Ansell

FLAME PROTECTION

SAFETY BRIEFING

INTRODUCTION

> “Thermal events are largely unpredictable; they happen quickly and without warning.”

As a worker’s last defence against occupational accidents, injury and illness, selection of appropriate personal protective equipment in the industrial sector is crucial, particularly where the threat of momentary thermal events such as flash fires is present.

Exposure to heat, flame and sparks — along with other flammable or combustible materials — can put workers at substantial risk of injury, necessitating the provision of suitable protective garments made from flame retardant fabrics.

Thermal events are largely unpredictable; they happen quickly and without warning. In most cases, the real threat is not the original hazard, but the potential for injury arising when non-flame retardant clothing catches fire and continues to burn until extinguished. In these incidents, every second of contact between the fabric and its wearer has a significant impact on the severity of subsequent injuries.

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BODY PROTECTION

The correct choice of Body Protection is critical when dealing with potential flash fire hazards.

Under the EN ISO 14116:2015 Protective clothing – Protection against flame – Limited flame spread materials, material assemblies and clothing, a classification system is given for materials, material assemblies, and garments which are tested according to ISO 15025, Procedure A.

- Parts/components covered by flame requirements
- One single limited flame spread index figure (1, 2 or 3)
- Re-usable clothing to be tested before and after washing
- Approval to EN ISO 14116:2015 alone does not allow the use of the fire protection pictogram

Under these tests, products are only required to meet the minimum performance requirements specified. Conformance to these type standards does not mean that the suit is 100% impervious to hazard.

Any external garment should be constructed from flame retardant materials and designed specifically to provide a shield from particulates and pressurised liquid spray, without compromising wearer protection in the event of a flash fire or other thermal event. A superior solution will incorporate additional protective details, such as stitched and taped seams that ensure an effective liquid and particle barrier.

BODY PROTECTION

EN 340:2003 has been replaced with EN ISO 13688:2013.

This standard sets out the general requirements for protective clothing, i.e. materials shall not be known to cause skin irritation or have any adverse effect to health.

In Europe, chemical protective clothing manufacturers and their products are regulated by Regulation (EU) 2016/425.

Compliance with one or more European Norms (EN) is an accepted means of demonstrating a product's conformance with the PPE Regulation and offers an indication of its potential for use in a hazardous chemical environment.

The European Union defined a norms (standards) system based on "Types" and "Classes." Chemical protective clothing is categorized into one or more of these "Types," with the designation based upon the physical state of the hazard and type of exposure. This system of "Types" is also described in the global standard ISO 16602.

CURRENT EUROPEAN "TYPES" OF CHEMICAL PROTECTION CLOTHING

EN "TYPES"	DEFINITION	SYMBOL*
EN 943-1 & 2 "Type 1"	**Gas Tight Chemical Protective Clothing** Protective clothing against dangerous solid, liquid and gaseous chemicals, including liquid and solid aerosols	 TYPE 1
EN 943-1 "Type 2"	**Non Gas Tight Chemical Protective Clothing** Suits which retain positive pressure to prevent ingress of dusts, liquids and vapours **Note:** As of 2015 EN 943-1, Type 2 is no longer specified	 TYPE 2
EN 14605 "Type 3"	**Liquid Tight Suits** Suits which can protect against strong and directional jets of liquid chemical	 TYPE 3
EN 14605 "Type 4"	**Spray Tight Suits** Suits which offer protection against saturation of liquid chemicals	 TYPE 4
EN ISO 13982-1 "Type 5"	**Dry Particulate Protection** Suits which offer protection to the full body against airborne solid particulates	 TYPE 5
EN 13034 "Type 6"	**Reduced Spray Suits** Suits which offer limited protection against a light spray of liquid chemicals	 TYPE 6

HAND PROTECTION

Like body protection, hand protection used to minimise the effects of heat will also permit the wearer to carry out required tasks.

Under the EN 407:2020 Gloves giving protection against thermal hazards, thermal protective gloves are given a performance level rating across six key areas:

a. Resistance to flammability
b. Contact heat resistance
c. Convective heat resistance
d. Radiant heat resistance
e. Resistance to small splashes of molten metal
f. Resistance to large splashes of molten metal

Tested gloves achieve a rating of 1-4, with 4 indicating the highest level of protection.

STANDARD	PERFORMANCE LEVEL	1	2	3	4
	a. Limited flame spread After flame time and after glow time (finger & seam areas)	< 15 s no requir.	< 10 s < 120 s	< 3 s < 25 s	< 2 s < 5 s
	b. Contact heat (10°C increase) Contact temperature and Threshold time (glove palm and, where relevant, other areas)	100°C > 15 s	250°C > 15 s	350°C > 15 s	500°C > 15 s
	c. Convective heat (24°C increase) Heat transfer index (glove palm & back)	> 4 s	> 7 s	> 10 s	> 18 s
	d. Radiant heat (40°C increase) Heat transfer (back of glove)	> 7 s	> 20 s	> 50 s	> 95 s
	e. Small drops of molten metal (24°C increase) Number of droplets (glove palm & back & cuff)	> 10	> 15	> 25	> 35
	f. Large quantities of molten metal (damage to a simulated PVC skin) Mass of molten iron (glove palm & back & cuff)	30g	60g	120g	200g

HAND PROTECTION

Gloves must also achieve at least a level 1 rating and meet the EN ISO 21420:2020 Protective gloves – General requirements and test methods.

The recently revised EN 407 also added a minimum glove length requirement for gloves which claim to protect against molten metal splashes, as below:

GLOVE SIZE	MINIMUM GLOVE LENGTH (MM)
6	300
7	310
8	320
9	330
10	340
11	350

The maximum temperature at which a glove can be used also depends on the following characteristics:

- Glove construction material
- Contact or radiant heat
- Exposure time
- Exposure temperature
- Nature of molten material

Glove construction materials and fibres melt at different rates, so it is important to ensure the chosen solution is designed to offer heat protection at the specific temperature risks present in an application.

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COVERING ALL THE BASES

Some industries, such as oil and gas, utilities, metal fabrication, welding and petrochemical, will additionally expose workers to liquid splashes and sprays.

In these applications, the best defence is a multifaceted workwear selection approach. Incorporating a combination of suitable thermal protective workwear, supplemented by appropriate outerwear designed specifically to deliver protection from liquid chemicals, will deliver a superior flame protection solution.

While the overall aim is to provide adequate protection against thermal injury, comfort is still a key issue. Selecting a design that emphasises wearer comfort can improve adherence to PPE policy, lessens the chance of workers circumventing the rules and delivers a safer workplace overall.

> **“... the best defence is a multifaceted workwear selection approach.”**

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