

Firm: Taiwan KK Corporation
5FL., No 14., Lane 235
Pao Chiao Road
Hsin-Tien District
New Taipei City
Taiwan ROC

For the attention of: Karen Lee

Technical Services Report

Subject: Flame engulfment tests on Fire-fighter Garment

Firm: Taiwan KK Corporation
Our ref: SPC0194888/1122
Date: 10th June 2011

Conditions of Issue:

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Results given in this report refer only to the samples submitted for analysis and tested by SATRA. Comments are for guidance only and are not part of the reported results. All comments and interpretations are outside the scope of UKAS accreditation and are based on current SATRA knowledge.

A satisfactory test report in no way implies that the product tested is approved by SATRA and no warranty is given as to the performance of the product tested. SATRA shall not be liable for any subsequent loss or damage incurred by the client as a result of information supplied in the report.

Report signed by: D Mckeown
Position: PPE Technologist
Department: Safety Product Centre

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INTRODUCTION

A sample of a fire-fighter suit described as "Inseparable Fire-fighting suit size L Product code TK09AD01" was submitted for flame engulfment tests according to EN 469:2005 Annex E note: deviation below.

Video footage of the test was shot.

TEST CONDITIONS

Test method: ISO 13506

Manikin details: Nominal 180/100 manikin with 105 heat flux sensors distributed over the head, torso, arms and legs. Actual manikin dimensions are: Height = 175 cm, Chest = 98 cm, Waist = 86 cm which deviate from the manikin dimensions specified in EN 469:2005 annex E.

Note: 8 sensors in the head, 97 sensors arranged over the torso, arms and legs. No sensors in hands or feet.

Exposure duration: 8 seconds

Nominal heat flux: 84 kW/m²

Mean heat flux determined in nude burn immediately preceding the test: 82 kW/m² over the whole manikin

Mean heat flux determined in nude burn immediately after the test: 82 kW/m² over the whole manikin

Testing carried out on garments as received – no pre-treatment was applied. Before testing, the garments were placed on clothes hangers in a temperature and humidity controlled laboratory at 20°C/65%RH for at least 48 hours. Testing commenced within 30 minutes of removal from this atmosphere.

ANALYSIS

Duration of data logging: From start of burn and lasting 120 seconds

Data logging rate: 10 readings per second per sensor

Calculation: skin model used to predict burn damage using numerical analysis to predict temperatures through the skin thickness over the duration of the test, then using burn parameters and criteria as specified in ISO 13506 to predict the onset of Pain, 1st, 2nd and 3rd degree burns

Burning to the head area was not taken into account in this report.

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RESULTS

Sensor location	Number predicting Pain	number predicting 1st degree burns	number predicting 2 nd degree burns	Number predicting 3 rd degree burns
Total (torso, arms, legs)	56	1	6	0
Torso	31	1	5	0
Arms	8	0	0	0
Legs	17	0	1	0

OBSERVATIONS

After the test flame was extinguished parts of the garment continued to burn for a few seconds.

After the test the outer layer of the garments had suffered significant embrittlement and there was significant discolouration to the surface of the next layer. Most of the fluorescent yellow/reflective tape was destroyed.

SUMMARY

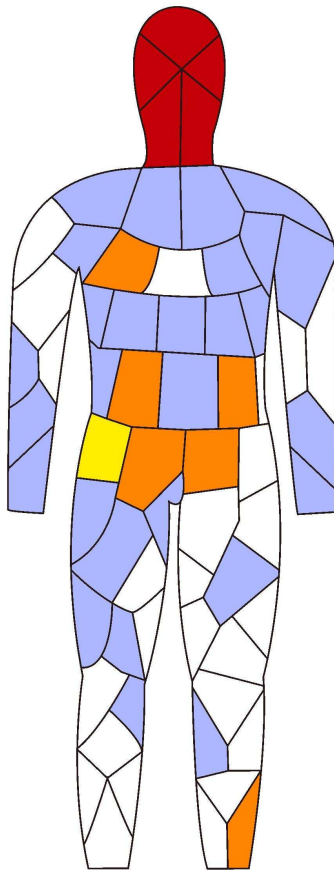
The garment described as “Inseparable Fire-fighting suit size L Product code TK09AD01” submitted for assessment according to EN 469:2005 Annex E achieved the predicted burn results given in the tables below. These were achieved with 8 second exposure times at a nominal average heat flux of 84 kW/m² and a data logging time of 120 seconds.

Sensor location	Number predicting Pain	Number predicting 1st degree burns	Number predicting 2 nd degree burns	Number predicting 3 rd degree burns
Total (torso, arms, legs)	56	1	6	0

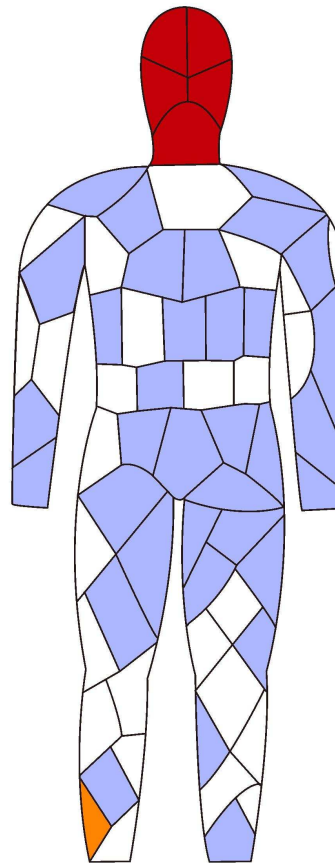
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Job Reference: SPC0194888
Standard: ISO 13506
Exposure: 8 seconds

Suit: TK09AD01



FRONT



BACK

	Pain
	1st degree burns
	2nd degree burns
	3rd degree burns

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Garment before testing

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Garment after testing

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Issue Date: 1st October 2009