

White Paper

Radiant Heat & Convective Heat Standards

Revised:

October 2012, November 2014

Introduction

The last few years have seen the withdrawal and replacement of three well-known Fire Resistant (FR) workwear standards for clothing including EN531 which is now EN ISO11612 Protective Clothing for Heat & Flame Protection.

The new standards are similar in terms of their FR protection levels, but quite different to their predecessors concerning the amount of testing required. In addition, the standards are targeted at testing complete garments including the seams whereas before most were fabric tests only with clothing design aspects.

Included in EN ISO11612 are test requirements for Convective and Radiant Heat tests. These tests are identified by the letters B for Convective and C for Radiant, followed by a number.

The purpose of this White Paper is to note how the Min/Max values of these figures have been amended from the EN531 standard to the EN ISO11612 standard and the effect that has on the associated Performance Level figures.

Below are two charts showing the previous EN531 figures compared to the EN ISO11612 figures:

EN367/ISO 9151– Convective Heat

The test: A sample is subjected to a calorific flux of 80 Kw/m^2 . A calorimeter (in contact with the sample) will measure the necessary time in order to produce an increase in temperature of $24^\circ\text{C} \pm 0,2^\circ\text{C}$. The result is defined by the code B and a digit which defines the protection level.

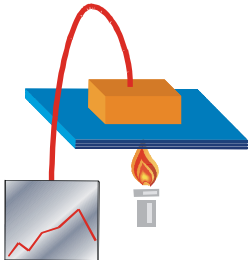


Table 1 - Performance Levels: Convective Heat Test

Performance Levels	Range of HTI ^a 24 Values			
	EN ISO11612 (ISO 9151)		EN531 (EN367)	
	min.	max.	min.	max.
B1	4,0	< 10,0	3,0	6,0
B2	10,0	< 20,0	7,0	12,0
B3	20,0		13,0	20,0
B4			21,0	30,0
B5			31,0	

^a Heat Transfer Index, as defined in ISO 9151

EN366 Method B – Radiant Heat

The Test: A source of radiant heat with a density calorific flux of 20 Kw/m² falls upon a sample. This test measures the necessary time in seconds (t₂) for the person to start feeling pain, and the time it takes to produce 2nd degree burns. The result is obtained from the mean result and is defined by the code C and a digit which defines the protection level.

ISO6942 Method B – Radiant Heat

The Test: A source of radiant heat with a density calorific flux of 20 Kw/m² falls upon a sample. This test measures the necessary time in seconds for the calorimeter to register a 24 degree rise in temperature (RHTI₂₄). It is to be noted that the ISO test method utilises a copper calorimeter which is faster reacting to that of the aluminium calorimeter used by EN 366). The result obtained from the lowest result and is defined by the code C and a digit which defines the protection level.

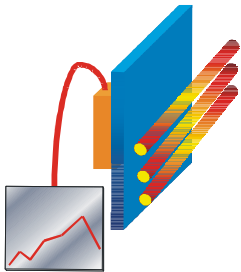


Table 1 - Performance Levels: Radiant Heat Test

Performance Levels	Range of Allowed values			
	EN ISO11612 RHTI 24		EN531 Time to T ₂ (s)	
	min.	max.	min.	max.
C1	7,0	< 20,0	8,0	30,0
C2	20,0	< 50,0	31,0	90,0
C3	50,0	< 95,0	91,0	150,0
C4	95,0		151,0	

Conclusion using a Product Example:

Specification from a Competitors Aramid Firesuit (Document Dated: November 2007)

These performance requirements are taken from a Firesuit currently on the market place using an aramid fabric:

“The outer fabric shall give limited flame spread to comply with BS EN 531 Code Letter A. The Convective Heat performance level for the fabric assembly shall be a minimum of B3 (HTI value 13) and the Radiant Heat performance level a minimum of C2 (mean time 31 sec)”.

The ProGARM® FR AS EA 5500 Firesuit

A Performance Figure of B3 at a HTI Value of 13 on the old EN531 Standard was border line on B3 – refer to above chart for details. With the New EN ISO11612 standard, to achieve a B3 Performance Figure a figure of 20 is required which is not possible using these weights of fabric.

However, the fabric system used in ProGARM® Model 5500 achieves a figure of 17.2 (4.2 higher than the original fabric) although this figure is now a B2 on the New ISO standard. Therefore, the Safety Protection of this garment is higher based on this figure despite the fact that the new EN standard only allows a lower performance level figure.

For further details on the ProGARM® 5500 FR AS EA Firesuit, contact the Sales Office on the contact details on the reverse of this White Paper.

ProGARM®

Unicorn House, Broad Lane
Gilberdyke, Brough, East Yorkshire
HU15 2TS, United Kingdom
Tel: +44 (0)1482 679600
Fax: +44 (0)1482 638233
Email: sales@progarm.eu
Web: www.progarm.eu