



Confidential Report

Our Ref: E-003426/1



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Date: 4 May 2018

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Client: Sirius Produkt Kft
1044 Budapest
Szilaspatak sor 42/b
Hungary

Job Title: RALPH manikin testing of one garment ensemble

Client's Order No: --

Date of Receipt: 6 April 2018
Date of Test Start: 27 April 2018

Description of Sample(s): One garment ensemble, comprising:
Bib&brace: Dávid MR
Jacket: Dávid MR
T-shirt: Dávid BodyWear

Work Requested: We were asked to make the following test:
ISO 13506: 2008 on the BTTG™ male manikin (RALPH)
4 second flame exposure time
After 1 wash at 60°C



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RALPH MANIKIN TESTING OF ONE GARMENT ENSEMBLE

REFERENCE JACKET / BIB&BRACE / T-SHIRT

1. Samples

One garment ensemble comprising jacket, bib&brace and long sleeved T-shirt was submitted for test referenced:-

Bib&brace: Dávid MR
Jacket: Dávid MR
T-shirt: Dávid BodyWear

The jacket was sized: 52 (Chest: 102-105cm, Height 176-182cm).
The bib&brace was sized: 52 (Waist: 93-96cm, Height 176-182cm).
The T-shirt was sized: L

The jacket, bib&brace and T-shirt were considered to be a “good” fit on the manikin.

2. Method of Test

Testing was undertaken on the 2006 version of the “male” heat sensing manikin known as RALPH (Research Aim Longer Protection against Heat) developed at BTTG™. This version of RALPH together with the associated test facility has been built to comply with ISO 13506: 2008.

RALPH has a total of 123 sensors distributed over the head, torso, legs and arms which monitor the temperature on the surface of the manikin during a test. (The hands and feet of the manikin are not sensed.)

From the temperatures recorded predictive percentage burn injury at Pain, 1st, 2nd and 3rd degree levels are calculated using the values developed by Takata and Stoll for the skin burn equation specified in Annex C of ISO 13506: 2008

During a test the manikin is challenged by a flame engulfment apparatus consisting of 12 burners (in two tiers of six) surrounding the manikin in a hexagonal pattern. The manikin is placed at the centre of the hexagonal pattern. The lower set of six burners are pointed at the legs and lower body of the manikin whilst the upper set of six burners are pointed at the upper body and head.

The tests were performed under the following conditions:

Mean heat flux: 84kW/m² ± 2.5% (i.e. 81.9kW/m² – 86.1kW/m²)
Flame exposure time: 4 seconds
Data acquisition time: 60 seconds

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3. Cleansing Pretreatment

Prior to test the garments were washed once at 60°C according to EN ISO 6330: 2012 Procedure 6N. The garments were dried by low temperature tumble drying.

4. Summary of Results

Notes Relating to Interpretation of Results

The RALPH manikin test has been developed to provide information on the flammability and heat transfer performance of clothing systems when subjected to flame envelopment such as might only reasonably be expected to occur under "emergency" conditions. It is essentially intended to compare one clothing system with another, it does not purport to provide information in terms of the "survivability" of a given event. The following points should also be borne in mind when assessing the results obtained.

- (a) These results were obtained using the specified test conditions and do not necessarily represent the behaviour of the clothing system under other conditions of test or use.
- (b) The fit of the garments has an important bearing on the heat transfer results obtained during the test. For this test the garments were considered to be a "good" fit on the manikin.
- (c) It must be stressed that whilst the test conditions used can be considered very severe there may be occasions where the clothing system is subjected to even greater challenge which could result in serious injury to the wearer.
- (d) The RALPH manikin together with the associated test facility has been built to comply with ISO 13506. Not all manikin test systems fully comply with ISO 13506: 2008 and, therefore, currently results from the various manikins will not necessarily be the same. **It is very important when comparing manikin test results to take into account which "skin model" has been used to calculate the percentage burn injury results. The results in this report have been calculated using values developed by Takata and Stoll for the skin burn equation specified in Annex C of ISO 13506: 2008**
- (e) The burn injury results are expressed according to clause 9.5.3 of ISO 13506: 2008 which calculates the percentage burn injury based on the total area of manikin covered by the garments under test being 100%. For this test, therefore, the head is not included in the calculations.
- (f) These particular test results must be considered as indicative only in that no replicate testing was carried out.
- (g) These results must not be used in advertising or promotional literature without the written permission of BTTG™.

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Observations during the test

There was 1-2 seconds of general surface afterflame following the burners being switched off. There was no "break-open" of the jacket and Bib&Brace during the test.

After test examination

Bib&brace: The exposed areas of the bib&brace were generally charred and stiffened.

Jacket: The exposed areas of the jacket were generally charred and stiffened.

T-shirt: The T-shirt was undamaged but stained.

Burn Injury Prediction

The results below are expressed according to clause 9.5.3 of ISO 13506: 2008 which calculates the percentage burn injury based on the total area of manikin covered by the garments under test being 100%. For this test, therefore, the head is not included in the calculations.

Burn Injury Prediction (according to ISO 13506: 2008 clause 9.5.3)				
Pain	1st° Burn	2nd° Burn	3rd° Burn	2nd° + 3rd° Burn
24.6%	0.9%	19.3%	10.5%	29.8%

See page 5 for the burn injury prediction diagram.

See page 6 for the burn injury development with time.

Note: This report relates only to the samples submitted and as described in the report.

Reported by:.....  M T Healey, Principal Technician
Countersigned by:.....  C Dean, Laboratory Director



TESTING • CERTIFICATION • AUDITING

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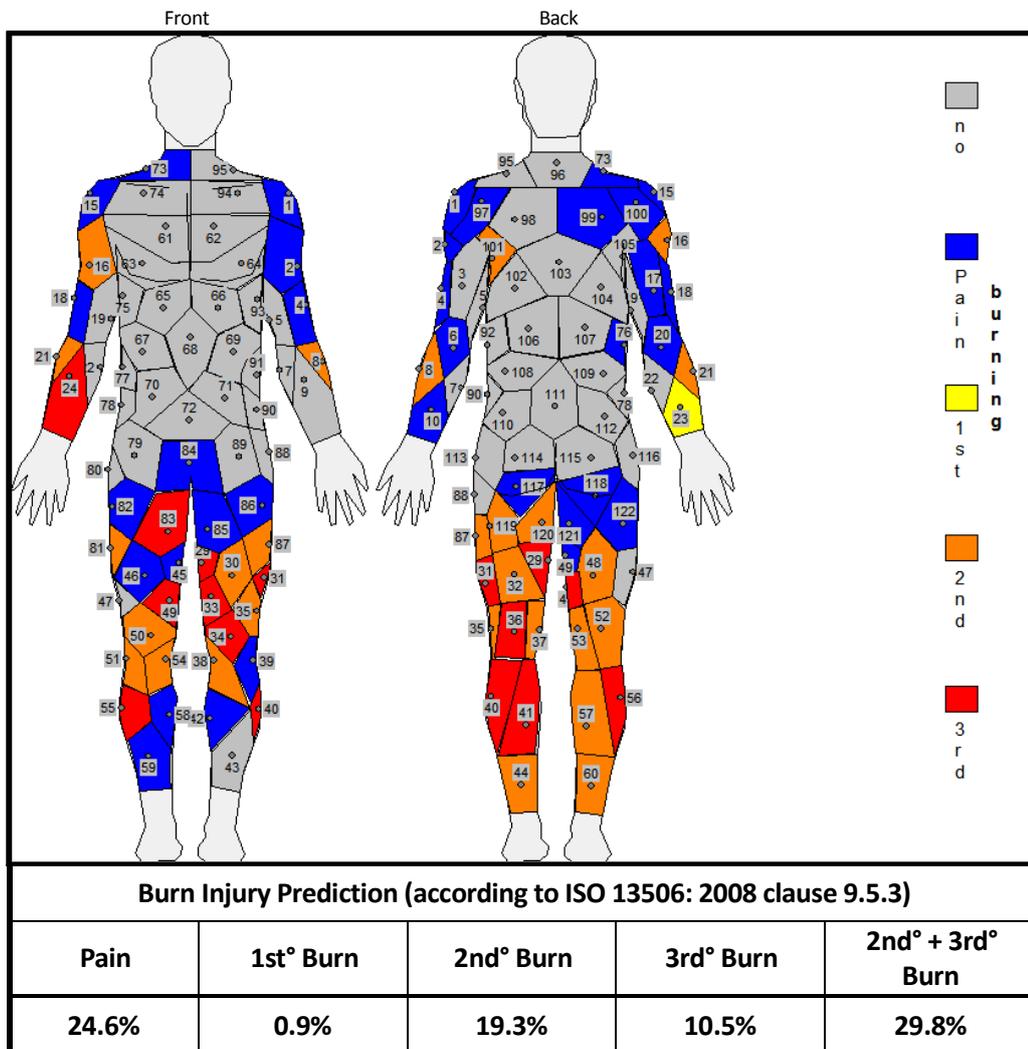
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RALPH MANIKIN TEST – BURN INJURY PREDICTION AT 60s

Sample: One garment ensemble, comprising:
 Bib&brace: Dávid MR
 Jacket: Dávid MR
 T-shirt: Dávid BodyWear

Flame Exposure Time: 4 seconds (data acquisition time 60 seconds)



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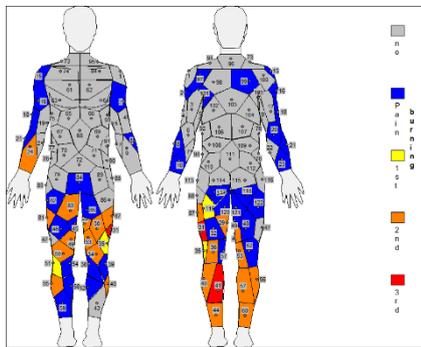
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RALPH MANIKIN TEST – BURN INJURY DEVELOPMENT WITH TIME

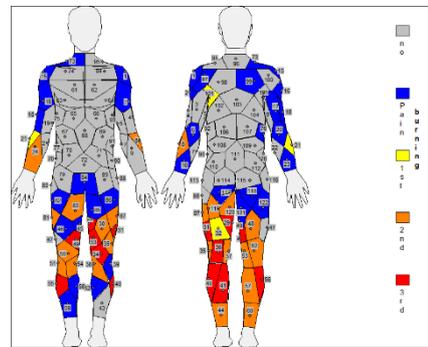
Sample:

One garment ensemble, comprising:

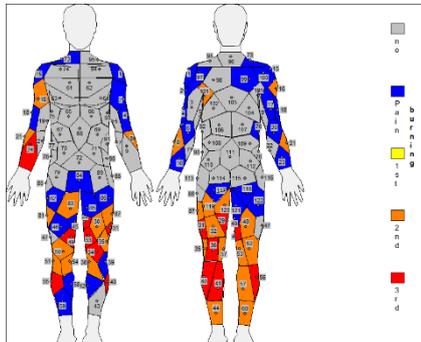
- Bib&brace: Dávid MR
- Jacket: Dávid MR
- T-shirt: Dávid BodyWear



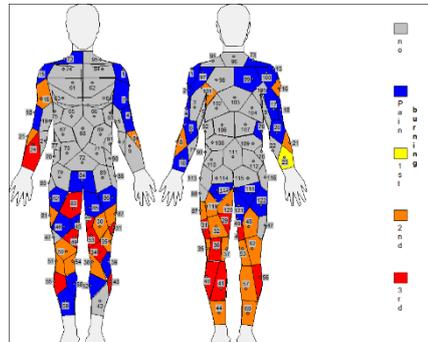
At 15 seconds



At 30 seconds



At 45 seconds



At 60 seconds

