Homeland Security
Science and Technology

TechNote

U.S. Department of Homeland Security
SAVER
System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions.

Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts unbiased operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

Information provided by the SAVER Program will be shared nationally with the responder community providing life- and cost-saving assets to federal, state, and local responders.

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

For more information on this and other technologies, please see the SAVER Web site or contact the SAVER Program Support Office.

Telephone: 877-336-2752
E-mail: saver@dhs.gov
Web site: https://www.rkb.us/saver

This SAVER TechNote was prepared by the Space and Naval Warfare Systems Center, Charleston, for the SAVER Program.

SPAWAR
Systems Center Charleston

Inflatable Boats for Swift Water Rescue

Boats are essential equipment in waterborne search and rescue (SAR) operations, and are used to transport SAR teams, their equipment, and victims. SAR operations in swift water require selection of a boat that will provide The safest transportation possible in this extreme environment.

Swift water is powerful, relentless water moving down an incline. Rapids, streams, and waterfalls are examples of swift water and may be naturally occurring or driven by floodwaters. The selection of a boat for a particular swift water incident should be driven by the severity of the swift water, as well as likely underwater obstructions and the method that will be used to transport the boat to the launch area.

Kingfisher, OK, August 2007
Photo by: Marvin Nauman/FEMA

There are two types of inflatable boats that are best suited for swift water SAR, inflatable rescue boats (IRBs) and rigid hull inflatable boats (RHIBs). Numerous other types of boats can be used in swift water SAR, including rigid hull boats, "V" hulled boats, flat bottom boats (Jon boats), and personal watercraft. Each type has specific advantages and limitations in swift water environments, which are not discussed in this TechNote. Although many boats are not ideally suited to swift water environments, they are used in such settings when nothing better is available. Commonly, multiple types of watercraft are needed in a jurisdiction for SAR use in the various types of operating environments.

Technology Overview

Materials used in the construction of inflatable boats vary. IRBs generally have either rubberized fabric floors or inflatable floors, which allows water to drain effectively. IRBs can also have a rigid floor, which improves the speed of the boat. The rigid floor is typically made of wood, fiberglass, or aluminum.

RHIBs have a rigid fiberglass, wood, or aluminum hull surrounded by an inflatable bladder that forms the sides of the boat. An RHIB combines the stability and buoyancy of an inflatable boat with the speed of a rigid hulled boat.

A boat for swift water rescue should always have at least two types of propulsion: primary and secondary. Types of primary propulsion include conventional propeller drive outboard motor with propeller guard and outboard motor with jet drive. Types of secondary propulsion include paddles and oars.

Swift Water Rescue

Advantages of Inflatable Boats

Ease of deployment: Inflatable boats are relatively light and easy to deploy, even without a trailer. If necessary they can be deflated and carried into remote locations, or flown in by helicopter either inflated or deflated. They are easily inflated using a mobile air compressor or compressed air tank.

Safety: Inflatable boats are stable and forgiving in swift water and capable of operating in fairly heavy whitewater or surf conditions. In the event of a flip, the boat has fewer hard surfaces to injure crewmen or victims. If the motor fails, most inflatable boats are light enough to be paddled.

Training: Because inflatable boats are stable and more forgiving, they require less operational training than most other rescue boats.

Disadvantages of Inflatable Boats

Cost: Inflatable boats cost three to four times as much as conventional boats.

Speed: IRBs are slower than conventional boats of comparable size.

Durability: The outer skin is subject to abrasion, tearing, and environmental deterioration.

Time constraints: Rescuers must allow some time for inflation before use.

IRBs and RHIBs Comparison

The environment in which a rescue boat is used impacts its performance. Due to the flexibility of the hull, IRBs out-perform RHIBs in swift water. This hull flexibility allows the IRB to bounce when it comes in contact with debris, making IRBs safer and more durable in swift water. RHIBs, however, are a better choice in calmer waters or where speed is a consideration. RHIBs are faster than IRBs because of their rigid hull.

Performance Considerations

Inflatable boats are powered by conventional outboard motors which can have problems in swift water. Aerated whitewater can be as much as 60 percent air, which reduces the effectiveness of a conventional propeller. Due to this reduction in effectiveness, using a propeller designed for these conditions is essential. In addition, using a propeller guard reduces thrust, but makes the boat safer when operating around victims and rescuers who are in the water. Outboard motors can be purchased with a jet drive in place of the conventional propeller. Although expensive, the jet drive reduces exposure to the external blade.

When selecting the most appropriate inflatable boat for an incident, the incident manager will want to review planned mission profiles, including weather and water conditions, to address key capabilities such as speed, range, load capacity, towing capability, draft, propulsion types, and equipment.

Resources

The InterAgency Board. (2007). *Standardized Equipment List*. http://www.iab.gov

Ray, Slim. (1997). *Swiftwater rescue*. Asheville, NC: CFS Press.

Spivak, Wayne. (nd). *Rigid Hull Inflatable Boats (RHIBs)—Built for Rescue*. United States Coast Guard Auxiliary. http://www.auxguidanceskills.info/press/rhib.html