



Foundation Findings

A Boater Education Series

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Report #31: September 1998 - **Pyrotechnic Visual Distress Signals**

If there is one type of boating safety equipment you are unlikely to use until you need it in an emergency, it's pyrotechnic visual distress signals - as in flares, rockets, smoke signals, and other attention getting devices that burn, sputter, smoke or explode.

The Coast Guard requires most recreational boats 16 feet and larger to carry equipment to signal for assistance and approves two types. Non-pyrotechnic devices are straightforward and include a three-foot-square orange signal flag for day use and for night, an electric light that flashes the international SOS signal 50 to 70 times per minute. (Dye markers and signal mirrors, though useful to attract attention and often carried by boaters, are not Coast-Guard-approved).

In the pyrotechnic category, the regulations are broad and how you fill the requirement for your particular type of boating is fairly flexible. The choices include a variety of red hand-held or aerial flares for day and/or night use, and devices that emit orange smoke for daytime use.

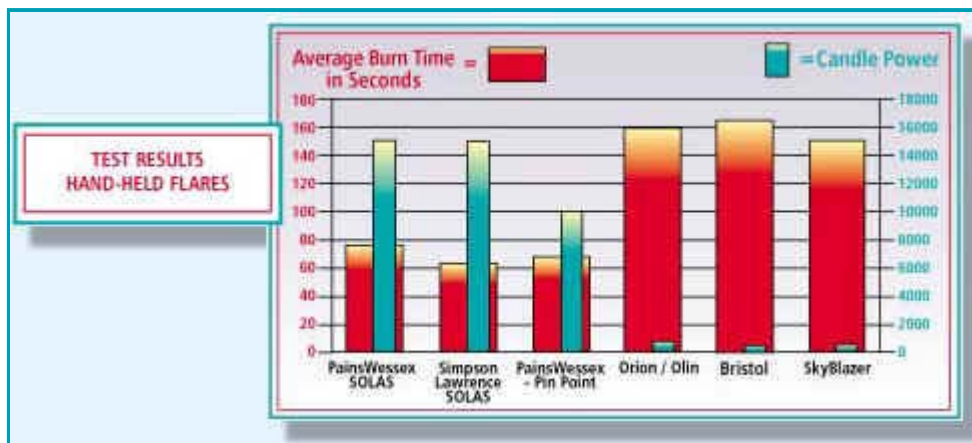


The Coast Guard sets a 42-month service life and expiration dates are stamped on the devices. The International Maritime Organization approves signals for commercial use on the high seas with a SOLAS (Safety of Life At Sea) rating. These devices far exceed Coast Guard standards for luminosity and many boaters use the more expensive SOLAS devices or the added margin of safety they provide.

If you opt for pyrotechnics, you must carry three devices approved for day and/or night use but beyond that, you have to mix and match what you wish to carry. By far, pyrotechnics are the popular choice and the majority of boaters opt to meet minimum Coast Guard requirements with hand-held flares or gun-launched meteors that are approved for day/night use.

But is that the best choice for you? And with the variety of pyrotechnic devices on the market, are there others that would be better for the kind of boating that you do? Since few boaters get the chance to actually use pyrotechnic visual distress signals prior to an emergency, the BoatUS Foundation for Boating Safety decided to test a range of commonly available Coast Guard-approved devices.

We hope this vicarious visit with visual distress signals will help you think through your options in making what could be life-saving decisions.



Don't Try This at Home

We conducted our tests on the Chesapeake Bay off Sandy Point State Park in cooperation with the Maryland Natural Resources Police, Maryland State Police, and the U.S. Coast Guard.

Our technicians established two stations for the test boat, one at a quarter mile off the beach and the other at a half mile. On shore they set up equipment to gauge the approximate altitude above the water attained by aerial flares, measure burn time for all devices and to document each test photographically.

The crew, comprised of experienced boaters and landlubbers alike, recorded subjective assessments for brilliance and overall visibility as well.

The crew afloat, using a 29-foot powerboat as the anchored test platform, launched flares with the help of a gunwale mounted device to maintain a consistent firing trajectory. They also confirmed burn times with a stop watch and took notes on "user friendliness" and safety values.

The Cold Light of Day

Since so many boaters carry hand-held and aerial flares that are approved for day/night use, we wanted to see just how effective these are in daytime conditions. They aren't.

Our shore crew found the Coast Guard-approved hand-helds very poor at attracting attention. SOLAS flares were only marginally better in daylight but burned only half as long. Luminosity ratings range from 500 candle power to 15,000. We found the lowest-rated flares virtually invisible in daylight at one-quarter mile and the highest-rated flares only slightly more visible. But the 67-second average burn time was less than half that of the three lower-rated devices tested. (see table)

While all handhelds exceeded manufacturer specifications for burn time, beware: These devices generate considerable slag as they burn (hold them well overboard) and they get hot, especially SOLAS flares which burn inside a metal tube that gets *really* hot.

Aerial flares are also not very visible or attention-getting in daytime, either, and except for the parachute types, burn time is a scant five to six seconds on average. Real-world conditions of wind, vessel motion and the angle of the shooter's arm at firing moment can dramatically affect height.

Remember, these devices are like firearms and should be treated with equal respect. In fact, we found that aerial flares with self-contained launchers can deliver a strong recoil, posing a risk for injury.

For daytime use, we found the orange smoke devices to be, by far, the most effective at attracting attention. All smoke devices exceeded manufacturer's specifications for burn time and the "hang time" of the brilliant orange plume, even in a moderate breeze, makes smoke our choice for day signaling. Save the flares for after dark.

Rockets Red Glare

For nighttime distress signaling there are three factors to consider: brightness, burn time, and with aerials, altitude. In the textbook night rescue, your aerial flare, be it meteor or parachute, gets the attention and the handheld flare is then used to guide the assisting vessel or aircraft to you.

Unless you are quite a distance from shore or from other help, altitude may not be as critical a factor as luminosity and burn time. In our tests, we found that the Coast Guard-approved parachute flares burned for an average of 25 seconds while the SOLAS parachute burned 43 seconds.

Yet depending on where you go boating, on rivers, lakes or other confined waters, for example, meteor flares could be just as effective. Remember, they have a short (5-6 seconds) burn time but cost considerably less so you can stock up accordingly.

Expiration Counts

When it comes to buying visual distress signals, let's face it, you are spending money for something you may never use. If you've been a boater for any length of time, you've probably got a pile of out-of-date hand-held flares and signal rockets aboard your boat. But to be in compliance, you must have unexpired units. Many boaters, however, keep expired units aboard for backup.

Since this is such a common practice, we decided to test a variety of expired devices - some long out of date - to see if their performance had diminished.

The answer is yes. There really is a reason for those expiration dates. These devices use a variety of chemicals, all of which can deteriorate over time, either limiting burn time or altitude, or causing the device to fail altogether.

We found expired hand-held flares that were very hard to ignite or didn't seem to burn as brightly as they should, and meteor flares that didn't fly as high or burn as long as their advertised claims. A few failed to fire at all. However, we still think (and the Coast Guard does too) that expired pyrotechnic devices are good for backup; just don't depend on them.

Conclusions

- In considering which pyrotechnic devices to equip your boat with, remember the twofold purpose of visual distress signals: to signal that you're in trouble and to direct help to your location.
- From our experience, small boats in daylight near shore and with heavy boat traffic should consider carrying three hand-held smoke flares to guide assistance vessels to them.
- Big boats on large bodies of water and night boaters may be best advised to carry aerial meteors or parachute flares to attract attention and hand-held flares for help to home-in on.
- Think of it this way: Aerials give height (that is, visibility from a greater distance) while hand-helds give duration. Smoke is the best option for day-only signaling.
- Also consider that exposure justifies expenditure. While SOLAS flares and aerials can be three to four times more expensive, in offshore or remote locations that could be money well spent. As a compromise, however, you may want to carry extra non-SOLAS devices.
- You and your crew should be thoroughly more familiar with how each device operates, even if you can't discharge them (it's against the law in non-emergency situations). Attending demonstrations of proper handling and use of these devices that are offered by many U.S. Power Squadrons and U.S. Coast Guard Auxiliary flotillas is a great way to gain firsthand knowledge.
- Store your pyrotechnics in a red or orange watertight container marked "Distress Signals" and store in a dry but readily accessible place.