



PROTECTING THE WORLD'S FIREFIGHTERS



**Structural**



# Bristol

## A global force in firefighter protection

With 50 years' experience in the specification, design and manufacture of firefighter Personal Protective Equipment (PPE) it is little wonder that Bristol's garments now protect firefighters in over 110 countries.

This catalogue contains details of Bristol's clothing designed for use in structural fire fighting situations, known in some countries as bunker or turnout gear. The main standards covering structural firefighting garments are EN469 in Europe and the NFPA standards in the USA. You will find more information on these, together with test methods and a glossary of terms, on pages 6 and 7 of the Bristol Technical Introduction catalogue.

### The European standard EN469 tests for compliance with:

- Heat transfer of flame and radiation
- Resistance to liquid chemicals
- Water vapour resistance

### In the USA, the NFPA 1971 standard also calls for compliance with:

- Thermal Protective Performance (TPP)
- Conductive and Compressive Heat Resistance (CCHR)
- Blood/viral protection
- Total Heat Loss (THL)
- Transmitted and Store Thermal Energy Test

This catalogue shows the base styles from which Bristol's many product variations are made. With over 3500 separate models on offer, we can rightly claim to provide a unique bespoke service to meet firefighters' exact needs.



On pages 10 and 12 of the Bristol Technical Introduction catalogue, you will see the most commonly used feature additions. And you can of course get further information from Bristol or your local distributor.

**Structural firefighting clothing to Level 2 must consist of:**

- An outer layer to protect the wearer from flame injuries.
- Moisture barrier to give protection from external water penetration and allow internal moisture vapour to escape.
- Thermal barrier and inner layer/lining providing heat protection from proximity to flame.

There are also minimum requirements for reflective material that may be specified as part of EN471. All Bristol garments conform to EN343 water resistance requirements and most to EN1149 for protection against static electricity.

Bristol also meets the variations to European standards, such the German HuPF, Australian Standard AS/NZ 4697: 2009, Austrian Standard AS-04 and Russian Standard. So, whatever your circumstances, you can be confident that our expertise and product range will meet your needs.





# Using the best fabrics to achieve outstanding performance

## Fabric choice

Protective clothing for firefighters is manufactured from three layers: outer layer, moisture barrier and thermal barrier.

The choice of fabrics available for each of these layers is described below.

### Outer

The following fabrics are supplied and recommended by Bristol because their properties and construction are such that they will neither melt nor ignite.



**NOMEX® TOUGH** - Widely used over many years by fire brigades throughout the UK and Europe, Nomex® Tough has proved its durability for the rigours of firefighting. It comprises 75% Nomex®, 23% Kevlar® for strength and 2% P140 carbon fibre (which gives the fabrics its anti-static properties). It is available in 195 g/m<sup>2</sup> twill weave in a variety of colours. This fabric gives excellent tensile and abrasion resistance.

**TITAN** This is a patented TI-technology™ fabric design manufactured using a Nomex®/Kevlar® fibre combination. Because the system uses the 'ACTIVE AIR ENTRAPMENT' system, coupled with the added strength, it offers the highest levels of thermal protection and garment integrity.

**TITAN1220** Independent testing has proved that the **TITAN1220** fabric system creates up to 25% more thermal protection than conventional Aramid fabrics of the same weight, because it effectively harnesses the benefits of air, one of the world's lightest and most effective heat insulators. The fabric composition is 89% Nomex®, 9% Kevlar®, 2% P140 (Anti-static). It is supplied in a weight of 220 g/m<sup>2</sup> in a wide range of colours. **TITAN1220** manages the fibres in such a way, with a double cloth construction of Nomex® on the face and a Kevlar® grid on the back, that the fabric has excellent colour fastness, abrasion resistance and is able to withstand multiple launderings. These properties ensure excellent wear-life and best value.

**TITAN1250** is woven using TI-technology™, a unique double cloth construction using a Nomex®/Kevlar® fibre combination. The system has Dual Protection with the Nomex® layer on the face of the fabric, the Kevlar® grid on the back which is woven together with the Nomex® yarn. This produces an

intelligent flame retardant outershell that increases your thermal protection when it is needed, giving you more time to react to your environment. During exposure to intense heat and flame, our unique and innovative design moves and ripples, trapping insulating air within your garment – a process known as 'ACTIVE AIR ENTRAPMENT'. This intelligent reaction is your reassuring reminder that **TITAN1250** gives you even more protection when you need it most and works harder to keep you safer for longer. The fabric composition is 59% Nomex®, 40% Kevlar®, 1% Anti-static, weight 270 g/m<sup>2</sup>. It can be supplied in a range of colours.

**REPEL+** In addition, the **TITAN** fabrics are supplied with the **REPEL+** which offers a durable protection against water, acids, alkalis, white spirit, aviation fuel and petrol.

**REPEL+** technology produces a soft-feel finish without affecting the excellent handle of top quality outer-shell fabric.



**PBI Gold** is an exclusive blend of fibres that provides protection and comfort. This fabric does not shrink or become brittle after exposure to heat or flame. PBI Gold gives you extra time and mobility to be effective and to get out quickly from the heat and flame, when every second counts.

The fabric comprises 40% PBI and 60% Para-Aramid and is available in a ripstop plain weave, 205 g/m<sup>2</sup>. The natural colour is gold but other colours are available.



**PBI Matrix®** is a durable matrix of high-strength Aramid filaments which have been woven into the PBI Gold fabric to enhance and reinforce its resistance to wear and tear whilst retaining its heat and flame protection. This fabric does not shrink or become brittle after exposure to heat or flame.

The fabric comprises 40% PBI and 60% Para-Aramid and is available in a plain weave of 205 g/m<sup>2</sup>. The natural colour is gold but other colours are available.

Other PBI fabrics are also available, such as and **TITAN1260** with PBI.



Other fabrics. Fibre producers and weavers are constantly introducing new developments, and Bristol can supply outershell fabrics in addition to those described above.



## Moisture Barrier

Moisture barriers manufactured by Gore & Associates are the primary choice for firefighting clothing produced by Bristol. The micro-porous breathable fabric performs a dual role: stopping water passing through to the firefighter's personal clothing while allowing perspiration and heat to escape to the outside atmosphere. This reduces any heat stress the firefighter might suffer.

The moisture barriers are extremely durable, ensuring that the properties of the fabric last the lifetime of the garment.

Gore & Associates products available from Bristol are:



**GORE-TEX® FIREBLOCKER** moisture barrier is an ePTFE membrane laminated to a non-woven substrate.

**GORE-TEX® AIRLOCK®** moisture barrier - A unique combination of thermal protection and moisture barrier which eliminates the need for extra-thick insulation. The innovative construction uses thermally stable and chemically resistant foam silicone spacers to create an insulating air cushion, giving a very high level of thermal protection without a bulky and restrictive insulation layer.

**GORE-TEX® FLAMELINER** moisture barrier is an ePTFE membrane laminated to a woven 50% Aramid/50% Viscose FR fabric.



**CROSSTECH®** fabric is the result of Gore's ongoing commitment to innovation in the area of high-performance protective fabrics for use in demanding rescue and recovery applications.

If a risk assessment indicates the need for durable protection against blood and body fluids, **CROSSTECH®** fabrics provide the solution. **CROSSTECH®** fabrics offer the most durable body-fluid penetration resistance in a breathable moisture barrier.

**CROSSTECH® FIREBLOCKER** moisture barrier - This has all the features of Gore-Tex® Fireblocker with the additional benefit of providing protection against blood-borne pathogens.

**CROSSTECH® AIRLOCK** moisture barrier - This has all the features of Gore-Tex® Airlock with the additional benefit of providing protection against blood-borne pathogens.

**CROSSTECH® A/R FABRIC** moisture barrier is an ePTFE membrane laminated to a woven fabric. This has all the

features of Gore-Tex® Flameliner with the additional benefit of providing protection against blood-borne pathogens.

Other recommended barriers:

In addition to those described above, Bristol can supply alternative moisture barriers, including:

## Thermal Barriers

### Quilted Barriers

The lightweight thermal barrier used by Bristol is 100% Aramid non-woven felt and is quilted to either:

- **Nomex Delta C**
- **Nomex Viscose**
- **FR cotton**

**ECO-DRYCOOL** lining, which is lightweight incorporating wool/Lenzing FR to transport moisture vapour, in the form of sweat, through the liner. The hygroscopic nature of wool absorbs moisture and keeps you dry without feeling cold or wet. Weight 135 g/m<sup>2</sup>.

**ECO-DRYACTIVE** has a unique double cloth construction which has all the features of the above but with the double cloth construction which gives enhanced thermal protection. Weight 220 g/m<sup>2</sup>.

## Weaves

### Twill

Diagonal twill gives good tensile strength and abrasion resistance.

### Plain weave

This usually consists of an equal number of warp (down) and weft (across) yarns, so that there is no diagonal weave effect.

### Rip stop (twill or plain weave)

This produces a raised self colour check effect, retaining virtually all of the abrasion resistance of normal twill. A thicker gauge or superior strength thread used periodically in both warp and weft directions gives a subtle checked appearance, and prevents tears becoming larger.



# B-Tech

## Standard EN469 Level 2

B-Tech is Bristol's entry level for a structural firefighting coat and trousers to EN469 Level 2.

The short style coat is designed with ergonomic fit. The trouser measurements provide adequate overlap, so that there is no gap between coat and trousers when bending.

### Features

#### Coat

- Two outer lower welt pockets with mitred flaps
- One internal patch pocket
- Plain cuffs with Neoprene anti-wicking barrier
- Neoprene anti-wicking barrier in hem
- Hanger loop on under collar
- Moulded zip front with Velcro fastened flap, Neoprene lined
- Flip back throat tab Gore-tex lined
- Articulated sleeves

BT/A with silver reflective

BT/B with triple trim reflective

#### Trousers

- Standard waist trousers with side elasticsation
- Fixed braces crossed at back
- Back seat with yoke
- Self cloth outer curved kneepads, twin stitched seam and Aramid felt internal knee pads
- One internal hip patch pocket
- Plain trouser hems with Neoprene anti-wicking panels

TBT/A with silver reflective

TBT/B with triple trim reflective

### Sizes

**Chest/waist:** Small to 4XL

**Height fittings:** short/regular/tall/extra tall

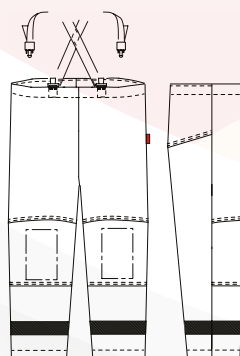
28 male and 28 female sizes



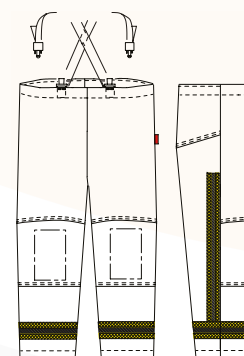
BT/A coat



BT/B coat



TBT/A trouser



TBT/B trouser





BT/A Coat, TBT/A Trousers



BT/B Coat, TBT/B Trousers



# Ergotech Action fire coat and trouser

## Standard EN469 Level 2

### Ergotech Action coat model EA2/A

- Collar and throat tab shape provide optimal compatibility with helmet and fire hood
- Shoulder shape and increased upper sleeve allow full rotational mobility in shoulder and arm
- Shaped panel over the shoulder eliminates the shoulder seam and makes a smoother line with greater comfort when wearing breathing apparatus
- Increased underarm gusset allows more manoeuvrability when reaching overhead
- Two action pleats added at the back shoulder

### Ergotech Action trouser model TEA2/A

- Articulated knees with convex seams around the knee for greater flexibility when bending/climbing
- Shaped seaming on back of knee to reduce fullness when crawling
- Top of trouser contoured to the body with raised back and elasticated adjustment across lumbar region
- H pattern braces
- Two large half bellow pockets

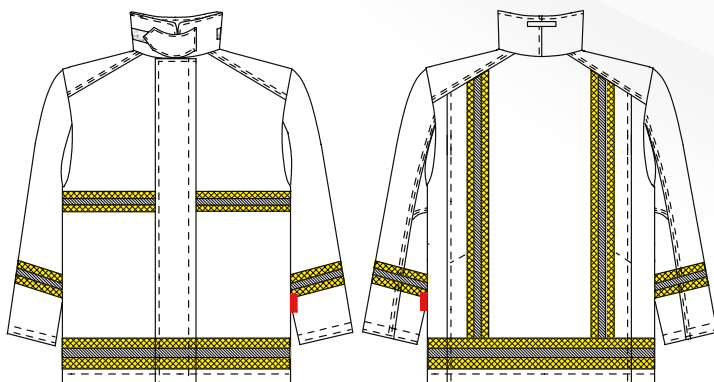
### Sizes

**Chest/waist:** small - 4XL

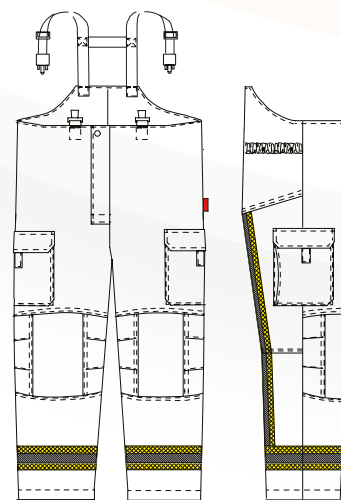
**Height fittings:** short, regular, tall and extra tall  
28 male and female sizes



H braces and elastication in lumbar region



EA2/A coat



TEA2/A trouser





Back  
Pleat



Articulated  
Knee

EA2/A Coat, TEA2/A Trousers



EA2/A Coat, TEA2/A Trousers



# XFlex: EN469

XFlex is Bristol's latest silhouette in light-weight firefighting PPE. Ergonomically designed it gives the ultimate in fit and comfort for the maximum number of body types. XFlex has distinctive sports styling and offers a garment combination that is suitable for the various hazardous roles associated with a fire-fighter's work.

## Coat

### Silhouette

- Tapered body shape
- Hem curved up at front and down at back – comfort and protection
- Shoulder shape and under arm gussets allow for full rotational arm movement
- Shoulder yoke shaped for comfort, especially with breathing apparatus
- Angled and curved style lines, emphasised shaping highlighted with reflective piping and contrast stitching

### Style Features

- Double zip flap extends to neck with internal zip guard to protect throat
- Soft knitted inner lining on collar
- Deep return on cuff hem ensures gloves fit well inside sleeve
- Large landscape side pockets with shaped flaps incorporating internal pull tab
- Vertical pocket under zip flap and pen pocket
- Large internal pocket with care and instruction label
- Ergonomic three dimensional articulated elbow
- Hem of sleeve curved over back of hand for additional protection

## Trouser

### Silhouette

- Natural waistline at front with high curved back
- Centrally placed zip fly allows tapering of top of trouser, giving superior fit and making it easier to put on.
- Distinctive angled and shaped seam lines highlighted with reflective piping.

### Style Features

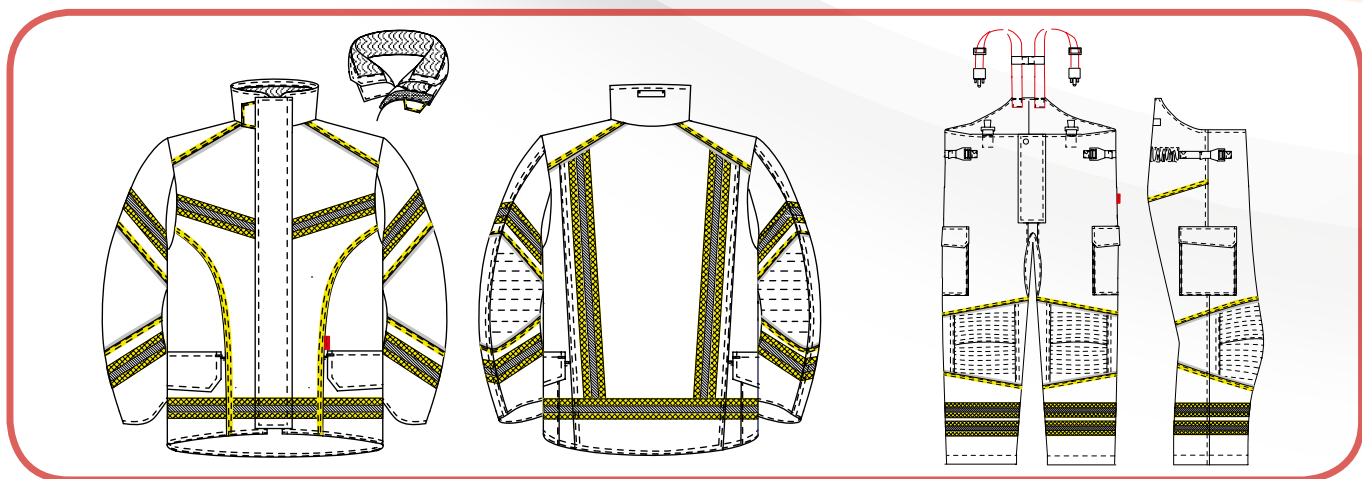
- H Braces with unique webbing slide adjuster
- Large twin pleated cargo pockets with shaped pocket flap incorporating integral pull tab, and large internal patch pocket, with care and instruction label.
- Inside hem lined with Neoprene to minimise abrasion from boots.
- Fully articulated 3 dimensional ergonomic knee shaping which goes through all layers.
- Very flexible reinforcement fabric used.

## General

Tape configuration gives extra reflective area whilst also emphasizing style lines. The tape is breathable and stitched with 'Trimsaver' meta-aramid braid.

Brigade names can be added to the back or on a vertical sleeve graphic on the coat.

28 sizes, i.e. 7 chest fittings 4 height fittings available in both male and female ranges.







Shaped  
Back



Articulated  
Knee







# XFlex: NFPA

The XFlex design has been developed and will also meet NFPA 2013. The ergonomic design gives the ultimate in fit and comfort for the maximum number of body types. XFlex has distinctive sports styling and is available in fabric combinations that are suitable for the various hazardous roles associated with a fire-fighter's work.

**The NFPA XFlex suits are available in the following fabric combinations: -**

**Outer:** Hainsworth TITAN1220 **TITAN1220** or Pbi Matrix 

**Moisture Barrier:** Crosstech  Black.

**Inner Lining:** Thermal Barrier quilted to a Nomex  filament lining which wicks the sweat away from the body and also is "slippery" for ease when putting the garments on and taking them off.

## Coat

### Silhouette

- Tapered body shape
- Hem curved up at front and down at back – comfort and protection
- Shoulder shape and under arm gussets allow for full rotational arm movement
- Shoulder yoke shaped for comfort, especially with breathing apparatus
- Angled and curved style lines, emphasised shaping

### Style Features

- Bristol designed Drag Rescue Device (DRD)
- Double zip flap extends to neck with internal zip guard to protect throat
- Deep return on cuff hem ensures gloves fit well inside sleeve
- Large landscape side pockets with shaped flaps
- Vertical pocket under zip flap and pen pocket
- Large internal pocket with care and instruction label
- Ergonomic three dimensional articulated elbow
- Hem of sleeve curved over back of hand for additional protection
- Inspection zip

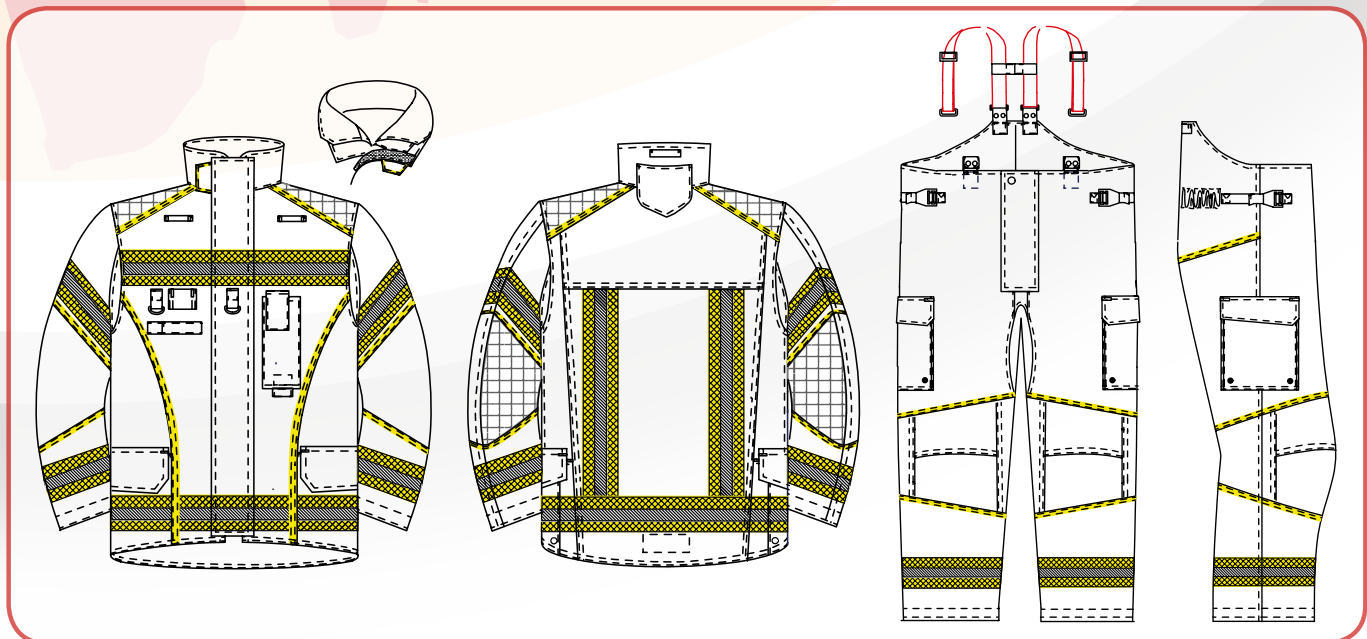
## Trouser

### Silhouette

- Natural waistline at front with high curved back
- Centrally placed zip fly allows tapering of top of trouser, giving a superior fit and making it easier to put on.
- Distinctive angled and shaped seam lines.

### Style Features

- Detachable H Braces with unique webbing slide adjuster
- Large twin pleated cargo pockets with shaped pocket flap, large internal patch pocket with care and instruction label.
- Inside hem lined with Neoprene to minimise abrasion from boots.
- Fully articulated 3 dimensional ergonomic knee shaping which goes through all layers. Very flexible reinforcement fabric used.
- Two side waist adjusters





# North American style - NFPA

## Standard NFPA 1971

Based on the Ergotech model, Bristol manufactures firefighter garments which meet the North American standard NFPA. They are tested independently by Underwriters Laboratories Inc. (UL), who carry out rigorous testing on all materials, components and garments.

Not surprisingly, Bristol was the first company to have sold NFPA type garments, manufactured in the UK from European fabrics, into the United States market.

### Coat NE/A

#### Features

- Bristol design Drag Rescue Device (DRD)
- Underarm gussets
- Flip back throat tab
- Articulated sleeves
- Action pleats on back
- Elbow and shoulder pads
- Two lower box bellow pockets with flaps, pull tabs and drainholes, handwarmer pockets behind
- One inside patch pocket on lining
- Two vertical jetted pockets under front flap
- Radio pocket
- Two microphone loops
- Two D rings on front
- Torch loop
- 75mm triple trim reflective tape

### Trouser TNE/A

#### Features

- Two box bellow pockets with flaps, pull tabs and drainholes
- Zip fly with Velcro flap
- Detachable 'H' braces
- Articulated knees with Arashield centre panel
- High back
- One inside hip patch pocket
- 75mm triple trim reflective tape
- Two side waist adjusters and elasticsation at back

### Sizes

Coat 34" - 60", trousers 30" - 60"

Height fittings: short, regular, tall and extra tall



NE/A Coat, TNE/A Trouser





# Coverall to EN469

## Fully lined coverall UNC9

In certain areas, a one-piece garment is preferred to the coat and trouser. Bristol offers a practical solution which is durable, yet comfortable.

### Features

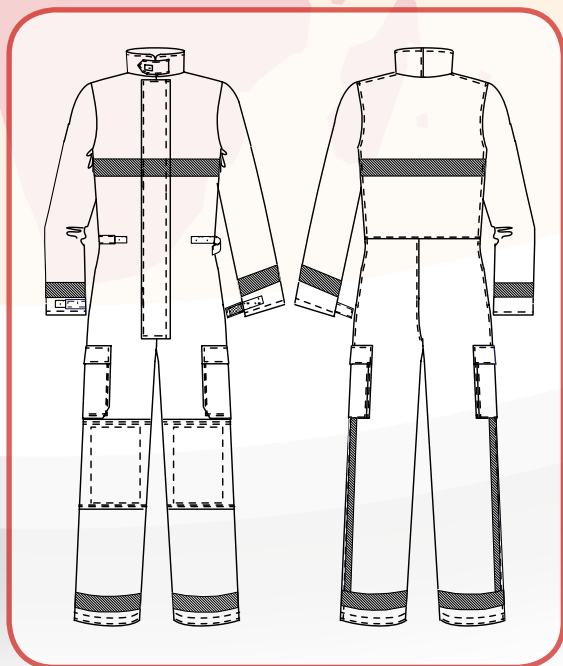
- Two half bellow thigh pockets with drainholes
- One internal pocket
- Plain waist (no elastic)
- Two way zip covered with Velcro fastening flap
- 50mm silver 3M Scotchlite™ reflective tape
- Available in sizes: small, medium, large, X-large, XX-large

### Sizes

**Chest/waist:** small - 4XL

Height fittings: short, regular, tall and extra tall

28 male and female sizes



UNC9



UNC9



# Bristol

## Motorcycle Suit

Bristol's Motorcycle Suit is a new design which is dual certified to meet both the European Standard for Professional Motorcycle Riders and also the European Standard for Fire-fighters' Clothing. The Standards are met as follows: -

### Features

- Protective Clothing for Professional Motorcycle Riders BS EN13595-1:2002 Level 2.
- Motorcyclists Protective Clothing Against Mechanical Impact Part 1: Requirements and Test Methods for Impact Protectors BS EN1621-1:1998.
- Motorcyclists Protective Clothing Against Mechanical Impact Part 2: Motorcyclists Back Protectors – Requirements and Test Methods BS EN 1621-1:2003.
- Protective Clothing for Firefighters – Performance Requirements for Protective Clothing for Firefighting BS EN 469 Level 2.

**The Motorcycle Suit uses four fabrics in the coat and trouser, which are: -**

**Layer 1** Outer fabric which has high tensile, tear and abrasion qualities.

**Layer 2** Moisture Barrier – Goretex Fireblocker.

**Layer 3** Thermal protective fabric which also provides excellent abrasion resistance.

**Layer 4** Aramid/Viscose lining.

### Jacket

#### Silhouette

- Tapered body shape.
- Hem curved up at front and down at back for comfort and protection.
- Shoulder shape and underarm gusset allow for full rotational arm movement.
- Ergonomically shaped sleeve.

#### Style Features

- Front zip fastening with double flap fastening.
- Vertical pocket with zip fastening under front flap.
- Two large internal pockets.
- The back, shoulder and elbow protectors are removable for cleaning.
- The jacket can be attached to the trouser by a zip.

### Trouser

#### Silhouette

- Waistline curved at front and higher at the back.
- Centrally placed zip fly for ease of putting on and superior fit.

#### Style Features

- H-braces with unique webbing slide adjuster.
- Fully articulated three dimensional ergonomic knee shaping which goes through all layers.
- Ankle zip with flap to ensure close fitting and for ease of putting on
- The hip and knee protectors are removable for cleaning.



Note: A two-layer Motorcycle suit which meets EN469 Level 1 is also available. Please contact us for further details.







# Making clothing to order ensures meeting the customer's requirements

Almost every fire brigade has its own special requirements when equipping operational teams: for instance, the type of radio used, where it is to be located with the associated mic loop and PPT fittings.

These needs are catered for by Bristol's bespoke approach to PPE specification, using our core designs (found in the Bristol Structural fire-fighting catalogue). The addition of special features is tailored to each fire brigade's needs.

## **Bristol can provide technical support in preparing specifications and tender documents.**

This bespoke approach meets the unique need of each firefighter, as each element of the garment is tailored to the individual's requirements. Bristol has over 300 product feature variations.

The styles we have shown in this brochure are the base styles which can have a combination of additions, as required. Examples of the additions available are: Pockets and Flaps, Radio Pockets, Loops and Straps, Glove Hooks, Badging and Graphic – many other additions are also available.





## Coat and trousers with harness

We have designs in Ergotech Action and XFlex which are designed to be worn with a harness. An example is shown below: -



The trousers are fitted with a lightweight seat harness which is certified to CE EN368. The trousers are designed so the harness is fitted around the waist of the trouser. The leg straps are integrated inside the layers of the trouser with the adjustment via openings on either side fastened by Velcro.



A second harness which is certified to EN361 can be added to the top half of the body and attached to the seat harness to give full fall arrest protection. When the coat is worn there is an opening on the front to allow access to the central carabiner when required.



Both harnesses can be removed and replaced to inspect the harness and also to clean the fire clothing.



PROTECTING THE WORLD'S FIREFIGHTERS



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(ICP)

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Services