

# **Safety Guidelines Of the WPAG**

**Official Fireworks Safety Guidelines  
in effect at WPAG Meeting/Shoots**



**Wisconsin Pyrotechnic Arts Guild, Inc.  
2009**

# Wisconsin Pyrotechnic Arts Guild Safety Guidelines

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# Wisconsin Pyrotechnic Arts Guild Safety Guidelines

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## WPAG Safety Guidelines Preface

The purpose of the Wisconsin Pyrotechnics Arts Guild, Inc. (hereafter referred to as the "WPAG") Safety Guidelines (hereafter referred to as "The Guidelines") is to promote the recommended and safe use of pyrotechnic material and compositions. The need for safe conduct before, during and after the discharge of fireworks is to be considered of the highest importance at any official WPAG meeting and/or pyrotechnics shoot.

### 1. AUTHORITY, ADOPTION, AND SCOPE

1. These guidelines shall be known as the *Official Fireworks Safety Guidelines* and be cited as such. They shall be referred to herein as "The Guidelines."
2. *Authority:* These guidelines were adopted by the Pyrotechnics Guild International, Inc. (PGI) in July 1983; revised July 1987, revised July 1990 [to incorporate changes to NFPA 1123 (1990)], revised June 1994 [to cover the rapid growth of PGI membership]; revised in April 2000 ; revised in May 2001; and revised again in November of 2008.
3. *Adoption:* These guidelines were adopted, in modified form, by the Wisconsin Pyrotechnic Arts Guild, Inc. (WPAG) December 1998; revised in November 2009 and shall remain an official document of the WPAG until amended or discontinued. As NFPA codes are continually revised, NFPA-1123 and NFPA-1126 in their current editions should serve to guide future revisions of these Safety Guidelines.
4. *Scope:* These Guidelines apply to the handling, storage, sale, discharge or other use of all kinds of fireworks and pyrotechnic or explosive devices during any official WPAG Meeting/Shoot. These Guidelines apply, without exception, to all WPAG members, to friends, relatives, nonmembers and to all other persons attending a meeting/shoot or on site during a meeting/shoot.

### 2. THE SAFETY TEAM consists of the SAFETY DIRECTOR and SAFETY VOLUNTEERS (The terms Safety Team and Safety Volunteers are synonymous and are used interchangeably in this document.)

1. The need for safe conduct before, during, and after the discharge of fireworks cannot be over-emphasized. In order to ensure that fundamental requirements for safe conduct during the handling and discharge of fireworks are being observed, the Safety Director of the WPAG shall appoint, before each meeting/shoot, a Safety Team, having complete authority over all safety matters, subject only to the discretion of the Safety Director and the Board. The Safety Director shall be a member of the Board of Directors.
2. Members of the Safety Team shall be present before, during, and after the discharge of all fireworks.
3. If the Safety Director is unable to attend the meeting/shoot, or unable to discharge his/her duties, the officers of the WPAG shall appoint a temporary Safety Director for that meeting/shoot.
4. The discharge of fireworks shall not begin until members of the Safety Team have surveyed the overall situation and are satisfied it is safe to proceed. Whenever adverse conditions arise that

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significantly affect safety, such as crowd control or weather, a member of the Safety Team or Board of Directors, shall halt or postpone any or all pyrotechnic activities as they deem necessary. The resumption of those activities shall only take place upon approval of the Safety Director or the designee.

5. All safety personnel shall be provided with identifying insignia, such as shirts, vests, armbands or other markings that are clearly identifiable.

6. The Safety Director or the designee shall investigate any instances of unsafe behavior or conditions, whether observed directly or reported by others, and take appropriate action.

7. Any requirement in these Guidelines may be waived or modified by the Safety Director, at their discretion, or upon approval of a petition made to the Safety Director. Petitions must be in writing and received before the display, contain details of the specific request and the rationale for the modification of a specific requirement. Petitions that are approved apply only to the specific instance described in the Petition. However, when appropriate, the modification may be interpreted by the Safety Director or the designee to apply equally to all participants.

8. In the event of an accidental fire, explosion and/or similar emergency, the WPAG Safety Team shall respond to the emergency situation and attempt to resolve the problem using all available resources.

## **3. GENERAL REQUIREMENTS**

1. All safety personnel shall be qualified as determined by the Safety Director and may be required to attend a safety class given by the safety director and key personnel of the safety team. They shall have readily available, as a reference, a copy of these Guidelines, and they shall be familiar with its contents.

2. No person who is acting in an irresponsible manner or appears to be under the influence of alcohol or other drugs shall be allowed to handle or discharge any fireworks.

3. Only WPAG members are permitted in any of the firing areas. Any persons under the age of 18 should be accompanied by a responsible adult. No underage person shall discharge, fire, or use any Class B/1.3G material, including aerial shells, ground bombs, or rockets. (All decisions on the classification of this material shall be left to the discretion of safety director, or the board appointed designee.)

4. Smoking or open flames, other than devices used to ignite fireworks, shall not be permitted within fifty feet of any firing areas. Smoking may be allowed in areas specifically designated by the Safety Team.

5. Only flashlights, electric lights or approved means of illumination (some chemical devices may be approved such as Cyalume™ Light Sticks) shall be used at firing sites. Fusees, propane torches, or other approved means of ignition may be used by the pyrotechnist at a mortar line.

6. A first aid kit shall be present at all times in areas where fireworks are present.

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7. A portable water supply and/or fire extinguishers shall be available at firing sites, as specified by the safety Director, to be used for flooding mortars, extinguishing fires, etc.
8. Mortar cleaning tools shall be provided and shall only used to remove debris from mortars.
9. After delivery to the firing sites, fireworks shall not be left unattended and shall not be allowed to become wet.
10. The inside diameter of the mortar rather than the circumference shall be used when describing shell and mortar sizes.
11. Persons bringing boxes, bags or containers into the 1.3 G display fireworks firing line, hereinafter referred to as the “B line”, rocket, ground salute, or Class C/1.4G areas shall also remove the containers. Shooters shall leave no garbage. Trash containers will be provided at various locations for trash disposal. No live material shall be placed in any trash container.
12. Salutes, Mortars:
  - a) All aerial salutes, of dimensions within those allowed by NFPA-1123 (current edition) shall be fired from paper or HDPE (High-Density Polyethylene) mortars.
  - b) Multi-break shells containing large salutes shall be fired from mortars approved by the Safety Team. The Safety Team may allow or require special traditional multi-break shells to be fired from steel mortars or fiberglass mortars.
  - c) Salute shells of dimensions exceeding those of NFPA-1123 (current edition) require heavier than usual lifting charges and may require firing from steel mortars. Upon approval by the Safety Director or the designee, such large single salute shells may be fired from steel mortars. Appropriate safety measures shall be determined by the Safety Director or the designee for firing such large salute shells and shall be affected.
  - d) PVC or ABS plastic mortars shall not be used unless specifically approved for such use, on site, by the Safety Director or the designee. PVC or ABS plastic tubes may be used to make whistle effects. The Safety Director or the designee shall make all final determinations regarding the use of PVC or ABS plastic devices. These brittle plastics are NOT NFPA approved for use as display mortars, but, at the discretion of the safety Director or the designee, may be occasionally used for firing small devices such as comets.
13. Salute Restrictions
  - a. All salutes are limited to 100 grams of flash after 9:30 PM
  - b. Aerial salutes are limited to 5” diameter by 5” high
  - c. Salutes as components in shells, multi-break shells, or mines are limited to 3” in diameter and 3” high.
  - d. Bottom shots are limited to 5” diameter by 5” high

Ground salutes are limited to 3” in diameter and 71 grams of composition and must be suspended above the ground.
14. Ground salutes shall not be thrown.

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15. All steel mortars and any mortars to be used for repeated hand firing shall be buried at least three quarters of their length in earth or sand free of rocks and any other hazardous debris.
16. No torpedoes shall be allowed. Exceptions to this rule, for demonstration purposes, may be granted by the Safety Director.
17. Dry grass or combustible materials located beneath ground display pieces shall be wet down or removed, if possible, prior to the display if they are a potential fire hazard.
18. Poles and other bracing used for ground pieces shall be firmly placed, guyed or otherwise secured to prevent accidental displacement prior to or during the functioning of the ground piece.
19. Guy wires and stakes used to support ground pieces shall be marked with colored tape or ribbons to prevent personnel from being injured.
20. All personnel engaged in discharging fireworks shall wear protective clothing and utilize any safety equipment deemed appropriate by the safety team. Examples of such clothing and equipment include, but are not limited to, cotton rather than synthetic clothing, safety glasses, ear plugs, and hard hats. All personnel at the firing lines, whether actually discharging fireworks, assisting, or observing the discharge of fireworks MUST wear safety glasses.
21. At the shooting sites, Safety Team members shall closely observe the firing in order to detect and maintain an accurate count and location of misfires and duds.
22. After the completion of shooting for the night, all firing lines and fallout areas shall be inspected by Safety Team members in order to locate and retrieve hazardous materials.
23. After securing the grounds for the night, members of the Safety Team or Security Team or others so delegated, shall again inspect the firing sites and fallout areas very early the following morning for any remaining materials.

## **4. CLASS B/1.3G TESTING AND OPEN SHOOTING AREAS**

1. This section provides Guidelines for the safe testing of Class B/1.3G fireworks in order to determine aspects of their performance.
2. The safety practices provided under article 3 shall apply to all instances of Class B/1.3G testing.
3. Clearly marked firing lines and firing direction shall be established by the Safety Team and observed by all participants. Class B/1.3G testing and open shooting shall be conducted only at these designated firing sites and only during times designated for this purpose. Exception: Small amounts of pyrotechnic compositions, stars, inserts, fuses, etc., MAY be tested at other locations and at other times as **explicitly** permitted by the Safety Team member in charge of the particular site.

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4. Members are responsible for any live material that may fall to the ground as a result of a device malfunction. The member cannot leave the event without securing, or making arrangements with the safety director to secure, these items.
5. No shells over 6 inches in diameter shall be hand fired. Only qualified personnel shall install electric matches. The member of the Safety Team present shall determine a safe firing distance. Exceptions to this, such as use of visco delays, must be individually approved by safety personnel.
6. The member of the Safety Team present prior to use shall approve equipment such as mortars or rocket launchers provided by a participant.
7. Rockets shall be launched from guide tubes or racks constructed to the specifications of the Safety Team.
8. Smoking is strictly prohibited within fifty feet of all Class B/1.3G firing sites.
9. All shells not loaded into mortars shall be in ready boxes, with ready box lids closed, at the time shells are fired from mortars. Cardboard boxes may be used only for transporting shells to the firing line. Upon arrival at the firing site, the shells must be placed in the ready box.
10. Shells with short leaders shall not be fired. For Class B/1.3G testing or open shooting and competition, a length of leader as determined by safety personnel to be adequate shall be exposed from the mouth of the mortar. All black match shall be fully covered with a safety cap until the moment of firing.
11. Only single shells shall be tested or fired in open shooting. No multiple simultaneous firings of individual devices by multiple shooters shall be allowed. Class B/1.3G cakes, properly designed and engineered, with a maximum of 4" tubes mounted on a firm base and attached so as not to tip over when fired, shall be allowed at the discretion of the Safety Team member in charge of the area. Flights of shells may be allowed if connected to one fuse and approved by the Safety Team member in charge of the area.
12. Safety personnel shall have the right to inspect any and all material brought to the shoot line for firing. Defective material, bad leaders, under-lifted shells and any items not consistent with WPAG guidelines shall be disallowed. Any unauthorized person possessing or attempting to use Class A/1.1 material shall be escorted from the shoot site, the material confiscated and a recommendation shall be made to the officers that the person shall be removed from the Meeting/shoot pending a board review of possible expulsion from the Guild. Use of this material is not generally to be approved or endorsed at WPAG Meeting/Shoots. Special effect demonstrations and other exceptions, such as use by the safety team to destroy defective material, must be individually approved in each and every instance by the Safety Director.
13. The Safety Team shall handle all misfires. No shooter shall attempt to remove any shell from a mortar.



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14. No person who is acting in an irresponsible manner or is under the influence of alcohol or other substances shall be allowed to handle or discharge any fireworks.

15. Only WPAG members shall be permitted in any of the firing areas. Any persons under the age of 18 should be accompanied by a responsible adult. No underage person shall discharge, fire, or use any Class B/1.3G material, including aerial shells, ground bombs, or rockets. (All decisions on the classification of this material shall be left to the discretion of safety director, or the board appointed designee.)

## **5. FORMAL DISPLAYS**

1. A Display Operator, who is approved by the Board, will have the authority, in conjunction with the Safety Director, to determine how displays are setup, where and when displays are fired, and the duration of the displays.

## **6. CLASS C/1.4G SALES**

1. Sales shall be made only to WPAG members. Unescorted non-WPAG members shall not be allowed in the Class C/1.4G sales areas. WPAG identification cards shall be required to prove membership.
2. A sale, gift, or other means of distribution shall not be made to any one who appears to be under the influence of alcohol, drugs or acting in an irresponsible manner.
3. All vendors are obligated to challenge anyone suspected of not meeting the eligibility requirements in items 1 through 2.
4. Sales shall be conducted only by those WPAG corporate members in good standing.
5. Only Class C/1.4G items shall be offered for sale. The Safety Director or designee shall inspect and approve or disapprove questionable items.
6. Sales shall be conducted only in locations approved and designated for this purpose by the Safety Director.
7. Sales shall be conducted only during the times designated for this purpose.
8. Vendors and/or members of the Safety Team have full authority to require anyone causing a safety hazard to leave the sales area.

## **7. CLASS C/1.4G SHOOTING**

1. Specific times and locations shall be designated for the discharge of Class C/1.4G consumer fireworks.
2. A separate area for Class C/1.4G shooting shall be provided.



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3. All shooting locations shall be a minimum distance of 200 feet from fireworks assembly areas, magazines, Class C/1.4G vending and chemical sales.
4. In a case of significant wind shift, shooting shall be stopped and the site rearranged as necessary.
5. Fountains, gerbs, cakes and candles shall be embedded in sand or otherwise supported to prevent toppling when fired. No roman candle or any other device except sparklers shall be held in the hand when firing.
6. No person who is acting in an irresponsible manner or is under the influence of alcohol or other substances shall be allowed to handle or discharge any fireworks.
7. Only WPAG members shall be permitted in any of the firing areas. Any persons under the age of 18 should be accompanied by a responsible adult. No underage person shall discharge, fire, or use any Class B/1.3G material, including aerial shells, ground bombs, or rockets. (All decisions on the classification of this material shall be left to the discretion of safety director, or the board appointed designee.)
8. Members of the Safety Team shall be present at all times during Class C/1.4G shooting to ensure enforcement of these safety regulations and practices.
9. All unauthorized persons shall be prevented from entering any of the shooting locations by Safety personnel.
10. All Class C/1.4G fireworks brought to a shooting location shall be kept in closed containers and maintained behind any established firing lines.
11. Fire extinguishers and a first aid kit shall be on site during shooting of Class C/1.4G devices.
12. Safety glasses shall be required for all those participating in Class C/1.4G open shooting.
13. Rockets shall be launched to minimize flight toward spectators and from racks or launch tubes approved by the safety team.
14. Safety personnel shall remain in the shooting area until all live materials have been removed.

## **8. EDUCATIONAL WORKSHOPS AND DEMONSTRATIONS**

1. All demonstrations, workshops, and other comparable activities shall be conducted in appropriate locations depending upon the nature of the materials used. Presentations using pyrotechnic compositions, black powder, stars, live fireworks and components shall be conducted in the designated manufacturing area as approved by the Safety Director.
2. Smoking shall not be permitted during any workshop or demonstration where hazardous materials are present. NO SMOKING signs and fire extinguishers shall be prominently displayed.

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3. Proper safety equipment shall be present and used, where appropriate (as determined by safety) during demonstrations and workshops to emphasize safety technique. This includes, but not limited to: respirators, rawhide mallets, face shields, gloves, anti-static products and devices, etc.
4. Hazardous materials shall be brought to workshops and demonstrations in closed containers.
5. Excess or unused hazardous materials shall be returned to their respective containers and not be allowed to accumulate in work areas.
6. Only enough hazardous materials necessary (as determined by the Safety Director) to conduct the demonstration or workshop shall be permitted at the work area. Bulk (as defined by the Safety Director) containers of black powder, stars, inserts or components shall require specific approval by the safety Director.
7. All work areas shall be thoroughly cleaned as soon as the demonstration or workshop is completed.

## 9. STORAGE

1. Explosive storage facilities (magazines) shall meet Federal requirements.
2. All class B/1.3G fireworks shall be stored in an approved magazine.
3. Persons appearing to be under the influence of alcohol, drugs or acting in an irresponsible manner shall not be allowed in or near any storage magazine.
4. Smoking is prohibited within 50 feet of any magazine or fireworks storage area. NO SMOKING signs with lettering at least 2" high with 1/2" wide stroke on a contrasting background shall be posted in all areas where smoking is prohibited.
5. Any explosive storage facility shall remain locked at all times when unattended.

## 10. MINIMUM SEPARATION DISTANCES FROM AUDIENCES

1. All devices (both Class C/1.4G and Class B/1.3G) when ignited, shall be separated from the audience by a safe distance which is determined solely by these Guidelines and which have taken NFPA-1123-2006 distances into consideration. The "audience" is defined as all public, non-WPAG member spectators AND WPAG members in the specifically designated display viewing area(s). It is recognized that WPAG members attending a meeting/shoot, having signed appropriate waivers, have access to almost all meeting/shoot site areas, including "live-fire" areas. Separation distances apply only to audiences (WPAG members OR public) in designated viewing areas for displays, demos, competition, and other firing of pyrotechnic materials. **As WPAG displays experimental, non-commercial, complex, and other unique devices and assemblies of devices, the Safety Director or the designee may require increased separation distances for any device at any time at thier discretion.**

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Item	Minimum Distance
1. All metal mortars . . . . .	.300 feet
2. Individually fired shells (vertical mortars) . . . . .	.70 feet per inch of mortar diameter
3. Individually fired shells (angled mortars) . . . . .	.70 feet per inch of mortar diameter
4. Chain fused shells from racks. . . . .	.70 feet per inch of shell diameter
5. Mines (containing stars or non-splitting/non-bursting comets only) . . . . .	35 feet per inch of device diameter
6. Mines (containing other effects) . . . . .	.70 feet per inch of device diameter
7. Roman candles and cakes (Class C/1.4G) . . . . .	.150 feet
8. Roman candles and cakes (Class B/1.3G w/stars only). . . . .	.200 feet
9. Roman candles and cakes (Class B/1.3G w/inserts, shells, whistles, salutes, etc.) . . .	300 feet
10. Suspended salutes (1" x 2") . . . . .	100 feet
11. Suspended salutes (2" x 4") . . . . .	200 feet
12. Suspended salutes (3" x 6") . . . . .	300 feet
13. Suspended salutes (Larger than 3" x 6") . . . . .	.Subject to Safety Team approval
14. Non-bursting/non-splitting comets. . . . .	35 feet per inch of device diameter
15. All other comets . . . . .	70 feet per inch of device diameter
16. Wheels . . . . .	.150 feet
17. Saxons or Merry Go Rounds . . . . .	.100 feet
18. Line rockets . . . . .	.150 feet
19. Buzz Bombs and Helicopters . . . . .	200 feet
20. Fountains, gerbs & whistles (1" I.D. and smaller) . . . . .	.75 feet
21. Fountains, gerbs & whistles (Above 1" and small than 2" I.D.) . . . . .	.100 feet
22. Fountains, gerbs & whistles (2" I.D. and larger) . . . . .	.150 feet
23. Waterfalls (without reports) . . . . .	.75 feet
24. Waterfalls (with reports) . . . . .	See above ground salute distances
25. Bottle rockets (1/4" diameter max.) . . . . .	.200 feet
26. Rockets . . . . .	.300 feet min. Large rockets subject to Safety Team approval
27. Lance work (No pyrotechnically driven parts) . . . . .	75 feet
28. Lancework (Pyrotechnically driven parts) . . . . .	.150 feet
29. SuperStrings and MegaStrings (Firecrackers only) . . . . .	.150 feet
30. Concussion mortars . . . . .	Subject to Safety Team approval
31. "Creamora" effects . . . . .	.Subject to Safety Team approval
32. Professionally manufactured proximate effects. . . . .	per NFPA-1126-2006 or its successor current editions
33. Pumpkins, potatoes, and other solid, inert projectiles fired from mortars . .	only upon specific approval by the Safety Director at distances established by them
34. Special effects and all other items not listed . . . . .	Subject to Safety Director approval

2. The Safety Team may increase these separation distances at any time. The Safety Team will consider wind direction and velocity; shoot site peculiarities, and any other relevant factors. Lesser distances shall be utilized only upon approval of the Safety Director.

3. The discharge areas shall be located so that the trajectory of shells and other aerial effects shall not come within 25 feet of any overhead object.

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## 11. MANUFACTURING:

1. Each WPAG shoot will have a manufacturing area (hereinafter referred to as "the area") that will be a designated area having a perimeter marked with yellow caution tape (or equivalent). The defined area will have been approved by safety before any manufacturing or live material seminars are started.
2. A sign will be posted at the entrance of the area saying:
  - a. The area is open or closed for manufacturing or assembly.
  - b. Eye protection is required when the area is open.
  - c. No smoking within 50 feet of the perimeter.
3. Any of these guidelines may be waived, modified, or enhanced by Safety Director (or a board appointed designee).
4. The area will be under the supervision of the Safety Director (or a board appointed designee) or a designated Safety Volunteer.
5. All manufacturing, or assembly, of pyrotechnic compositions and devices will be done only in the area.
6. All seminars utilizing live pyrotechnic material will be conducted in the area.
7. Only WPAG members may enter the area.
8. Any persons under the age of 18 should be accompanied by a responsible adult.
9. All persons in the area shall wear safety glasses at all times when the area is open for manufacturing or assembly.
10. All persons engaged in actual manufacturing will wear the appropriate protective clothing (to include hand protection and footwear) for the type of manufacturing being done. Seminar leaders will advise participants of the type of safety gear that is required.
11. No open electrical connections or devices are allowed in the area. This includes exposed battery terminals or other live electrical contacts without prior approval of the Safety Director (or a board appointed designee).
12. No spark producing tools or accessories will be allowed in the direct manufacturing of pyrotechnic materials or devices.
13. Compositions and finished materials not being used or worked upon further are required to be placed in a magazine, ready box, or other protective and closed container.

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14. At the end of club member's manufacturing day or session, all live material is required to be placed in the magazine or ready box.

15. Each work area shall have working containers for compositions being used and a composition/completed effects day box. These containers shall be closed and sealed after each removal from or addition of any items to the container.

16. Only one working container with less than 500 grams of composition, stars, or components shall be out of the day box in any one working area at any time, except as approved by the area seminar/manufacturing leader, Safety Volunteer, Safety Director (or a board appointed designee).

17. Completed effects shall immediately be placed into the composition/completed effects day box.

18. Blast shields for hydraulic presses are recommended for use whenever possible. When groups of people wish to gather to observe the pressing of rockets, the seminar/manufacturing leader, Safety Volunteer, Safety Director (or a board appointed designee) shall determine how many may observe and where they may observe from. While unshielded presses may be used to make rockets, depending upon the type and size of rocket being pressed, observers may be kept away from unshielded presses at the discretion of the seminar/manufacturing leader, Safety Volunteer, Safety Director (or a board appointed designee).

19. The Safety Director or their safety volunteer designate shall authorize and supervise all whistle or strobe composition manufacture. Unless authorized by safety, no batch of whistle or strobe composition shall exceed 500 grams. Each batch shall be completed and properly stored before starting another batch. No unauthorized or unsupervised manufacture of whistle or strobe composition is permitted.

20. Except as provided for in paragraph 23 below, all flash-containing devices and components (e.g., salute or report headings, bottom shots, "bumps," lambetti, shell inserts, etc.) must be pre-made, prior to the event, and brought to the meeting/shoot and manufacturing area in closed, finished, assembled form.

21. Possession or manufacture of flash composition - in any quantity - other than by exception as provided for in paragraph 23 below, is strictly prohibited

22. Manufacture of flash-containing devices or components, other than as provided for in paragraph 23 below, is strictly prohibited

23. At the discretion of the Safety Director (or a board appointed designee), an "A" and "B" mixing method for flash - whereby oxidizer and fuel are separately introduced into a device, the device is then permanently sealed, and mixing later occurs by routine handling of the assembled device - may be permitted on a case by case basis.

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24. No smoking or open flames are allowed within 50 feet of the perimeter of the designated manufacturing area(s).
25. Ball milling of material will be allowed at the discretion of the Safety Director (or a board appointed designee).
26. Metal mixing bowls are not allowed to be used in the area.

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