

**Program of the 3<sup>rd</sup> ECPC conference  
10-12 May, 2006, GDYNIA, POLAND**

**10 May 2006 – WEDNESDAY**

**8.30 – 9.30            Registration**

**9.30 – 9.45            Opening and welcome**  
D. Koradecka, Director of *Central Institute for Labour Protection-  
National Research Institute, POLAND*

**9.45 – 10.00        Introductory lecture:**  
**Protective clothing - nowadays and vision**  
H. Mäkinen, chair of the European Society of Protective Clothing,  
*Finnish Institute of Occupational Health, FINLAND*

**10.00 – 11.00        Session 1 A**  
**New aspects in methodology of testing protective clothing  
and gloves**

**Chairperson:**        **G. Bartkowiak, CIOP-PIB, POLAND**  
**Co-chair:**            **N. Sorensen, BTTG Fire Technology Services, UK**

**10.00                Development of a test method against hot alkaline chemical splashes**  
H. Mäkinen, K. Nieminen, S. Mäki, S. Isopahkala – *FIOH, FINLAND*

**10.15                Protection from steam at high pressures: development of a test device  
and protocol**  
R. Sati, E.M. Crown, M.Y. Ackerman, J.A. Gonzalez, J. D. Dale - *University of  
Alberta, CANADA*

**10.30                Alternative methods of determination of water vapour resistance of  
fabrics by means of a skin model**  
L. Hes - *Technical University of Liberec, CZECH REPUBLIC*

**10.45                Nighttime visibility assessment of garment designs**  
D. Loosen - *3M, GERMANY*

**11.00 - 11.30        Coffee break**

Poland            Gdynia            10-12.05.2006

**11.30 – 12.45**      **Session 1 B**  
**New aspects in methodology of testing protective clothing and gloves**

**Chairperson:**      **A. Mayer, INRS, FRANCE**  
**Co-chair:**        **J. Fan, Hong-Kong Politechnic University, HONG-KONG**

**11.30**            **The effect of the glove material stretch deformation on cut resistance**  
J. Lara – *IRSST, CANADA*  
T.B.N. Vu, T. Vu-Khanh - *Université de Sherbroke, CANADA*

**11.45**            **Evaluation of the flexibility of protective gloves**  
L. Harrabi, P. I. Dolez, T. Vu-Khanh - *ETS, CANADA*  
J. Lara – *IRSST, CANADA*

**12.00**            **New developments in cut resistance - an update on standards and products**  
R. Zumloh, Ch. Hahn - *Teijin Twaron GmbH, GERMANY*

**12.15**            **Seam characterization in antistatic protection garment**  
P. Lemaire - *Centexbel, BELGIUM*

**12.30**            **Discussion**

**12.45 - 13.45**      **Lunch break**

**13.45 – 15.30**      **Session 2**  
**Standardization in the field of protective clothing and gloves**

**Chairperson:**      **P. Heffels, BG BAU-Arbeitsschutzzentrum Haan, GERMANY**  
**Co-chair:**        **I. Frydrych, Technical University of Łódź, POLAND**

**13.45**            **The need of continuous improvement of the EN standards on PPE and of the information given to consumers**  
A. Mayer – *INRS, FRANCE*

**14.00**            **PPE programme as a part of safety management**  
E. Korhonen - *FIOH, FINLAND*

**14.15**            **Protective clothing against rain or low temperatures - overview of European standardisation**  
P. Heffels - *BG BAU-Arbeitsschutzzentrum Haan, GERMANY*

Poland      Gdynia      10 - 12 . 05 . 2006

- 14.30**      **Protective clothing against the thermal risks of an electrical arc – requirements for development, testing and evaluation**  
H. Beier – *STFI, GERMANY*
- 14.45**      **Approaches for incorporating CBRN requirements as part of protective ensemble standards for emergency responders**  
J. O. Stull - *International Personnel Protection, Inc., USA*  
W. E. Haskell, A. M. Shepherd - *NIOSH, USA*
- 15.00**      **A review of European methods of estimating the covers protecting against the blunt injury**  
G. Redlich - *ITWW Moratex, POLAND*
- 15.15**      **Discussion**

**15.30 – 16.00**      **Coffee break**

**16.00 – 17.45**      **Session 3**  
**Research in development of new materials and products**

**Chairperson:**      **H. Mäkinen, FIOH, FINLAND**  
**Co-chair:**        **J. Lara, IRSST, CANADA**

- 16.00**      **Flame resistant multifunctional fabrics against electric arcs**  
U. Pitschner - *Schümer GmbH & Co., GERMANY*
- 16.15**      **Development of a versatile insulating jacket using SMA (Shape Memory Alloy)**  
E. Kim, J. Yeo, S. Yoo - *Functional Textile System Research Lab, KOREA*
- 16.30**      **Comfortable protection against molten iron sparks and splashes**  
Y. Bader, H. Eichinger - *DuPont Personal Protection, SWITZERLAND*
- 16.45**      **Knitted textile materials protecting against static electricity**  
A. Pinar, E. Matyjas-Zgondek - *TRICOTEXTIL, POLAND*
- 17.00**      **New cooling undergarment for protective garment systems**  
B. Pause - *Textile Testing & Innovation, USA*
- 17.15**      **Optimizing the performance of phase change materials in personal protective clothing systems**  
R. E. Reinertsen, H. Færevik, K. Holbø, J. Reitan, A. Røyset - *SINTEF Health Research, Norway*
- 17.30**      **Discussion**

Poland      Gdynia      10 - 12 . 05 . 2006

**11 May 2006 – THURSDAY**

**9.00 – 11.00      Session 4  
Protective clothing for fire-fighters**

**Chairperson:**      **J. Stull, *International Personnel Protection, Inc., USA***

**Co-chair:**         **R. Reinertsen, *SINTEF Health Research, Norway***

- 9.00            Thermal stress on firefighters in extreme heat exposure**  
I. Holmér, K. Kuklane, Ch. Gao - *Lund University, SWEDEN*
- 9.15            Thermal and mechanical performance of firefighters' protective clothing after heat exposure**  
R. Rossi, W. Bolli, R. Stämpfli - *EMPA, SWITZERLAND*
- 9.30            A new facility for testing the fire protective performance of ensembles of PPE**  
N. Sorensen, P. Eaton, M. Healey - *BTTG Fire Technology Services, UK*
- 9.45            Thermal strain in fire fighters while wearing task-fitted protective clothing vs. EN 469 protective clothing during a prolonged job-related rescue drill**  
R. Ilmarinen, H. Mäkinen, H.Lindholm A. Punakallio - *FIOH, FINLAND*  
H. Kervinen - *Länsi-Uudenmaa Rescue Service Region, FINLAND*
- 10.00          Performance and limitations of aluminised PPE**  
S. Assmann - *ALWIT GmbH, GERMANY*
- 10.15          Determination of the protective performance of the worn PC for the fire fighters**  
O. Dvorak - *Fire Technical Institute, CZECH REPUBLIC*
- 10.30          Analysis of the distribution of sweat in firefighters' protective clothing layers**  
C. Keiser, C. Becker, R. Rossi, L. Schlapbach - *EMPA, SWITZERLAND*
- 10.45          Discussion**
- 11.00 - 11.30      Coffee break**

Poland      Gdynia      10 - 12 . 05 . 2006

**11.30 – 12.45**      **Session 5**  
**Protection against chemical hazards**

**Chairperson:**      **H. Eichinger, DuPont, SWITZERLAND**  
**Co-chair:**        **M. Rodot, Mapa-Spontex Professionnel, FRANCE**

**11.30**            **Study on the permeation resistance of gloves against hairdressing chemicals**  
P. Paszkiewicz - *BGIA, GERMANY*

**11.45**            **A perspective on realistic material chemical performance requirements: the need to redefine how industry chooses chemical protective suit materials**  
J. O. Stull - *International Personnel Protection, Inc., USA*

**12.00**            **Load, risks and the need to use PPE in agricultural enterprises**  
T. Hinz - *Federal Agricultural Research Centre, GERMANY*

**12.15**            **Protective Clothing for Pesticide Applicators: A comprehensive online system for data management, analysis and dissemination of information**  
A. Shaw, G. Vankayala - *University of Maryland Eastern Shore, USA*

**12.30**            **Chemical protective gloves from performances to service time prediction**  
M. Rodot - *Mapa - Spontex Professionnel, FRANCE*

**12.45**            **Discussion**

**13.00 – 14.00**      **Lunch break**

**14.00 – 15.00**      **Session 6**  
**Physiological aspects of wearing protective clothing**

**Chairperson:**      **I. Holmer, Lund University, SWEDEN**  
**Co-chair:**        **L. Hes, Technical University of Liberec, CZECH REPUBLIC**

**14.00**            **A transient comfort model of the human-clothing-environment system**  
X.F. Wan, J. Fan - *Hong Kong Polytechnic University, HONG KONG*

**14.15**            **Heat strain in air-permeable protective and semi-permeable protective clothing**  
P.A. Reffeltrath, M.G. Brandsma, E.M Van Es, J.A. Kistemaker, M.G.M. Weghorst, H.A.M. Daanen - *TNO, THE NETHERLANDS*

**14.30**            **Numerical simulations of heat and moisture transport in thermal protective clothing system under flash fire condition**  
G. Song - *University of Alberta, CANADA*

**14.45**            **Discussion**

- 15.00 - 16.30**      **Introduction to poster session  
(32 presentations of posters - 3 minutes each)**
- 16.30 – 16.45**      **Coffee break**
- 16.45 –17.45**      **Poster session**
- 18.30**              **Tour around Gdansk**  
**20.00**              **Gala Dinner**

**12 May 2006 – FRIDAY**

- 9.00 – 10.45**      **Session 7  
Thermoregulation systems for protective clothing**

**Chairperson:**      **G. Havenith, *Loughborough University, UK***  
**Co-chair:**         **R. Ilmarinen, *FIOH, FINLAND***

- 9.00**              **Safe&Cool, an innovative protective workwear interliner**  
S. Carosio - *D'Appolonia SpA, ITALY*,  
G. Bartkowiak, A. Kurczewska – *CIOP-PIB, POLAND*
- 9.15**              **High visibility and passive cooling integrated in workplace clothing**  
R. M. Laing, M. J. Matthews, B. E. Niven - *University of Otago,  
NEW ZEALAND*
- 9.30**              **Simulator for modeling protective clothing and microclimate cooling  
system**  
Yermakow - *International Center for Information Technologies and Systems  
UNESCO, UKRAINE*
- 9.45**              **Influence of different parameters on cooling efficiency of liquid  
circulating garments**  
J. Wang, J.P. Dionne, A. Makris - *Med-Eng System Inc., CANADA*
- 10.00**             **Active clothing protecting against cold**  
A. Kurczewska – *CIOP-PIB, POLAND*
- 10.15**             **Thermoinsulation parameters of membrane and wool type fabrics**  
I. Frydrych, W. Sybilska, I. Jasińska - *Technical University of Łódź, POLAND*
- 10.30**             **Discussion**
- 10.45 – 11.15**      **Coffee break**

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**11.15 – 13.00**      **Session 8**  
**Human heat balance in protective clothing –**  
**THERMPROTECT project**

**Chairperson:**      **R. Rossi, EMPA, SWITZERLAND**  
**Co-chair:**        **P. Bröde, University of Dortmund, GERMANY**

**11.15**            **Introduction to THERMPROTECT – scope and objectives**  
G. Havenith - *Loughborough University, UK*

**11.30**            **Evaporative Cooling in Protective Clothing**  
G. Havenith, X. Wang - *Loughborough University, UK*  
M. Richards - *EMPA, SWITZERLAND*  
V. Candas – *CEPA CNRS, FRANCE*  
H. Meinander - *Tampere University of Technology, FINLAND*

**11.45**            **Dry and wet heat transfer through protective clothing dependent on the clothing properties and climatic conditions**  
M. Richards, R. Rossi - *EMPA, SWITZERLAND,*  
G. Havenith - *Loughborough University, UK*  
V. Candas - *CEPA CNRS, FRANCE*  
H. Meinander - *Tampere University of Technology, FINLAND*

**12.00**            **Effects of heat radiation on the heat exchange with protective clothing - a thermal manikin study**  
P. Bröde - *Institut für Arbeitsphysiologie an der Universität Dortmund, GERMANY*  
V. Candas - *CEPA CNRS, FRANCE,*  
K. Kuklane - *Lund University, SWEDEN,*  
E. den Hartog - *TNO, THE NETHERLANDS,*  
G. Havenith - *Loughborough University, UK*

**12.15**            **The comparison of thermal properties of protective clothing using dry and sweating manikins**  
C. Gao, I. Holmér - *Lund University, SWEDEN*  
J. T. Fan, X. F. Wan, Y. S. J. Wu - *The Hong Kong Polytechnic University, HONG KONG*  
G. Havenith - *Loughborough University, UK*

**12.30**            **Modelling the metabolic effects of protective clothing**  
L. Dorman, G. Havenith - *Loughborough University, UK.*

**12.45**            **Discussion**

**13.00 - 14.00**      **Lunch break**

Poland      Gdynia      10-12.05.2006

**14.00 – 15.30**      **Session 9**  
**Performance of protective clothes and gloves during wear life**

**Chairperson:**      **E. Korhonen, FIOH, FINLAND**  
**Co-chair:**        **P. Paszkiewicz, BGIA, GERMANY**

- 14.00**            **Care and maintenance of protective clothing. The view of textile rental services**  
R. Long - *European Textile Services Association, Belgium*
- 14.15**            **Prediction of clothing thermal insulation and moisture vapour resistance under “walking” motion and windy conditions**  
J. Fan, X. Qian - *The Hong Kong Polytechnic University, HONG KONG*
- 14.30**            **Sustained performance of personal protective equipment during wearlife and the implications towards harmonized European standards, risk assessment and user specifications**  
A. M. Fries, H. Eichinger - *DuPont International S.A., SWITZERLAND*
- 14.45**            **Assessment of PPE ensemble compatibility: Thermo-physiological methodology for assessment of firefighter PPE according to Draft BS 8469**  
D. Bethea, C. Millard, N. Vaughan - *HSL, UK*
- 15.00**            **A manufacturer's report about testing of gastight Chemical Protection Suits**  
K. M. Rueck - *Draeger Safety, GERMANY*
- 15.15**            **Discussion**
- 15.30**            **Closing of the conference**

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## POSTER SESSION

- 1. European fire fighter clothing trends and technical evolutions**  
Bader Y., Capt A., *DuPont Personal Protection, SWITZERLAND*
- 2. Reference materials for test method of resistance to radiant heat penetration**  
Bartkowiak G., Krzemińska S., *CIOP-PIB, POLAND*
- 3. Determining temperature regulating factor of apparel fabrics containing phase change material**  
Bendkowska W., Gonciarz-Wach M., Tysiak J., Grabowski L., Blejzyk A., *Textile Research Institute, Poland*
- 4. Motorcycle helmets ventilation and heat transfer characteristics**  
Bogerd N., Brühwiler P. A., *EMPA, SWITZERLAND*
- 5. Sol-gel coatings of plasma modified polypropylene fabric for gas defence**  
Cireli A., Mutlu M., Celik E., Kutlu B. Onar N., *Dokuz Eylul University, TURKEY*
- 6. A Proposed Heat Transmission Test for Single Layer Fabrics – Results of Interlaboratory Trials**  
Crown E. M., Lawson L., Ackerman M. Y., Gonzalez J., Dale J. D., *University of Alberta, CANADA*
- 7. Optimizing Fabric Characteristics for Balanced Protection in Cleanroom Garments**  
Cybulska M., Schiffelbein P., *Technical University of Lodz, POLAND*
- 8. Development and Application of ASTM F2371-05 - Standard Test Method for Measuring the Performance of Personal Cooling Systems Using Sweating Manikins**  
Dionne J.-P., Wang J., McCullough E. A., *Med-Eng System Inc, CANADA*
- 9. Effects of short wave radiation and radiation area on human heat strain in reflective and non-reflective protective clothing**  
Es E. M., Hartog E. A., Broede P., Candas V., Heus R., Havenith G., Holmer I., Meinander H., Nocker W., Richards M., *THERMPROTECT network*
- 10. Effects of the Properties of T-shirts on Wearers' Comfort Sensations**  
Kar F., Fan J., Yu W., *Hong Kong Polytechnic University, HONG KONG*
- 11. Evaluation of dexterity tests for gloves**  
Gauvin C., Tellier C., Daigle R., Petitjean-Roget T., *IRSST, CANADA*
- 12. UV Protective Cotton Fabrics**  
Kaihong Qi, Xin J., *Hong Kong Polytechnic University, HONG KONG*
- 13. Polish protective clothing market – enterprises' adjustment to operation in the single European Market**  
Koszevska M., *Technical University of Lodz, POLAND*
- 14. New filtering materials including nanofibres**

Krucieńska I., Klata E., Chrzanowski M., Majchrzycka K., *Technical University of Łódź, POLAND*

**15. Determination of the barrier material resistance to permeation by organic mixtures**

Krzemińska S., *CIOP-PIB, POLAND*

**16. Effects of natural solar radiation on manikin heat exchange**

Kuklane K., Gao C., Holmér I., *Lund University, SWEDEN and THERMPROTECT network*

**17. Heat and moisture transfer from skin to environment through fabrics: a mathematical model including radiation and surface diffusion.**

K. Min, Y. Son, C. Kim Y. Lee and K. Hong, *Korea University, Korea*

**18. The evaluation of the effect of use of high visibility clothing on preservation of its protective properties**

Łęzak K., Bartkowiak G., *CIOP-PIB, POLAND*

**19. Protective clothing and other personal protective equipment against high temperature liquid splashes for recovery boiler workers**

Mäki S., Koskinen H., Mäkinen H., *FIOH, FINLAND*

**20. Physiological response during exercise in a hot environment in chemical protective clothing**

Marszałek A., *CIOP-PIB, POLAND*

**21. Determining body odour in knit fabrics**

McQueen R.H., Laing R., M., Niven B. E., *University of Otago, NEW ZEALAND*

**22. Test methods for the thermoregulatory properties of textiles**

Meinander H., *Tampere University of Technology, FINLAND*

**23. Examination of domestic and commercial washing machines from the point of view of effects on washing of PPE's**

Nasadil P., *Textile Testing Institute, CZECH REPUBLIC*

**24. Speed-march performance while wearing a respirator**

Reffeltrath P., Tan K., *TNO, THE NETHERLANDS*

**25. A manned test for evaluating slipperiness for boots on icy surface**

Rintamäki H., Oksa J., Mäkinen T., Päsche A. *FIOH, FINLAND*

**26. Gastight chemical resistant elastomer socks**

Rueck K.-M., *Draeger Safety, GERMANY*

**27. Mapping Body Armor Design and Customer Performance Requirements**

Schiffelbein P., *DuPont Engineering, USA*

**28. Prediction of Operator Efficiency in Apparel Manufacturing Using Time Series based Artificial Neural Network**

Song B.L., Wong W.K., Fan J., Chan S.F., *Hong Kong Polytechnic University, HONG KONG*

- 29. End-of-service-life indicators for chemical protective gloves**  
Szczecińska K., *CIOP-PIB, POLAND*
- 30. Photometric properties of visibility accessories for non-professional use on the Finnish market**  
Tammela E., *FIOH, FINLAND*
- 31. Assessing the fogging resistance of complete eye protectors**  
Webb D., Vaughan N., *HSL, UK*
- 32. Interlaboratory comparative tests, analysis of test results and assessment of the colour fastness to perspiration**  
Werner J., Napieralska A., Górski M., *TRICOTEXTIL, POLAND*
- 33. Criteria and assessment of mechanical properties of fabrics destined for the protective clothing in the light of harmonized standards**  
Witkowska B., I. Frydrych, *The Institute of Textile Materials Engineering, POLAND*
- 34. Application of Sympatex Reflexion in protective wear enduses**  
Wittmann G., Ven H., Drinkmann M., *Sympatex Technologies GmbH, GERMANY*