 Fuse must be obvious or identified.
- g. 2-1.11.6 Fuse attachment must not affect performance.
- h. 2-1.12 Must not resemble food or candy.
- i. 2-1.13 Assembly must prevent damage during transportation, etc.
- j. 2-2.2 Stick must be 1/8" in diameter.
- k. 2-2.4 Length must be at least 15 inches.
- l. 3-1.1 Primary effect near peak of trajectory.
- m. 3-1.2 Primary effects not within 5 meters of ground.
- n. 3-1.3 Flaming debris extinguished above 3 meters.
- o. 3-1.4 Device must travel at least 15 meters.

- p. 3-1.5 Effects may not extend beyond 5 meters.
- q. 3-2.1 Flight direction of sky rockets must be within 45 degree angle.
- r. 4-1.2 Labeling in English.
- s. 4-1.3 Name and address on label.

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**B. Requirements for Missiles.**

- a. 2-1.1 Sharp fragments.
- b. 2-1.2 Sharp edges.
- c. 2-1.4 Item must not be impact sensitive.
- d. 2-1.6 Prohibited chemicals.
- e. 2-1.9 Report design must prevent simultaneous explosion.
- f. 2-1.10 Wings, fins and sticks must be securely attached.
- g. 2-1.11.2 Location of fuse obvious or identified.
- h. 2-1.11.6 Fuse attachment must not affect performance.
- i. 2-1.12 Must not resemble food or candy.
- j. 2-1.13 Assembly must prevent damage during transportation, etc.
- k. 3-1.1 Primary effect near peak of trajectory.
- l. 3-1.2 Primary effects not within 5 meters of ground.
- m. 3-1.3 Flaming debris extinguished above 3 meters.
- n. 3-1.4 Device must travel at least 15 meters.
- o. 3-1.5 Effects may not extend beyond 5 meters.
- p. 4-1.2 Labeling in English.
- q. 4-1.3 Name and place of business.

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**C. Requirements for Helicopters.**

- a. 2-1.1 Sharp fragments.
- b. 2-1.2 Sharp edges.
- c. 2-1.4 Item must not be impact sensitive.
- d. 2-1.9 Report design must prevent simultaneous explosion.
- e. 2-1.11.2 Location of fuse obvious or identified.
- f. 2-1.11.6 Fuse attachment must not affect performance.
- g. 2-1.12 Must not resemble food or candy.
- h. 2-1.13 Assembly must prevent damage during transportation, etc.
- i. 3-1.1 Primary effect near peak of trajectory.
- j. 3-1.2 Primary effects not within 5 meters of ground.
- k. 3-1.3 Flaming debris extinguished above 3 meters.
- l. 3-1.4 Device must travel at least 15 meters.
- m. 3-1.5 Effects may not extend beyond 5 meters.
- n. 4-1.2 Labeling in English.
- o. 4-1.3 Name and place of business.

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## VIII. STANDARD FOR ROMAN CANDLES.

- a. 2-1.1 Construction must not produce sharp fragments.
- b. 2-1.3 No prohibited chemicals.
- c. 2-1.5.1 Must have plug adequate to prevent blowout or spike expulsion.
- d. 2-1.5.2 Plug must be clay or nonflammable.
- e. 2-1.5.3 Plug must be securely installed.
- f. 2-1.5.4 Plug must resist breakage or separation.
- g. 2-1.6.2 Fuse must be obvious or identified.
- h. 2-1.6.5 Ten seconds between effects.
- i. 2-1.6.7 Fuse attachment must not affect performance.
- j. 2-1.10 Finished item impact sensitive and resist premature ignition.
- k. 2-1.11 Reports must not occur below 3 meters.
- l. 2-1.12 Assembly must prevent damage during transportation, etc.
- m. 2-1.13 Must have a spike.
- n. 2-1.14 No continuous external flame greater than 1 foot.
- o. 2-1.15 Must not resemble candy or food.
- p. 2-2.3 No chemical composition between plug and end of spike.
- r. 3-1.2 Labeling in English.
- s. 3-1.3 Name and place of business.

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## IX. STANDARD FOR WHEELS.

- a. 2-1.1 No sharp fragments.
- b. 2-1.2 No impact sensitivity or premature ignition during shipping, etc.
- c. 2-1.3 Must not resemble candy or food.
- d. 2-1.5 No prohibited chemicals.
- e. 2-1.7 Assembled well enough to prevent damage during shipping, etc.
- f. 2-1.8 No blowout.
- g. 2-1.10.5 Method of fuse attachment must not affect with performance.
- h. 2-1.10.6 Timing between effects must not exceed 10 seconds.
- i. 2-1.11.2 240 grams vs. 200 grams.
- j. 2-3.2 String wheels must not be designed or be suitable for held operation.
- k. 3-1.3 Name of manufacturer on label.

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