

INTERNATIONAL LIFE SAVING FEDERATION

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LIFESAVING POSITION STATEMENT – LPS 23

FLOOD DISASTER RESCUER RESPONDER PERSONAL PROTECTION EQUIPMENT (PPE)

PLAIN LANGUAGE SUMMARY

NOTE: This statement is intended for those lifeguards, lifesavers acting in a professional or volunteer capacity, who are trained in the techniques of water “flood” rescue, who assume a duty to safeguard members of the public at flood disaster events. They may be called lifeguards, lifesavers, or both. This statement is not directed at members of the public trained in water “flood” safety and rescue techniques, but without a duty to respond, who may also be known, in some areas of the world, as lifesavers.

Final note, the enclosed image represents the required technical specification of personal protective equipment to be considered. Colour is not a factor for this statement, but it is recognised that several countries with developed flood rescue capabilities do use colour to demonstrate capability and management.

BACKGROUND

Flood and coastal disasters have impacted the planet and its population over many decades, but with the onset of climate change and extreme weather, the frequency and magnitude of such events are increasing year on year which in turn is increasing demand on civil protection such as Fire and Rescue, Police along with the volunteer sector in support of national, regional, and local events. The World Health Organisation estimates 75% of deaths in drownings come from floodsⁱ, and part of the Sendai Framework for Disaster Risk Reductionsⁱⁱ notes preparedness, protecting persons both community and responders, which is underlined in their “priorities for action”, priority 4: enhancing disaster preparedness for effective response and to build back better in recovery.

Flood disaster sites pose many occupational health and safety concernsⁱⁱⁱ. These hazards and exposures are a result of the unstable nature of the site and the environment. The potential for rescue responders being exposed to unknown hazardous substances within this type of operational activity may be high, yet low in frequency. An accurate assessment of all hazards may not be possible because they may not be immediately obvious or identifiable. A list below of some of the hazardous encounters in flood water is as follows, and more information can be found on the Centers for Disease Control and Prevention website^{iv}

- Chemical
- Agricultural
- Industrial
- Animal and human waste
- Dead wildlife
- Pathogens

All the above can impact a flood responder without the appropriate personal protective equipment, which has now been identified as a minimum level to operate safely in such a disaster zone. A critical responsibility by law in most countries, to ensure that employers protect people's physical and psychological health and safety from hazards and risks in the workplace. Lessons learned from responders who have operated in some of the biggest flood disasters to date such as Hurricane Katrina 2005 (USA), and the Gloucestershire floods of 2007 (UK) identified good practices that led to policy for

responders to be trained and be wearing the appropriate PPE; such examples are the UK's National Fire Chiefs Council National occupational guidance – control measures of PPE: water rescue Jan 2022^v

It is important to note this position statement is not specifically referring to training standards, however, such standards can be found in the USA FEMA “team typing” as well as the UK DEFRA Concept of Operations 2019^{vi}, but on what is the correct PPE to maximise safety and the appropriate level of protection required for a “trained” flood responder when operating in flood water. It is essential that any responder is trained in wearing and operating the type of PPE advised in this statement.

Countries that have experienced large-scale flooding are requesting support from lifesaving federations, where the “red shorts and yellow” lifeguard uniform is not appropriate in mitigation against the hazards and possible infections of flood water. Wetsuits may feel the natural choice in keeping the responders safe; however, the wetsuit only keeps the contaminated water close to their skin, with a high chance of infection happening. The buoyancy lifejacket (PFD) should also meet a technical standard, unlike the “jet ski” or Personal Water Craft (PWC) style PFD, which is not the appropriate level of PPE to be used in this type of environment. Even in hot climates, correct PPE should be worn, but management and welfare of the personnel in the rescue zone should be in place to ensure the safety of the responder in whatever operating temperature^{vii} (*Tipton et al*).

The flood responders’ PPE is designed with several primary objectives.

- Minimise the potential of contamination to the responder.
- Allowing the responder to be protected whilst operating either by wading, floating, swimming, paddling, or the use of powered rescue craft.
- Be “Fit for Purpose” for the operational environment it is being used.
- Decontamination of the responder

Warm climate countries and Flood Response PPE

The flood rescue/responder PPE does not give any thermal protection against cold, hence the need for a thermal layer or layering system underneath the drysuit, however in warmer climates the rescuer wearing the equipment can find themselves becoming warm and experience early signs of heat illness if not aware of how to mitigate these impacts on the body before they happen. As noted in the points above, PPE is designed for protection in a contaminated environment. Operating in warmer climates, there are mitigating points to consider: -

- Rescuers are to be hydrated before the task.
- Rescuers are to be rested before operational activity.
- Rescuers to receive training on heat illness and the warning signs.
- Managers are to ensure short operational times with long breaks to address overheating and hydration.
- Manager to ensure that when not in the “rescue” arena, then PPE clothing may be relaxed.
- Cooling systems to be used in breaks such as: -
 - a container of cold water to allow wrists to enter^{viiiix}
 - Fan cooling^x

Example of a Flood Rescue/Responder Personal Protection Equipment



EN1385 white-water helmet

Surface Drysuit with integrated sock, front zip. Neck seal and wrist seal.

Whistle (pea-less)

Rescue PFD with shoulder light and release chest harness, cows' tail (tether) and Karabiner. Water knife with release set to pull down the body.

Quick release throw bag with 20m 11mm floating line.

Neoprene gloves

Water rescue boot with toe protection



STATEMENT

Safety standards for PPE may vary in different countries, and it is highly recommended that countries look for national or international safety standards to ensure that any PPE meets the minimum requirements. The small examples below indicate the many safety bodies within their own country or regional area to support a country or a group of countries.

ISO – international safety standard

AS/NZ – Australia and New Zealand

JISC – Japan Industrial Standards Committee

ANSI – American National Standards Institute

BS/EN – is a prefix BS (British Standard) followed by EN (European Standard)

NFPA – National Fire Protection Association

For clarity, any references to standards in this document will be BS/EN ISO.

The following information can assist countries in providing PPE^{xi} for disaster flooding operations: -

WATER RESCUE PPE STANDARDS

Although there are certain standards for certain items of water rescue PPE, this doesn't automatically mean that the product is "Fit for Purpose," which is the ultimate responsibility of the user/organisation in their operational/equipment risk assessment.

For a product to be fully certified, it MUST pass all the testing requirements of the specific standard. Equipment certification/product approval for a product that meets some of the criteria of the standard, which is misleading and could be potentially dangerous.

The general/generic European PPE document is PPE Regulation 2016/425.

This regulation aims to ensure common standards for personal protective equipment (PPE) in all Member States of the EU in terms of the protection of health and the safety of users while enabling the free movement of PPE within the Union.

The Regulation applies to all types of PPE except, for example, those used by armed forces, certain private uses of PPE, and those subject to other standards (e.g., PPE on seagoing vessels, motorcycle helmets, etc.).

Definitions: The Regulation includes definitions for the following terms: personal protective equipment, making available on the market, placing on the market, manufacturer, authorised representative, importer, distributor, economic operators, technical specification, harmonised standard, accreditation, national accreditation body, conformity assessment, conformity assessment body, recall, withdrawal, Union harmonisation legislation, CE & UKCA marking.

HELMETS

There are two standards relating to water application helmets, which are as follows:

- BS EN 1385:2012 - Helmets for canoeing and white-water sports (internationally recognised standard)
- PAS 028:2002 - Marine safety helmets - This standard was originally written around the “Gecko” helmet for the military, who were looking for a marine safety helmet standard.

NOTE: PAS 028 has higher impact ratings/performance than EN1385, but both are designed as close-fitting helmets, i.e., no void or space in the crown area, which is a requirement for water application helmets.

The other helmet standard that sometimes comes into play is BS EN 12492:2012 - Mountaineering equipment for mountaineers. This could be a requirement if you are working/operating at height, say doing a recovery in a gorge, etc, but the performance tests are similar to PAS 028, where the helmet is designed to stay connected to the head in the event of impact. (Some helmets have chin straps that are designed to break on impact.)

PERSONAL FLOTATION DEVICES - (FOAM BUOYANCY AIDS)

There are separate standards in Europe/UK and the US.

In Europe/UK, the standard for Personal Flotation Devices is BS EN ISO 12402-5:2020 - Personal flotation devices Part 5: Buoyancy Aids (level 50N) and BS EN ISO 12402-6:2020 - Personal flotation devices Part 6: Special application lifejackets and buoyancy aids. This standard applies to swift water/rescue style buoyancy aids/PFDs.

In the US, rescue PFDs are certified under USCG Type V for a foam-style rescue type PFD.

SURFACE DRYSUITS

Currently, there is no standard for a surface drysuit, only for a diving wetsuit and diving drysuit, which is BS EN 14225-2:2017 for diving drysuits. Although drysuits are constructed using the same methods and materials, a surface drysuit does not have valves, which a diving drysuit must have, so this standard does not apply to surface drysuits. Note that membrane drysuits act as protection against contaminated water and provide no thermal protection except the neoprene-type drysuit. New technology in “flood” or “Search and Rescue” (SAR) suits is less cumbersome and allows good flexibility.

NB: Currently, there is an ISO committee looking into establishing a standard for firefighters undertaking specific rescue activities - surface water and unstable surface rescue, which includes clothing (drysuits) as well as their compatibility. There is currently no information regarding the potential publication date of the proposed standard.

THERMAL GARMENTS

There are no recognised standards for thermal garments relating to water rescue PPE except immersion suits/clothing, which is often tested to identify the Clo^{xii} value or sometimes a TOG rating, but this doesn't relate to clothing.

From the research (*Tipton et al*), thermal performance significantly varies depending on the type of material/fabrics used, which can assist with both moisture and heat management within the drysuit.

GLOVES

There are no standards for water application gloves. In general, the thicker the glove, increases the thermal properties but reduces the dexterity of the wearer. Another method to improve thermal performance without affecting dexterity is the use of Merino glove liners, which are designed to be worn underneath a traditional neoprene glove.

FOOTWEAR

BS EN ISO 20345:2022 was updated in May 2022 from the previous version published in 2011. The UK emergency services in general have adopted the safety footwear standard for water operations based on the historical fitting of safety wellington boots to drysuits. With the potential issues surrounding foot entrapment, there was a move away from attached boots to instead using a separate boot, which can be removed in the event of entrapment. The boots that are commonly used have a safety internal toecap and a midsole to protect against penetration through the outsole.

REFERENCES

The following references were consulted and reviewed in preparation for this document:

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- i WHO https://www.who.int/health-topics/floods#tab=tab_1
 - ii United Nations Sendai Framework for Disaster Risk Reduction 2015-2030
 - iii SLSGB Inland and Flood Water Awareness Document version 3 2020
 - iv <https://www.cdc.gov/disasters/floods/floodsafety.html>
 - v <https://www.ukfrs.com/component/15491/revisions/362444/view?t=1643144153>
 - vi https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/934130/frco-november-2019a.pdf
 - vii The Thermal Demands of Flood Rescue and Impacts on Task Performance: Michael J. Tipton, Cristian Abelairas-Gómez, Adrian Mayhew, Gemma S. Milligan
 - viii Hand immersion as a method of cooling and rewarming. A short review. Tipton et al (1993) JRNMS
 - ix 20. An evaluation of hand immersion for rewarming individuals cooled by immersion in cold water. Cahill et al (1995) ASEM
 - x Post-exercise cooling techniques in hot, humid conditions. Barwood et al EJAP
 - xi <https://safequip.co.uk/learning-zone/>
 - xii <https://idf1.com/info/tog-and-clo-measurements/>

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