



NFCC
National Fire
Chiefs Council

Challenges facing firefighters

PPE

17th and 18th May 2023

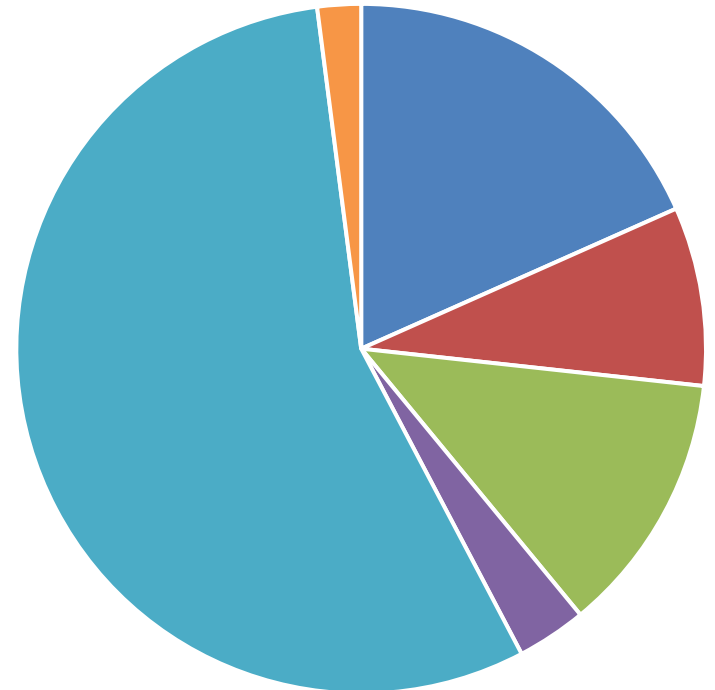
England fire Statistics 2021

“fires accounted for 27% of calls”

This represents 147,295 incidents:

- Dwellings = 27,015
- Other buildings = 12,358
- Road Vehicles = 18,117
- Other outdoors = 4,811
- Secondary fires = 81,982
- Chimney fires = 3,012

[Fire and rescue incident statistics:
England, year ending December 2021 -
GOV.UK \(www.gov.uk\)](https://www.gov.uk)



NFCC
National Fire
Chiefs Council

England fire Statistics 2021

The fire service traditionally supplies fire suits to EN 469 level 2 - protection required when fighting fires in structures.

From the data:

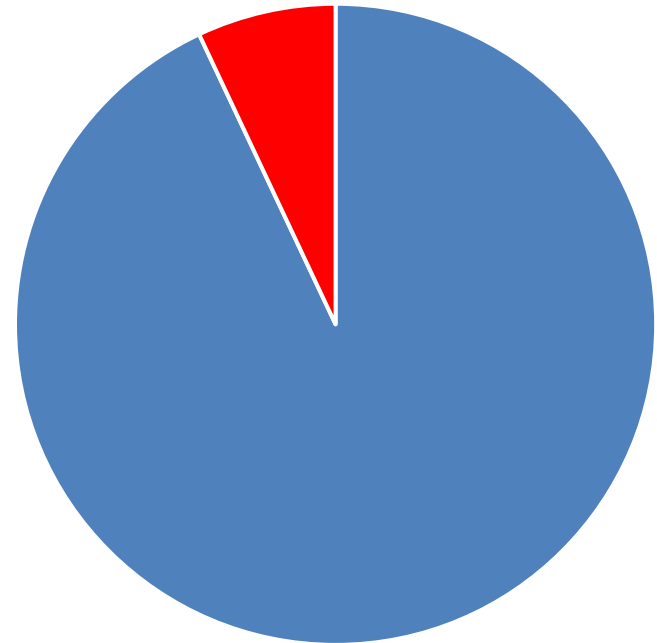
- Dwellings = 27,015
- Other buildings = 12,358

These incidents represent just 7% of activity.

Of that 7% it is likely that no entry was required into the structure.

Therefore we are using our structural PPC for the other $\geq 93\%$ of our activities.

NB. Previous years data has been calculated between 5-6%



NFCC
National Fire
Chiefs Council

Performance

Heat and Flame Resistance

- Heat resistance
- Heat transfer (flame)
- Radiant heat transfer

Mechanical Properties

- Tear resistance
- Tensile strength
- Residual strength

Comfort

- Dimensional change
- Chemical resistance
- Breathability



Relevant standards

	CEN (BS)	ISO
Structural Garments	BS EN 469	ISO 11999-3
Helmets	BS EN 443 BS EN 16471 (wildland) BS EN 16473 (Tech. Rescue)	ISO 11999-5
Fire Hoods	BS EN 13911	ISO 11999-9
Gloves	BS EN 659	ISO 11999-4
Boots	BS EN 15090	ISO 11999-6
Wildland Garments	BS EN 15384	ISO 16073 (various parts)
Technical Rescue Garments	BS EN 16689	ISO 18639 (various parts)

under review



NFCC
National Fire
Chiefs Council

Thermal Intensity faced by firefighters

Routine

- 20-70°C
- < 1.67 kW/m²
- 10-20 mins

External attack

Hazardous

- 70-300°C
- 1.67-12.56 kW/m²
- 1-10 mins

Internal Attack

Emergency

- 300-1200°C
- 12.56-209.34 kW/m²
- < 1 min

Flashover

N. J. Abbot, S. Schulman, Protection from fire: non-flammable fabrics and coatings, J. Coat. Fabr. 6 (1976) 48.

R. Rossi, Fire fighting and its influence on the body, Ergonomics 46 (10) (2003) 1017.

J.A Foster, G.V Roberts, measurements of the firefighting environment – summary report, Fire Eng. J .55 (178) (1995) 30.

B.N. Horschke, Standards and specifications for firefighters' clothing, Fire saf. J. 4 (1981) 125.



NFCC
National Fire
Chiefs Council

Heat and flame properties

- Heat resistance
- 180°C v 260°C
- Heat transfer (flame)
(22 sec = 169 %)
- $80\text{kw}/\text{m}^2$ - 13 sec
- Radiant heat transfer
(27 sec = 150%)
- $40\text{ kw}/\text{m}^2$ -18 sec



Boyd Street Fire, Los Angeles

May 2020

12 firefighters injured in
fire and explosion

Direct flame
impingement > 40 sec

[Boyd Street Fire](#)



NFCC
National Fire
Chiefs Council

Buffalo New York



<https://www.9news.com.au/world/us-firefighter-missing-in-new-york-building-after-blaze/4ddb40eb-2bae-43fc-bfc2-6fccc7dd9cda>



NFCC
National Fire
Chiefs Council

Mechanical properties

- Tear strength
(110n = 366%)
- Tensile Strength
(1500n = 333%)
- Residual strength
(1000n = 222%)
- $\geq 30n$
- $\geq 450n$
- $10 \text{ kw/m}^2 = \geq 450n$



Comfort

- Dimensional change
- +/- 3% in both directions
- Chemical Resistance
- > 80%
- Breathability
- $\leq 30\text{m}^2\text{Pa/W}$
- $(\leq 20\text{m}^2\text{Pa/W} = 133\%)$



Equality, Diversity and Inclusion



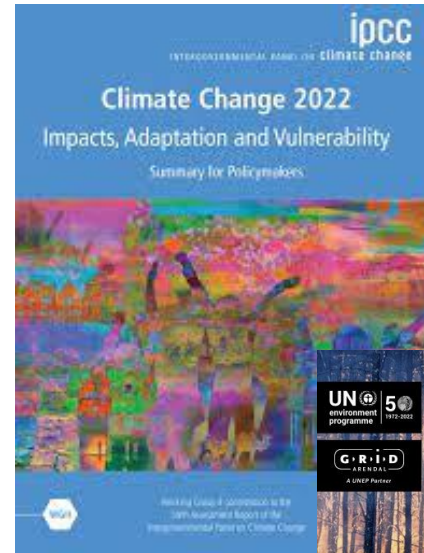
- Fit:
 - sizing
 - protection
- Gender neutral
- Religious garments
 - Hijab – FR?
- Brand



NFCC
National Fire
Chiefs Council

Environmental

- IPCC 6th Assessment
- UN Environment Programme - *Spreading like Wildfire*
- Summer 2022



NFCC
National Fire
Chiefs Council

Contaminants (PAHs /PFAS)

Fire effluent (wildland?)

- Additional protection?
- How clean is clean? – What cleaning system?

C8/C6 finishes – chemical resistance

- C8 now banned and derogation expired
- C6 likely to be banned – Affect?
- All forever chemicals to be banned – HSE

PFAS containing moisture barriers (PTFE)

- To be removed? – Affect?
- Use something different – Affect?

NFCC Contaminants Group

[Regulator's report on "forever chemicals" published | HSE Media Centre](#)



NFCC
National Fire
Chiefs Council

New threats

- Electric Vehicles
- Attacks on firefighters
(terrorist threat)



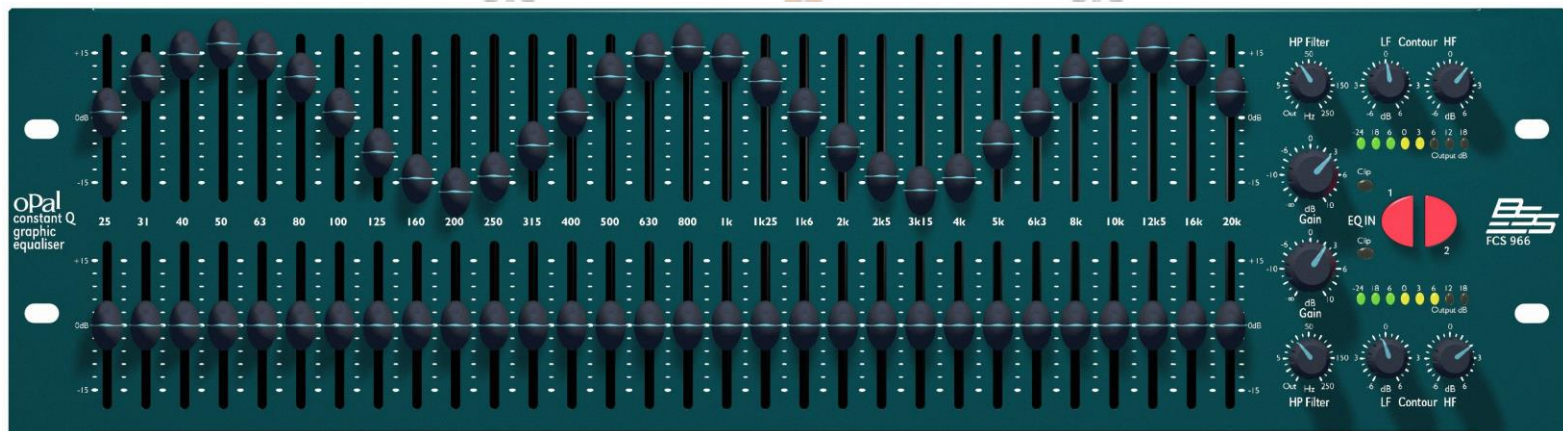
What next?

Last line of defence, but has limitations



Caution – be careful what you ask for!

Thermal Burden



Thermoregulation



NFCC
National Fire
Chiefs Council

Not forgetting



Helmets

- Better fit/weight
- Ease to adjust
- Ease to Clean

Fire hoods

- Protection level
- Particulate blocking?

Gloves

- Dexterity
- Grip

Boots

- Penetration resistance
- Fit/comfort/weight
- Electrical resistance



Next Steps



Work together – NFCC PPE as a conduit of sharing



Get involved – feedback through regional reps



Use research – e.g., Future firefighter



Standardise our requirement to get the best from suppliers

