**The following extract from BS ISO 23616:2024 is intended for UK licenced/certificated Aerodrome Operators.**

**BS ISO 23616:2024 - Cleaning, inspection, and repair of firefighters' personal
protective equipment (PPE)**

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The following is an extract from BS ISO 23616:2024 - Cleaning, inspection, and repair of firefighters' personal protective equipment. The extract provides Airport Fire Managers with outline guidance regarding the inspection, cleaning and drying of firefighter PPE and the relevant policy and records that should be available.

Full details can be found in:

[BS ISO 23616:2024 - Cleaning, inspection and repair of firefighters' personal protective equipment (PPE) - Documents](https://sd.iso.org/documents/ui/#!/doc/3d7912bb-9c15-46e5-8231-df3b4eb7da6b)

The full Standard considers all technologies for decontaminating and cleaning firefighters PPE, including all new technologies, i.e., LC02 processes.

**General:**

It is the responsibility of the firefighter (initially and ongoing) to undertake regular inspections of their PPE, and there should also be a reliable system/mechanism, (including training), to ensure that this can be achieved effectively.

**Cleaning:**

An effective cleaning, inspection and repair system includes the following:
a) inspection — checking for faults, damage, wear and tear, dirt, etc.;
b) cleaning — including disinfection and decontamination if appropriate;
c) repair;
d) replacement;
e) recording.
f) testing — to ensure PPE is operating as intended.

All routine PPE cleaning and inspection shall be carried out according to the manufacturers or supplier’s instructions and shall be conducted by a competent firefighter or competent person or competent organization, such as a PPE manufacturer, a competent laundry or other competent organization.

**Routine inspection**

Individual firefighters shall conduct routine inspections of their PPE upon issue and after each use, cleaning and/or repair. These checks shall be carried out by the firefighters before and after each use to identify any defects before being exposed to hazardous situations.

There shall be clear criteria and instructions provided to the firefighters for when and how to send PPE for cleaning and inspection. The instructions shall include details of how to prevent cross contamination and how those transporting or receiving these items can be protected.

The inspection criteria shall be selected based on the potential consequence and may include:

If the abnormality is
a) minor: take no action,
b) moderate: send for repair, and
c) major: prohibit use, major repair or discard and replace.

Firefighters shall distinguish between appropriate cleaning levels by reference to the following factors:

1. soiling:
— soiling in regular use require hygienic cleaning.

b) contamination:
— biological contamination (e.g. blood);
— fire contamination due to combustion products during fire (e.g. smoke, soot);
— chemical contamination (e.g. oil, grease, battery acid);
— unidentified CBRN agents;
— soiling due to other activities not listed above

Contaminated PPE shall not be brought into the home or transported in fire apparatus cabs or passenger compartments within personal vehicles. It is recommended that a procedure be established within the Rescue and Firefighting Service (RFFS) whereby contaminated PPE is removed from the body as soon as possible after the intervention and packed in a vapour-proof and puncture resistant bag/container. Where this is unavoidable, the cabin of the fire appliance/truck shall be cleaned and decontaminated at the first possible opportunity once firefighting operations have ceased.

Where cleaning of PPE is required, guidance shall be provided to the firefighter by the Airport Fire Manager/Accountable Manager on how to identify contamination, as opposed to soiling, and on how best to clean the PPE in a safe and effective manner.

Waste waters discharged from the laundry process and its environmental effects shall be considered and shall conform to local laws and/or national regulations when discharging waste waters or effluent to public drainage or waterways.

The RFFS shall have written procedures that detail decontamination and cleaning processes
for contaminated PPE. These procedures shall:

a) Minimize the risk of contamination to all people from exposure to contaminated garments/firefighting PPE.
b) Require that PPE not be worn or stored in the non-operational living areas of the fire and rescue service facilities.
c) Ensure PPE be stored in a correctly lit, ventilated and dedicated storage room, which is isolated from any other section of the fire station.
d) Provide training in identifying contamination and determining the cleaning methods (routine and
advanced cleaning) to be applied. PPE known or suspected to be contaminated by hazardous materials shall be assessed at the incident to determine the appropriate level of treatment.

**Routine cleaning**

Routine cleaning includes:

a) hygienic cleaning, and
b) partial cleaning completed by fire fighter (e.g. brushing of clothing).

Firefighters shall ensure that their PPE is cleaned routinely and as required. Routine cleaning shall
be carried out by a trained and competent person. Routine cleaning shall be carried out according to the manufacturers or supplier’s instructions.

**Advanced cleaning**

Any advanced cleaning shall be carried out by competent firefighters or competent organization according to the manufacturer’s instructions. Before advanced cleaning is undertaken advice shall be taken on whether the contaminant can be removed.

Advance cleaning includes:

a) decontamination from chemical contamination,
b) decontamination from biological contamination, and
c) decontamination from contamination due to products of combustion.

Items contaminated by unidentified CBRN must be disposed of according to local laws and regulations.

Some known chemicals are commercially available for industrial use. PPE that has been exposed to
identifiable chemicals may not have to be disposed of. Specialist advice shall be sought on appropriate decontamination methods.

PPE that is issued and used shall receive advanced cleaning at the time of advanced inspection if not
subjected to advanced cleaning in the preceding 12 months.

Organizations shall follow the manufacturer’s label and instructions on cleaning and drying that were
provided with the PPE.

**Records**

At least the following records shall be kept for each item of PPE:

a) person to whom PPE is issued;
b) date and condition when issued;
c) manufacturer and model name or design;
d) manufacturer’s identification number, lot number, or serial number;
e) month and year of manufacture;
f) date(s) of cleaning and inspection and type of cleaning;
g) date of repair with details of repairs carried out.

**Routine cleaning**

In the case of observing mild soiling without hazardous contamination, clean the surface with water and gentle brushing. Where possible, the contamination type shall be evaluated and field decontamination shall be initiated at the emergency scene. Contaminated garments shall be contained wherever possible and shall be isolated to avoid cross contamination.

Personnel shall be trained on cleaning garments and provided with PPE appropriate to the contaminant(s).

Any dry debris shall be brushed off, ensuring adequate respiratory protection is used during this process.

Other debris shall be gently rinsed off with water. Heavy scrubbing or spraying with high-velocity water jets such as a power washer shall not be used.

Where necessary, a soft bristle brush should be used to gently scrub the garment, and the garment shall be rinsed off again.

For spot cleaning only, a garment can be cleaned in a utility sink designated for PPE cleaning and
decontamination using the following procedures:

a) to avoid cross contamination, garment layers shall be isolated whenever possible;
b) cleaning of the entire garment shall be accomplished using advanced cleaning procedures;
c) to avoid contamination of personnel, handling shall be minimized when processing garments.

**Advanced cleaning**

Whenever PPE is heavily soiled and/or contaminated with hazardous materials which cannot be removed by routine cleaning, advanced cleaning shall be applied.

Advanced cleaning of garments shall be conducted by a cleaning process that has been proven to
adequately clean.

NOTE Depending on the accessibility, type and quality of the gear, the advance cleaning process can be carried out through a traditional water-based process as well as using new technologies such as the cleaning process based on liquid carbon dioxide, ozone technology, and or combination of different, or new innovative cleaning processes.

Washing machine manufacturer’s instructions shall be followed for proper settings or program selection for the specific garment being cleaned based on garment manufacturer's instructions. The garment manufacturer shall provide appropriate cleaning instructions.

If no instructions are provided from the garment manufacturer the following process shall be used:

a) Select an appropriate load factor. The recommended loading is 50 % to 60 %. In case of over loading, contaminants may not be sufficiently removed, in case of under loading the mechanical action may cause damage.
b) Heavily contaminated or spotted areas shall be pre-treated according to the garment manufacturer’s instructions.
c) Chlorine bleach, chlorinated solvents, active-ingredient cleaning agents or solvents shall not be used without the garment manufacturer’s approval.
d) Fasten all closures, including pocket closures, snaps, zippers, and hook and loop fasteners. Pockets can contain sharp objects so care shall be taken when checking/emptying pockets.
e) Water temperature shall not exceed the temperature stated on the care label and the manufacturer’s instructions. If no temperature is given, seek advice from the garment manufacturer. Failing that in the absence of any recommendation, the water temperature shall not exceed 60 °C.
f) A detergent with a pH range of not less than 6,0 pH and not greater than 10,5 pH as indicated on the product safety data sheet (SDS) or original product container shall be used.
g) Washing machines with drum revolutions per minutes (r/min) adjustment shall be adjusted to the
garment manufacturer’s instructions.
h) Removal of detergent and chemical residues through appropriate rinsing is very important.
i) A minimum three rinse cycles are advised, with a water to weight ratio of 9:1.
j) The item shall be inspected and rewashed if necessary.
k) The garment shall be dried in accordance with the guidance detailed below.

Independent verification of the cleaning process shall be obtained at least annually. This will prove that the cleaning process remains effective.

The washing machine shall be cleaned by running the machine without a laundry load, through a complete cycle with detergent and filled to the maximum water level with the water set to the maximum temperature (in excess of 70 °C). This shall be done at least weekly.

Where the outer shell and liner of protective garment are separable, those items shall be cleaned and decontaminated only with like items. Separable liner systems shall be turned inside out so the moisture barrier is on the inside for both machine washing and machine drying.

Where fabric treatments are required for a garment to meet the requirements of the relevant standard, based on the manufacturer’s instruction:

Ensure the fabric treatment still meets requirements.
If not, refurbish the fabric treatment.

**Drying**

All drying shall be performed in accordance with manufacturer’s instructions and shall be conducted by competent organizations.

In the absence of manufacturer’s instructions or manufacturer’s approval of alternative procedures, the drying procedures provided in this subclause shall be used. Based on the manufacturer's instructions, the drying temperature may need to be increased to re-activate repellency.

The following procedures shall be used for air drying:

a) items shall be placed in an area with good ventilation;
b) items shall not be dried in direct sunlight.

The following procedures shall be used for machine drying:

a) the recommended capacity of the machine shall not be exceeded;
b) all closures, including pocket closures, snaps, zippers, and hook and loop fasteners shall be fastened;
c) a “no heat” or “air dry” option shall be used, if available;
d) in the absence of a “no heat” or “air dry” option, the basket temperature shall not exceed 60 °C unless otherwise indicated on the garment label or in the manufacturer’s instructions;
e) the use of a heat cycle shall be discontinued prior to the removal of all moisture from the item;
f) the remainder of the drying process shall be accomplished by a “no heat” machine setting or removal of the item from the machine dryer to air dry.