



University of Zagreb  
Faculty of Textile Technology (TTF), AMCA TTF  
and Textile Science and Research Center (TSRC)

invite you to a

# LECTURE

entitled

**Imperfections of some standard gravimetric methods for testing of water vapour permeability of fabrics and principle of conversion of the Skin model Ret data into the gravimetric VWP inverted cup data**

by

**Prof. Lubos Hes,**  
**PhD, DSc, D.h.c., Ctext FTI, hon. FTI**  
from Technical University of Liberec, Czech Republic, Faculty of Textiles

on **Thursday, 31<sup>th</sup> August 2017 at 12:00 at B-316 (Kotka)**  
Prilaz baruna Filipovića 28a, Zagreb

## Abstract:

Water vapour permeability (WVP) is the second most important parameter of clothing comfort, after thermal insulation. That is why big attention is paid to its measurement in this decade. Historically, the WVP standard testing methods were based on the gravimetric principle, but decades ago, the Skin model testing method became also very important and standardized.

Currently, quality protective and outdoor jackets exhibit labels indicating the water vapour permeability, mostly expressed in g/m<sup>2</sup> of evaporated water during 24 hours determined by gravimetric WVP testers, or in the form of the evaporation resistance Ret [Pa.m<sup>2</sup>/W] according to the ISO 11092 based on the Skin model testers. The assessment of WVP by means of the Ret offers explicit characterisation of WVP, which regrettably is not the case of most of the gravimetric testing methods – when expressing the WVP in g/m<sup>2</sup>/24 hours, the clothing user does not know the used driving force (the partial pressures difference) unless the number of the used standard is also available.

The effect of other boundary conditions like emissivity of the internal walls of the measuring chamber on the measurement precision is theoretically analyzed and experimentally verified. In the second part of the presentation, mass transfer in the direct cup gravimetric WVP method is theoretically analysed with the conclusion, that most direct cup testing methods suffer from principal imprecision. In the end of the presentation, an equation of conversion of the fabric evaporation resistance Ret according to the ISO 110912 into the WVP determined by the inverted cup (ISO 15496) method is presented and its use is demonstrated by examples.

## Biography:



Prof. Hes worked 16 years in the Textile machinery institute in Liberec, Czech Republic as a designer of yarn texturizing and finishing machines and later entered the Czech University of Liberec where he currently teaches Clothing comfort and Heat and mass transfer in textiles. His research interests also include Technical textiles and Design of textile testing instruments. At the Faculty of Textiles of the TUL he became Head of Dept. of Nonwovens and later Head Dept. of Textile Marketing and also served 8 years at the Minho Univ. in Portugal as the Invited Professor. In 1990 he was on the UNIDO mission in India. Prof Hes has authored more than 80 peer-reviewed papers and delivered more than 250 communications at conferences. He is currently member of editorial boards of 5 international textile journals and serves as an examiner of PhD studies in Germany, Portugal and India. Prof. Hes was awarded by 65 patents and his original instruments for testing of clothing comfort are used in 22 countries. In 2010 he received the highest Manchester Textile Institute award – Honorary fellowship and in 2011 he was also awarded by the Honorary doctorate and in 2012 by the full professorship by the Wuhan Textile University in China. In 2016 he received an award from the Czech government for the design and manufacture of his instruments.

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