



NFCC
National Fire
Chiefs Council

The professional voice of the
UK Fire & Rescue Service

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Firefighters Personal Protective Equipment

Standard, Specification and Requirements

Structural Firefighting Layered Jacket

Please note that this standard is currently under review by NFCC PPE and Clothing Committee

Collaborative PPE Project - May 2016

SCOPE

This performance specification describes the requirements for a protective layered fire jacket for both male and female fire fighters.

The layered fire jacket should offer the wearer protection from injuries, which could arise through accidents in the working sector for which the clothing is designed.

The layered fire jacket is to be appropriately CE marked:

BS ISO 16073:2011; *Wildland firefighting personal protective equipment – requirements and test methods*

BS EN 15614:2007; *Protective clothing for firefighters – Wildland clothing*

BS EN ISO 20471:2013; *High visibility clothing – Test methods and requirements*

BS EN 469:2005; *Protective clothing for firefighters – Performance requirements for protective clothing for firefighting*

BS EN ISO 6350:2005; *Protection against liquid chemical*

PERFORMANCE REQUIREMENTS

Description and Use

Provision of protective layered fire jacket that meets the general and specific needs of Fire & Rescue Service (FRS) operational personnel.

The solution must be suited to the range of structural firefighting, external firefighting and rescue activities carried out during emergency response and training operations. The product must be of such design, robustness, material and specification to meet the needs of these operations. It should also be simple to clean, repair and maintain.

Modern fire service activity covers a broad range of incidents and as such innovative solutions for PPE can be developed.

One such solution is a layered (multi-functional jacket). This design will provide layers of kit which will provide protection, in a modular layering format; where the wearer 'layers up' from lower risk, by the addition of one or more layer(s), to higher risk (full structural).

The initial layer(s) will be the default 'every day wear' (not station wear) and be designed to perform and be worn for most interventions. Levels of protection here still exist but are lower than those required in full structural garments.

The initial layer(s)/garment should be less complex by design and be cheaper and easier to repair.

For the purpose of this specification the generic term 'layered jacket' will be used and more specifically: -

- Base-Layer- Station wear or equivalent (not to be part of this tender process for information purposes only)
- Mid-Layer Jacket – conforming to relevant sections of; BS ISO 16073:2011 BS EN 15614:2007, BS EN ISO 20471:2013 Class 3 for working on roadways and BS EN ISO 6350:2005 Protection against liquid chemical.
- Top-Layer- a further level of PPE to be combined with the mid-layer jacket, therefore achieving that the whole ensemble complies with level 2, BS EN 469:2005.

The colour of the Top-Layer fabric to match that of the supplied fire trouser fabric.

All test performance data must be submitted with tender document, please indicate compliant and submitted where requested. All documentation to be in English.

Firefighting PPE is designed, following a suitable risk assessment, to protect firefighters from risks that cannot be removed by other means.

One potential emerging risk to firefighter's health is exposure to contaminants as a result of the incidents that they attend; some of these contaminants may be carcinogenic.

All Contractors should be mindful of these emerging risks and as such ensure that the PPE is designed to be easily cleaned and decontaminated. In addition methods for identifying that the PPE may be contaminated should also be considered when designing the PPE.

UNDER REVIEW

1. BS EN 469:2005 minimum performance requirements	
2.1	In combination the mid layer and top layer to fully comply with the requirements of BS EN 469:2005, level 2 Required: Independent Certification from an organisation belonging to United Kingdom Accreditation Service (UKAS), or equivalent.
Additional Information – Required	
2.2	Clause 6.2 EN367:1992 Heat Transfer – Flame: Assembly: $HTI_{24} = 22 \text{ sec}$ Assembly: $HTI_{24} - HTI_{12} = 6 \text{ sec}$
2.3	Clause 6.3 EN ISO 6942:2002 Heat Transfer-Radiation @ 40Kw/m2: Assembly: $RHTI_{24} = \geq 27 \text{ sec}$ Assembly: $RHTI_{24} - RHTI_{12} = > 9 \text{ Sec}$
2.4	Clause 6.4 Residual Tensile Strength after EN ISO 6942:2002 method A @ 10Kw/m ² = > 1000N
2.5	Clause 6.6.1. EN ISO 13934-1 Tensile Strength, method 1 (outer material) = > 1500N
2.6	Clause 6.6.2. EN ISO 13935-2:1999 Tensile Strength (seamed outer) = > 310N
2.7	Clause 6.7 EN ISO 13937-2:2000 Tear Strength (outer fabric) = > 110N
2.8	Clause 6.11 EN20811 Resistance to water penetration (moisture barrier) Level 2 > 100 kPa
2.9	Clause 6.11 EN20811 Resistance to water penetration (seamed specimen) Level 2 $\geq 20\text{kPa}$
2.10	Clause 6.12 EN31092 Water Vapour Resistance Level 2 $\leq 20 \text{ m}^2\text{Pa/W}$

2.11	Clause 6.13 Ergonomic performance Annex D or BS EN 13921:2007	
2.12	Garment test results for Instrumented Manikin-Test Method EN ISO 13506:2005 (BS EN 469:2005, annex E) 8s @ 84Kw/m2 RALPH and SOPHIE	
3. BS ISO 16073:2011 and where applicable BS EN 15614:2007 minimum performance requirements		
3.1	Mid layered jacket to fully comply with the requirements of BS ISO 16073:2011 and additionally BS EN ISO 6350:2005 Required: Independent Certification from an organisation belonging to United Kingdom Accreditation Service (UKAS), or equivalent.	
Additional Information – Required		
3.2	Clause 4.5.1.2 Face Ignition	
3.3	Clause 4.5.1.3 Edge ignition (optional)	
3.4	Clause 4.5.1.4 Flame 5 behaviour test of the main seams	
3.5	Clause 4.5.2 Heat transfer – Radiant exposure RHTI ₂₄ ≥ 8 sec Clause 6.3 BS EN 15614:2007 = RHTI ₂₄ – RHTI ₁₂ ≥ 4 sec	Preferable meets Clause 6.3 BS EN 15614:2007 = RHTI ₂₄ ≥ 11 sec
3.6	Clause 4.5.3 Heat transfer – Flame exposure HTI ₂₄ ≥ 3.5 sec	
3.7	Clause 4.6.1 Tensile strength ≥ 600 N	
3.8	Clause 4.6.2 Tear Strength ≥ 25 N	
3.9	Clause 4.6.3 Main seam strength ≥ 300 N	
3.10	Clause 4.7.2 Thermal resistance ≤ 0.055 m ² K/W	

3.11	Clause 4.7.3 Water vapour resistance ≤ 10 m ² Pa/W	
3.12	Clause 4.8 Dimensional change after cleaning Not exceed 3% in either direction	
3.13	Clause 4.9 Retroreflective/fluorescent performance	
3.14	Clause 4.10– Clothing testing-Test Method EN ISO 13506:2005 4s @ 84Kw/m ²	Results to be submitted
3.15	Additionally BS EN ISO 6530:2005 Protection against liquid chemical.	
3.16	Additional thermal layers – Solutions for extra thermal protection against cold to be supplied, such as zipped liners	
4. BS EN ISO 20471:2013 minimum performance requirements		
4.1	Mid layered jacket to fully comply with the requirements of BS EN ISO 20471:2013 In achieving this standard polyester or blended polyester must not be used within the outer fabric. Fabric such as a modacrylic should be used. Required: Independent Certification from an organisation belonging to United Kingdom Accreditation Service (UKAS), or equivalent.	
Additional Information – Required		
4.2	Clause 4.1 Types and classes Class 3 – Torso with sleeves	
4.3	Colour – Fluorescent yellow	
5. General Requirements – Required		
5.1	Compatibility – Each Layer needs to be clearly identifiable and visually clear if both or one layer is being worn, to ensure that levels of protection can be suitably managed.	Must be proven to be compatible with other PPE items recommended in the tender bid (Helmet, Fire Hood, Gloves, Fire Trouser and Fire Boots). Especially the interaction areas such as the glove and the sleeve. Ease to don and doff.

5.2	Role marking and personal identification.	Suggestions for easily interchangeable Rank Markings and personal identification.
5.3	Unique Identification	<p>Details and examples to be submitted and included in pricing schedule.</p> <p>Solution supplied shall be capable of being uniquely identifiable to enable product traceability, such marking may include unique bar-coding and RFIDs tagging. Method to be durable taking into account the use of the item and the recommended cleaning procedures.</p> <p>In addition suitable area for wearer to add their details, if required; and for this to be reusable.</p>
5.4	Comfort	Solution to be comfortable to wear for extensive periods of over one hour.
5.5	Equality and Diversity	<p>A broad range of sizes to encompass both male and female wearers and those of differing ethnic backgrounds.</p> <p>A wide size range from at least XXS _ XXXL with a range of heights from at least XS-XT and the ability to make special sizes if required.</p> <p>Examples to be given and an indication of timescales</p>
5.6	Decontamination and Cleaning Wash cycles are a way for services to understand the expected life of a garment and remain assured that the product still remains 'fit for purpose'.	The solution must be easily decontaminated and cleaned. Must still pass BS EN 469:2005 after 40 wash cycles. Independent certification to be provided.
5.7	Pockets and attachments	<p>Tunic: radio pocket, glove loop, facility for attachment of rank markings, station/ID number.</p> <p>Inner pocket must have facility for attachment of whistle and chain.</p>
5.8	Protection Areas	Elbow and Shoulder. Ideally in the mid layer.
5.9	Collar	Designed so does not 'create' a "funnel" effect.
5.10	Anti-wicking	Tunic: hem and Cuffs (cuffing arrangement must be sufficient to prevent any bypass (wicking) to the internal fabric of the sleeve).
5.11	Retro-reflective Tape	Requirements of EN469:2005 Annex B

		Tape should ideally not compromise overall breathability of garments.
5.12	Tunic zip to have a quick release system to allow any internal heat to be released and removal of tunic in emergency situations.	
5.13	Any Velcro closures or attachments must not damage or interfere with other equipment, such as safety harnesses. In addition use of Velcro should be used in such a way that contamination, such as asbestos, is not trapped or attracted.	
5.14	Lifing	Provide information, in addition to care and maintenance instructions, as to the expected life of the respective jackets. This may be based on number of washes that the jackets maybe subjected to and still pass the requirements of BS EN 469:2005 when combined.