THE RESCUE COMPANY 1

HELICOPTER RESCUE

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SWIFTWATER RESCUE
GEAR

Personal equipment

Rescue teams carry a vast range of equipment, depending on their areas and levels of operation. Awareness level personnel are not rescue team members, but do need to have knowledge of the equipment used as they may perform a supporting role in the cold zone.

Personal protective equipment for a Rescue Technician

Rescue personnel need to be properly equipped for the situations they face and the role they intend to perform.

Protective clothing suitable for the task is essential. Just as firefighters would not wear a drysuit to attend a fire, the same approach must be adopted for water rescue. Fireproof clothing is unsuitable to enter the water.

Before equipment is chosen, it is necessary to look at the hazards that personnel need protection from. This directly relates to the zones to be operated in. In a water rescue, the most obvious hazard is the water itself. However, the hazmat issues of water rescue, and in particular flood events, must also be taken into consideration.

Drysuits

Personal protective equipment (PPE) must protect the wearer from the water itself and contact with it. A barrier is required between people and the hazardous material. A drysuit fulfills this purpose. A drysuit will fit a range of people, as long as the seals fit effectively.

A drysuit (membrane surface suit) offers a barrier but no impact protection or thermal properties. Therefore, a drysuit requires additional thermal clothing to be worn underneath. This can be regulated and layers added or taken away depending on the conditions.

Many different styles of drysuits are available. Some have integral boots and others offer gortex socks, latex socks or latex ankle seals.

Integral boots have the advantage of being complete and easily put on. The feet are protected from hazmat. The sizing of the boot is important for effective use. However, many boots tend to be difficult to swim in effectively, or they have soles which do not offer much grip. Integral boots cannot be removed if the boot is caught in an underwater entrapment. The drysuit would have to be compromised by cutting off the boot.

Possibly a better option is to use integral socks on the drysuit and have separate functional boots such as specialist water rescue boots, hiking boots or industrial safety boots. This option allows greater flexibility with equipment. Separate boots can then be the correct size for the end user. Naturally, latex socks are more fragile than integral boots and need to be protected more cautiously.

Wetsuits

Neoprene wetsuits offer good insulation and impact protection. Neoprene offers increased buoyancy for rescue swimmers. However to provide the best thermal qualities, wetsuits need to fit tightly. This makes them quite specific to individuals. Wetsuits work by trapping a layer of water between the individual's skin and the suit material which then becomes warm from the body heat. While wetsuits can be a good option for rescue teams when operating in clean rivers, they are not suitable for use in a flood environment as they offer no protection from hazmat, as the skin is in contact with the floodwater.

Personal flotation device (PFD)

A personal flotation device is any device which assists a person to float. Lifejackets (inflatable PFDs) and buoyancy aids are both different types of PFDs.

Terminology Note:

It is important to note that in the United States, the term PFD is used in common usage to denote both lifejackets and buoyancy aids.

PFDs For Rescuers

The most critical piece of equipment for anyone within 10 feet of the edge of the water is a good rescue buoyancy aid (PFD). Buoyancy aids are designed for intentional water entry, so are easy to swim in. They offer good impact protection as they are foam-filled. They also offer reasonably good insulation, but this is a negative when operating in the heat.

Rescue buoyancy aids have a number of extra functions in addition to providing buoyancy. They are highly visible. They provide storage for equipment and attachment for a knife. They also have a quick-release chest harness designed for work in the water environment. The harness is the only safe point to attach a floating rope to a rescuer. The quick-release chest harness is releasable under load, if the rescuer needs to escape the system.

A cowstail is a very useful addition to the quick-release chest harness, as it allows an individual rescuer to attach and detach themselves from rope systems with ease. However, the cowstail can pose a snag hazard if it is incorrectly stowed.

Fit is Key

While proper buoyancy is critical, fit is also very important when selecting a PFD. Try to find one that provides the proper flotation while still fitting properly. Comfort is important too, because if it is uncomfortable, it won't get worn.

Testing a Flotation Device

1. Try it on and fasten all the buckles and straps. Make sure you can breathe easily.
2. If you can pull it over your head, it's too big. If you can't fasten all the buckles and straps comfortably, it's too small.
3. With supervision, enter the water and float on your back. Make sure your chin clears that water so that you can breathe. If your chin/mouth is underwater, you need more flotation.
4. Try swimming on your front and back. Make sure you can move well enough and that your PFD or lifejacket does not float up around your face. If so, it's too big.

Specific Legislation

United States

In the United States, all PFDs are approved by the U.S. Coast Guard. The USCG recommends the following PFDs for emergency responders:

- Type III - for boat-based activity in calm, inland waters
- Type V - for special uses and work purposes
- Type III/V - multipurpose jackets that fit criteria of Type III & V

However, many PFDs in the above categories will not necessarily meet the minimum requirement for 22 lbs. of flotation set by the NFPA for surface water rescue. Check the label before you buy.

This assumption is given added weight because the use of lifejackets or PFDs for work is covered by provincial occupational health and safety legislation, and in British Columbia, for example, PFDs that meet the following standard are approved for work:

CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices with a minimum buoyancy of 69 N (15.5 lbs).

Worth noting however, is that the majority of lifejackets and PFDs sold (and worn) in Canada are made in the US and do not meet Canadian requirements for use on boats. And so the confusion grows.

We recommend what qualifies as either a Type III or Type IV PFD in the US.

- Type III PFDs - for those who work in, on or near moving water but for whom rescue is not their primary mandate
  - » inherently buoyant (ie. not inflatable)
  - » minimum buoyancy of 15.5 lbs
  - » at least 2 cinch straps to ensure PFD stays in place in swiftwater
  - » cinch-type strap and closure at the waist of the PFD

- Type V PFDs - for those whose primary mandate is rescue from swiftwater
  - » inherently buoyant
  - » minimum buoyancy of 15.5 lbs
  - » at least 2 cinch straps to ensure PFD stays in place in swiftwater
  - » cinch-type strap and closure at the waist of the PFD
  - » quick-release system for tethering or towing

We stand behind our recommendations because accident data clearly shows that the increased use of PFDs has resulted in significantly reduced fatalities overall.[1]

In summary, it is up to the employer to determine how to navigate this maze, but to be on the safe side, many Canadians wear a PFD in their boat, and carry lifejackets on board to meet the federal standard.

Inflatable PFDs

Lifejackets are designed for accidental immersion. They are intended to provide buoyancy and to maintain the body in a position that protects the airway. They are not designed to swim in, or for performing rescuers.

Still, lifejackets have gained popularity over the past several years due to their comfortable fit. While these PFDs certainly can be more comfortable, their need for a method of activation can be the device's Achilles heel. Some vests are equipped with a manual activator which requires conscious thought and effort to deploy. In the case of a head or spinal injury or a slow reaction time, this may not be possible. Conversely, some vests are equipped with an automatic activator which is initiated by water pressure. While removing the need for the wearer to deploy the vest, automatic inflation vests absolutely will inflate under pressure, including when the wearer is trapped in the fuselage or passenger area of a sinking helicopter or motor vehicle. This unwanted activation will trap the wearer inside the sinking equipment. They are therefore not recommended by the NFPA for rescuers.

1 US Coast Guard: http://www.uscg.mil/hq/cg5/cg5214 pfdselection.asp#commercialpfd

Helmets

The NFPA sets standards for helmets for surface water operations in the 1952 Standard. These helmets are designed to protect the head from impacts and must float. They must also be designed in such a manner that water will flow easily through them and not create a choking or injury hazard by "bucketing" or retaining water.

They must have a strong strap system and any metal parts must be corrosion resistant. The foam lining must not absorb so much water that it becomes heavy and uncomfortable to wear.

This standard does not address helmets to be worn in motorized or non-motorized boats.

Working at height helmets (EN 397) and mountaineering helmets (EN 12492) are designed to protect against objects falling from above. Most have a cradle that has a space between it and the top of the helmet. This space absorbs the energy from an impact. These helmets are not appropriate for use in swiftwater as the space can act as a bucket, catching the current, filling with water, and possibly leading to neck injuries. In extreme cases, the helmet could be ripped off, leaving the wearer unprotected.

Just because a helmet has holes does not mean it is meant for use in the water. Holes are usually intended for ventilation.

Footwear

Good footwear for the water rescue environment has always been a compromise. Recreational water shoes often have thin soles, making them unsuitable to work on rough river banks. Today there are a number of very good supportive boots available on the market and some even have climbing grade rubber soles. Water boots tend to take severe abuse from contaminated water, rough terrain, and long periods of being soaked followed by rapid drying.

Boots do not need to be waterproof (a drysuit with socks accomplishes this and so the wearer is protected from hazmat) but they must be non-slip on rough terrain, be flexible enough to swim in, and offer protection to the sole and toe area. Neoprene boots offer good insulation and will sustain constant drenching without rotting, unlike hiking boots. However, hiking boots may offer more grip and support on uneven terrain. Some industrial work boots are available. They are similar to hiking boots, but with additional steel or composite shank and toe-cap protection. The downside of using industrial boots is that they are heavy and do not drain well. This can be a distinct disadvantage in the water.

Gloves

Hands need protection in the water environment from cold, abrasion, and possibly hazmat. Neoprene gloves with reinforced palms offer warmth and some degree of protection from sharp objects. The NFPA specifies a cut-proof palm. However, if gloves are too thick, handling ropes becomes difficult and they do not offer any protection from hazmat. True dry gloves will provide hazmat protection but they become very cumbersome to swim in and for handling ropes etc. Make sure to choose your gloves carefully.

Whistle

A whistle that will continue to function after immersion in water is a vital tool for anyone operating at a water incident. Whistles can be used either to attract attention when in trouble, or as a communication system with specific calls. Swiftwater environments often have high levels of background noise created by moving water, and in many cases whistle blasts can be heard when vocal communication is not possible. They are also particularly useful during night operations.

Knives

Anyone working near the water environment with ropes must carry a knife. Ropes in water can become tangled and entrapped very easily. The knife carried needs to be very sharp and easily available, yet secure. Tying a knife on a lanyard to the PFD is not recommended, as this could become a hazard if open and thrashing around in the water when attached.

Throwbags

A throwbag is a standard water rescue tool and should be carried at all times when near water. It is comprised of a specialized water rescue rope contained in a bag for easy throwing.

Examples of throwbag types & sizes

Throwbags are available in various lengths depending upon their intended use, the most common being 50' (15m) to 75' (23m) long. The rope used is predominantly polypropylene; however, some specialist throwbags use ropes combining more than one material, such as nylon and spectra. All have a low melting point and therefore are unsuitable for high-angle rope rescue applications.

Must Float

The rope used in throwbags must float, as must the bag. Keeping the rope and bag on the surface of the water makes it easier for the victim to grab the rope and minimizes the chances of the rope tangling in debris.

Throwbags must be highly visible. The bags must be easy to pack and contain the rope easily and securely. Additional features such as lightstick holders, reflective tape and belt attachment points are all useful options.

Rope Diameter

Rope diameters vary and the thicker the rope, the easier it is to handle. Obviously, the thicker the rope is, the heavier it will be, and the larger the bag will be. Thicker rope also means that people with smaller hands may have difficulty throwing coils.

Commercially manufactured throwbags are available in a variety of lengths between 30' (9m) and 125' (38m). Smaller bags are easy to stow, carry, and throw but have limited range. Larger bags can be difficult to throw but are invaluable on wider channels. Remember, you can always make a long rope easier to throw by removing a few feet of rope from the bag before throwing, but it is much harder to make a short rope longer.

Lights

When personnel are working at night they need adequate lighting. This may be provided by portable generators and flood lighting, or from vehicles.

Personnel in the field need personal lighting. Headlamps are ideal, as they give a hands-free capability and light up wherever the individual looks. Headlamps are good for lighting the immediate personal space. LED bulb technology now delivers a pure white light and an extended battery life. Backup lights and batteries should be carried.

For search operations, headlamps are generally not powerful enough and do not cast light a sufficient distance. For this task, powerful handheld spotlights are required.

For rescuers who will operate in the water, the headlamps and lights need to be waterproof.

Emergency lights for personnel, such as Cyalume glow sticks, are advisable. Although they do not provide working light, they are very effective for locating equipment, or personnel if their personal lights fail.

Swim Fins

Swim fins can greatly increase a rescuer's speed when swimming in water. However, they can be difficult and tiring to use in swiftwater and are awkward when moving about on shore. Normal diving fins are too large for use in swiftwater, but specialist river fins are available from a number of manufacturers

Eye Protection

Water can act like snow in reflecting and magnifying light, and so if prolonged time is expected on the water in sunny conditions, suitable sunglasses that block 99-100% of UVA and UVB light can be used to help protect the eyes from damage. While polarization does not afford any further protection, it does cut glare from horizontal surfaces, such as water, and gives clearer, crisper vision.

If wearing eye protection, the benefits of cutting glare should be considered alongside possibility of impact, and operational issues, such as fogging. If an additional risk to rescuers' eyes is present (such as using hydraulic cutting tools on a vehicle in the water) then suitable eye protection should be worn.

Buoyant Aids

Although relatively rare in swiftwater rescue, for many years lifeguards have used buoyant aids to reduce the risk posed by the victim. Many different designs are available. They all work on the same basic principle of providing a large amount of buoyancy in an easy-to-grip shape and a length of rope that allows rescuers to distance themselves from the victim.