

The 10th European Conference on Protective Clothing: Protection challenges in a changing world

May 9 – May 12, 2023 | Arnhem | The Netherlands

Tuesday, May 9

11:00-13:00		ESPC board meeting at NIPV Arnhem
13:00-14:30		Arrival of conference attendees at NIPV Arnhem, registration, networking
14:30-15:15	Conference opening	Welcome speech by IJle Stelstra, General Director of NIPV Presentation of the sponsors, announcements
15:15-17:15	Session 1 Chairs: Ronald Heus and Ye-Sung Cho Keynote 1	Innovative protective products
15:15-16:15	Joo-Young Lee	Non-invasive wearable technologies to monitor heat strain
16:15-16:30		Coffee break
16:30-17:15	<u>Daniela Zavec</u> , Klaus Richter, Ella Lachmann, Irina Cherunova, Nikolai Kornev, Guobin Jia and Jonathan Plentz Anna Dąbrowska, <u>Monika Kobus</u> , Piotr Sowiński, Łukasz Starzak and Bartosz Pękosławski Soraia Neves, Margarida Silva, João Ribeiro, Adriana Moreira, Patrícia Fernandes, Francisca Miranda, Gilda Santos, Rita Marques, <u>João Miranda</u> and João Campos	ArTiShirt – workwear for cold and arctic temperatures Integration of active clothing with personal cooling system within NGIoT architecture for improved comfort of construction workers Combination of textiles and phase change materials for temperature management of a new firefighter protective vest - a numerical study
17:15		Return to the hotels (by a transfer bus)
20:00-21:30		Get-together at hotel Haarhuis (everybody goes on their own)

Wednesday, May 10

08:15-08:30 Arrival at NIPV, announcements

08:30-10:00	Session 2	Physiological impact of protective clothing and environment
	Chairs: Siyeon Kim and Edgar Garcia Torres	
08:30-09:00	Keynote 2	
	<u>George Havenith</u> , Josh Foster, James Smallcombe and Simon Hodder	Worker protection in a warming world – modelling the impact of climate and clothing on physical work capacity
	<u>Jenni Kaisto</u> , Sirkka Rissanen and Kirsi Jussila	Protection of face against cooling while using powered air purifying respirators in the cold
	<u>Maria Stenkina</u> , Ga-Young Lim, Yujean Ghim, Hyun-Soo Kim and Joo-Young Lee	Relationships between body morphological factors, core temperature, and heat extraction from the upper arm through a liquid cooling sleeve during cycling exercise
	<u>Juhyun Moon</u> , Siyeon Kim, Cho-Eun Lee, Yujean Ghim, Min-Seo Kim and Joo-Young Lee	Air-cooling vest is effective but not sufficient to alleviate physiological and perceptual heat strain of workers in a hot and humid environment
	Hyeshin Yoon	Physiological impacts and subjective comfort feelings by the amount of the total heat transfer through materials

10:00-10:30 Posters, exhibition and coffee break

10:30-12:00	Session 3	Symposium: digital human models and virtual ergonomics of PPE systems
	Chairs: Peter Bröde and md. Saiful Hoque	
(5 min)	<u>Peter Bröde</u> , Edith Classen, Jean Léonard, Ronald Heus and Kalev Kuklane	Digital human models and virtual ergonomics of PPE systems - a standardization perspective
	Paul Brassier	Scenario dependent optimizing the protective ability of PPE against its physiological burden
	Miriam Martinez Albert	Development of a new testing protocol to evaluate cooling systems
	Kalev Kuklane	Firefighter clothing database: preliminary modelling and exposure predictions
	Yordan Kyosev, Dominik Münks and <u>Felix Kunzelmann</u>	Possibilities for analysis of the motion comfort of protective clothing using high speed (4D) body scanning
	<u>Timofey Golubev</u> , Mark Hepokoski, Kevin Ward and Joel Coffel	Employing human thermal modelling to assess the effect of sweat accumulation on body temperatures
(10 min)		Panel discussion

12:00-13:00 Lunch

13:00-13:45	Session 4 Chairs: Kalev Kuklane and Lyda Kistemaker <u>Kamila Lunerova</u> , Michal Masin, David Kaiser, Vladimira Fialova, Jan Pokorny, Barbora Rehak Kopeckova and Jan Fiser <u>Seojin Lee</u> , Sora Shin, Daeyoung Lim and Siyeon Kim <u>Kalev Kuklane</u> , Koen Levels, Marijne de Weerd, Lennart Teunissen, Jakob Eggeling and Maurice Kemmeren	Manikins and models Applicability of human thermophysiological model for prediction of thermal strain in PPE A comparison of thermal manikin test methods to assess cooling efficiency of cooling vests Comparison of clothing measurements on 2 manikins in the light of size and fit
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13:45-14:15	Poster session	Main poster session with pitches (à 2 min)
	<u>Tim van Harten</u> , Kalev Kuklane, Ronald Heus and Hein Daanen	Ergonomic and performance differences between firefighter protective clothing systems
	<u>Peter Bröde</u> , Maren Claus, Doris Urlaub, Natalie Wolfsdorff and Carsten Watzl	Immune age: the feminine side of firemen?
	<u>Eunju Lee</u> , Yeonwoo Jung, Seungwook Han and <u>Siyeon Kim</u>	3D virtual model construction of filter membrane and multilayered fabric structure of firefighters' particulate hoods to simulate particle loading behavior
	<u>Siyeon Kim</u> , Jungteak Oh and Seojin Lee	Degradation in tensile strength of flame-retardant textiles after exposure to high temperature and high humidity and suggestions for an accelerated hydrolysis test development
	<u>Cho-Eun Lee</u> , Juhyun Moon, Byung-Hee Hong, Joo-Young Lee, Yujean Ghim and Min-seo Kim	Cooling effects of a graphene oxide-coated sheet to alleviate exertional hyperthermia
	Mohammad Abu-Rous	The influence of cellulosic content of heat dissipation in knits
	Seyoung Jeon and <u>Hyojeong Lee</u>	Development of digital garment clothing pressure distribution using 3D vector projection
	Anne Lamers	Exploring holistic body mapping and its application in a foul weather garment
	Anna Dąbrowska, <u>Monika Kobus</u> , Piotr Sowiński and Anita Jachowicz	Evaluation of health tracker's functionality in terms of its potential application to control the operation of protective clothing with cooling function
	<u>Mark Gaskill</u> and Robert Ormond	Assessment of fire investigator ensembles against chemical vapor and airborne particle infiltration
	Parris Tysinger, <u>Bryan Ormond</u> and Chandler Probert	Preliminary research to determine effectiveness of on-scene hose decontamination through comparison of different analysis techniques
14:15-14:45		Main poster session continues with exhibition and coffee break

14:45-16:15

Session 5

New materials and evaluation methods

Chairs: Carlos Kuhlmann and
Melissa Armistead

Bianca-Michaela Wölfing, Serge
Lang and Edith Classen

Research and development of simplified ways to
comprehensively evaluate thermophysiological comfort for
complex PPE garment systems

Jakob Eggeling, Róbert Toma and
Kalev Kuklane

A new approach to estimate R_{et} values

Ye-Sung Cho, Hee-Young Ju,
Hyun-Soo Kim and Joo-Young Lee
Kiarash Arangdad

Active heating shirts for workers in cold environments: which
combination is more effective?
Sustainable alternatives to fluorinated water repellent protective
fabrics

Ana Rita Sousa, José Barbosa, O.
Salomé G.P. Soares, João
Ferreira, Ana Gonçalves, Gilda
Santos, Augusta Silva, José
Morgado, Patrícia Soares, Sergey
A. Bunyaev, Gleb N. Kakazei,
Cristina Freire, M. Fernando R.
Pereira, Clara Pereira and André
M. Pereira

Tailored materials for electromagnetic shielding textile
application

Anugrah Shaw, Thavy Staal,
Marcelo Macedo, Hamilton Ramos
and Sonja Sterman

User input for PPE for pesticide operators: a global framework
for data collection

16:15-16:30

Coffee break

16:30-17:30

ESPC general assembly for all participants

17.30

Return to the hotels (by a transfer bus)

Thursday, May 11

Firefighter theme day

08:15-08:30		Arrival at NIPV
08:30-08:45		Opening of the day, welcome speech by Anton Slofstra, Safety Region Director and Fire Brigade Commander at VGGM Presentation of the sponsors, announcements
08:45-10:00	Session 6	Wildland firefighting and other operational conditions
	Chairs: Ricardo Weewer and Mark Gaskill	
08:45-09:15	Keynote 3 Frank Pons, L. Landes, M Poulat, L. Joseph, Thierry Carret, <u>Philippe Agopian</u>	Health management of firefighters during natural wild fires. A global and integrated approach
	<u>Jelmer Dam</u> and Maurice Kemmeren	From urban structural firefighting to wildland-firefighting - a northwest European journey
	<u>Maurice Kemmeren</u> , Dirk Hagebölling, Kalev Kuklane and Ronald Heus	Higher standardised test performance of PPE materials does not automatically lead to higher safety
	<u>Rijk van den Dikkenberg</u> and Ricardo Weewer	When water goes up in smoke, experimental research into the effect of the 3D pulse method and the arc method on smoke cooling
10:00-10:30		Posters, exhibition and coffee break
10:30-12:00	Session 7	Ergonomic testing and human studies of clothing systems
	Chairs: George Havenith and Didem Kiryaman	
	<u>Ronald Heus</u> , Maurice Kemmeren, Lyda Kistemaker and Kalev Kuklane	A new test protocol for ergonomic evaluation of firefighters' protective clothing
	<u>Eric Mol</u> and Ronald Heus	(Psycho)physiological effects of wearing task specific protective clothing for wildland firefighters
	<u>Meredith McQuerry</u> and Cassandra Kwon	Evaluating female firefighter anthropometrics for improved mobility and design in personal protective clothing for the United States fire service
	<u>Gilda Santos</u> , André Barbosa and Ana Barros	Development of an obstacle course to evaluate the ergonomics of military prototypes
	<u>Inga Dabolina</u> , Valdis Cielens and Eva Lapkovska	Procedures for use of personal protective clothing, its ergonomics
	<u>Aarti Solanki</u> and Prof Dr. Pavan Godiawala	Knowledge mapping of ergonomic issues in firefighter's protective clothing: a bibliometric review
12.00		A group photo will be taken
12:00-13:00		Lunch

13:00-14:45

Session 8

Evaluation of firefighter clothing materials performance

Chairs: Eric Mol and Bryan Ormond

Yulin Wu, Rui Li and Guowen Song

Polycyclic aromatic hydrocarbons (PAHs) simulation for standardized PPE contamination using a cone calorimeter

Vera De Glas, Koen Van Deun and Riet Van Deun

Risk assessment report (RAR) of polycyclic aromatic hydrocarbons (PAHs) in firefighters and instructors

Bryan Ormond, Arjunsing Girase, Nur-Ushafa Mazumder, Jingtian Lu and Andrew Hall

Transitioning the fire service to PFAS-free alternatives: trade-offs in exposure and performance

Thomas Verminck and Nils Van de Vloed

Decontamination of EN469 fire gear as an essential part of the firefighters preventive measures against cancer

Md. Saiful Hoque and Patricia Dolez

Aging of firefighter outer shell fabrics under accelerated conditions

Laura Munevar-Ortiz, John A. Nychka and Patricia I. Dolez

Accelerated aging of moisture barriers used in firefighters' protective clothing

Bengi Kutlu and Cansel Emir

Effects of tannic acid on flame retardant properties of jute and cotton

14:45-15:15

Posters, exhibition and coffee break

15:15-17:00

Session 9

Special session: smart protection and innovative solutions in firefighter protection

Chairs: Rahel Krause and Gilda Santos

(5 min)

Rahel Krause

Session introduction: European firefighter attitudes and needs for smart protection

Martin Camenzind, Ivona Jerkovic, Elodie Morlec and Rene Michel Rossi

Adaptable thermal insulation for heat and flame protection on demand

Edgar Garcia Torres and Emiel Denhartog

The effect of wind speed, ventilation, air layer thickness, and air permeability on heat flux in two-layer systems

Gilda Santos, Soraia Neves, Margarida Silva, João M. Miranda, João B. L. Campos, J. Ribeiro, A. Moreira, P. Fernandes, F. Miranda and Rita Marques

Smart firefighters PPE: impact of phase change materials

Patricia Dolez, Hyun-Joong Chung, Jane Batcheller, Chungyeon Cho, Diana Yehia, Lelin Zheng, Christina Braun, Reza Khalkhali, Zhitong Lin, Ashok Chhetry, Ankit Saha, Md. Saiful Hoque, Marwa Khemir and Nadeesha Samaraweera

Development of graphene-based end-of-life sensors for fire-protective fabrics

André Fonseca Malaquias, João Mário Miranda and J.B.L.M. Campos

Utilization of moisture barriers with enhanced tortuosity and porous attachments to mitigate burns introduced by impermeability: a numerical study

Panel discussion

17:00

The bus leaves immediately after the sessions from NIPV to open air museum in Arnhem and brings the remaining conference participants to the hotels

17:00-21:30

Social event in open air museum - conference dinner (optional)

Friday, May 12

08:15-08:30	Arrival at NIPV, announcements	
08:30-10:00	<p>Session 10</p> <p>Chairs: Henk Vanhoutte and Laura Munevar Ortiz</p> <p>Keynote 4</p>	<p>Special session: sustainability in protective clothing and equipment</p>
08:30-09:00	<p>Edith Classen</p> <p><u>Rahel Krause</u>, Lilin Feng, Roshan Paul, Isa Bettermann, Thomas Gries, Ulrich Schwaneberg, Claus Hummelsheim and Lampros Kampas</p> <p>Chloe Caux-Wetherell, Eric van Wely and <u>Gokhan Duman</u></p> <p><u>G M Nazmul Islam</u>, Dave Kasper, Ted Parker, Jane Batcheller and Patricia Dolez</p> <p>Alexander Gstettner</p>	<p>How does circular economy influence PPE?</p> <p>Development of an alternative flame retardant finish for textiles for fire protection applications and an adapted finishing process</p> <p>Nomex® Comfort with EcoForce™</p> <p>Recycling of post-consumer flame-resistant protective clothing</p> <p>Sustainability in flame resistant protective clothing with viscose FR fibers – the day after tomorrow</p>
10:00-10:30	Posters, exhibition and coffee break	
10:30-12:00	<p>Session 11</p> <p>Chairs: Frederik Goethals and Juhyun Moon</p> <p><u>Peter Hazendonk</u> and Frederik Goethals</p> <p><u>Gertrude Kignelman</u>, Frederik Goethals, Silvia Pavlidou, Hannu Salmela, Anna Nardi and Marion Real</p> <p><u>Bert Groenendaal</u>, Joost Wille, Jan Bruneel, Christophe D'Halluin, Bernard Colson</p> <p><u>Selcen Kilinc-Balcı</u>, Zafer Kahveci, Christian Coby and Patrick Yorio</p> <p><u>Melissa Armistead</u>, Anuja Dandekar, Marc Mathews and R. Bryan Ormond</p> <p><u>Didem Kiryaman</u>, Kaushik Nonavinakere Vinod, Emiel Den Hartog and Tiegang Fang</p>	<p>Medical protection - innovation in production and respiratory protection</p> <p>Reservist project: Simulation of a rapidly deployment of an emergency hospital</p> <p>Reservist project: Blueprint for testing and certification of protective equipment in emergencies</p> <p>Reservist project: Re-design of textile protective equipment for production via alternative lines in case of spiking demand times</p> <p>How do disinfecting wipes impact the barrier performance of protective clothing?</p> <p>Development of an animatronic headform test method to evaluate the efficacy of barrier face coverings</p> <p>Filtration performance of cloth masks with different air permeability worn over a surgical mask</p>
12:00-12:15	Short comfort break	
12:15-12:45	Closing of the conference (awards, next conference)	
12:45-13:45	Networking and farewell with lunch	
13:45-...	Possibility to visit Hospitainer, a company from the Reservist project	

Thank you for joining the

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