

ANNEX 21G**EXPLOSIVES AND PYROTECHNICS****1. Ships Explosives Organisation**

For any incident involving Explosive Stores, advice should be taken from the ERO and members of the Ship's Explosive Organisation.

2. Definitions

A magazine is defined as a compartment or locker specially designed to be safe for the permanent or temporary stowage of explosives or explosive stores, ie all weapons, missiles or stores containing substances used to produce an explosive, incendiary or pyrotechnic effect.

3. Firefighting

A small fire in a magazine should be first tackled with the 9 ltr foam (AFFF) extinguisher provided. A fire that has progressed beyond the use of portable equipment will normally be dealt with by the activation of a fitted spray system. Some spray systems are manually operated, but in most ships they are automatically operated at a specific rise in temperature (see [Chapter 22](#)). Flooding arrangements, as fitted to some magazine, RU magazine and pyrotechnic lockers are manually operated.

4. Floods and Sprays

With a manual system, the decision whether to spray and/or flood a magazine must be made in good time. The responsibility to do so rests with the MEO or OOD who, if time permits, must consult the Command and the Ship's Explosive Organisation. In cases of extreme emergency, the decision must be made by the officer/rating of the appropriate Fire and Repair Party or, in the case of RU magazines or lockers on the weather deck, by the officer/rating closed up in the vicinity. The MEO or OOD should be informed immediately.

5. Adjacent Compartments

To meet the hazard of fire in a compartment adjacent to a magazine, the bulkhead/deck/deckhead of the magazine should be sprayed with water (boundary cooled) from within the magazine, using either a firefighter nozzle supplied with water from the nearest hydrant or CFHR by running a hose through the door or hatch. The decision to boundary cool rests with the officer/rating in charge of the firefighting team or, in extreme emergency, with the officer/rating that may be stationed in the magazine.

6. Air Weapons Magazines

a. If the air weapons magazine smoke alarm activates (and if torpedoes are carried), the OOQ is to inhibit the sprays or, if the sprays are already activated, isolate the HPSW supply. Using both indicator test plug and 'fish eye' viewer, he is to attempt to ascertain the situation in the magazine:

(1) If it can be seen that the cause of the smoke alarm is a non self sustaining torpedo battery fire, the sprays are not to be re-activated. Once all battery activity has ceased and the smoke has been cleared, a controlled re-entry into the magazine is to be made by the Support Party, backed up by the WE Hazard Team.

(2) If the cause of the smoke alarm is confirmed as a self sustaining battery fire, a major magazine fire, or if there is any doubt, the sprays should be activated and/or the HPSW supply de-isolated. The magazine should then be sprayed for a minimum period of 30 mins. On completion, provided all battery activity has ceased and other fires are extinguished, a full re-entry is to be made by the Support Party, backed up by the WE Hazard Team.

b. If no Sting Ray warshot torpedoes are held in the magazine, the policy for spraying remains the same as for any other magazine.

7. Boundary Cooling

If boundary cooling is being carried out in a magazine fitted with an automatic (quartzoid bulb) spray system and a high proportion of the spray heads are suddenly activated, the person(s) carrying out the boundary cooling, unless wearing breathing apparatus, should vacate the magazine immediately, as it is considered that the volume of fine spray water will make the compartment uninhabitable.

8. Regulations

The regulations applying in each ship should be contained in Ships General Orders (SGO).

9. Incendiary Weapons

These are generally thermite, or a similar substance, in a magnesium alloy casing. The filling produces its own oxygen and, once ignited, cannot be extinguished. While it is burning the outer case ignites and generally explodes, so that pieces of burning magnesium alloy can be thrown a considerable distance. These weapons should be cooled with large quantities of water spray. Burning magnesium should be attacked with large quantities of water. Water on burning magnesium causes intense reaction and increases the burning rate, so vast quantities must be used. CO₂ should not be used because it increases the burning rate without producing any cooling effect. Firefighters must make full use of any available protective cover when tackling this type of fire.

10. Ammunition with Phosphorus Content

Phosphorus is air reactive and, when on fire, should be fought with copious amounts of water. At about 250°C, encased white phosphorus changes its chemical form, with the resultant considerable release of heat, and is likely to explode.

11. Risk Reduction Measures

a. The need for rapid and efficient firefighting is vital. The risk of explosion makes it necessary for the firefighters to protect themselves as much as possible by shielding behind any structure or fitting which may be close to their required firefighting position. The possible loss of all or part of the firefighting team and their equipment as the result of an explosion must be considered, and back-up crews and their equipment must be available in a suitably sheltered position. Ships General Orders are to contain suitable procedures for dealing with this situation. The requirement to ditch weapons, or loaded or crashed aircraft, must also form part of the contingency plan and detailed regulations are contained in JSP 862 Parts 1, 2 and Addendum - MOD Maritime Explosive Regulations - Surface Ships, Submarines and MAPS.

Ditching must be considered immediately it is known that a fire involving explosives has developed; it may be the only way to avert a major disaster. Regular fire exercises are to be arranged so that Ships' Companies are thoroughly conversant with the requirements of these Orders.

b. The chance of explosives becoming involved in a fuel fire is greatest when the explosive is out of its normal stowage, for instance, on a flight deck. Every precaution must be taken, every order implicitly obeyed. The danger from explosives on flight decks arises from either those loaded on aircraft or from those held in weapon parks. JSP 862 should be consulted for detailed regulations for handling and care of air weapons. The amount of explosive stores on flight decks must be carefully controlled and should never exceed that required for immediate operational requirements. The Ships Explosive Organisation will have detailed knowledge of the methods and official routes for the disposal of explosives iaw JSP 862 Part 1 Chapter 8.

12. Cooking Off

a. The time factor for ammunition to 'cook off' (ie premature explosion due to excessive heat) in a fire situation depends on many variables, eg the nature of the explosive and the propellant, the thickness of the case, the temperature of the fire and the proximity of the explosive to the source of heat. JSP 862 addendum contains Ships Explosive Store Safety Instructions (SEXSSI) which state the hazard times and risk times of weapons when they are involved in fire, and officers/ratings who may be responsible for such firefighting operations are to familiarise themselves with the relevant SEXSSIs.

b. When the flames surrounding a weapon have been extinguished, the internal temperature of the weapon may continue to rise and cause 'cook off' some considerable time later. The cooling of weapons exposed to fire must continue for at least 30 mins after the fire is extinguished.

13. Weapons and Pyrotechnics on Aircraft

BRd 2170(5) - Embarked Aviation Crash Fire Rescue (CFR) 2013 Edition gives guidance on the effect of fire on weapons and pyrotechnics associated with embarked aircraft.