

Supervisor's evaluation of the upgraded version of the PhD Thesis of Mr. Asif Mangat „Thermal absorbtivity and other thermal comfort parameters of rib knitted fabrics“

The Thesis begins with systematic and comprehensive survey of state of art in the area of thermal absorbtivity of textile fabrics. In the next text, the basic theory some of thermal absorbtivity of materials and a new term was introduced and explained there: thermal contact absorbtivity. The main objective of the Thesis, which is the development of a simple model of thermal contact absorbtivity of fabric and its experimental verification, was initiated by an introduction of an original simple algebraic model of thermal contact absorbtivity of fabrics. From the analysis of the partial differential equation of transient heat transfer in a semi-infinite porous body resulted, that the fabric porosity can be also used in the new simple model (expression) for thermal contact absorbtivity of fabric.

This theoretical model was successfully verified by experimental determination of thermal contact absorbtivity of 31 rib knitted fabrics with varying geometry of these ribs. This very large set of knitted polyester fabrics was manufactured personally by the candidate. The fabrics structure and yarn properties were sufficiently characterized. The surface structure of the rib fabrics used in the study was systematically determined by means of the special TALYSURF instrument and by the Image analysis paint technology. Then the correlation between the predicted and experimental results was determined by means of advanced statistical method, and the results were very satisfactory.

Next study on thermal absorbtivity of knits involves the original analysis of the effect of singeing on thermal contact properties of 12 samples, and the results were evaluated by means of advanced statistical methods.

Even more systematic was the study of the effect of enzymatic treatment on thermal absorbtivity and other sensorial comfort properties on altogether 31 knitted fabrics on thermal of these knits, and correlated with the subjective thermal contact assessments by 30 testing persons. All experimental results were treated by modern statistical methods, which confirmed the strong effect of treatment on all the studied properties.

Among the unique results presented in the Thesis belongs the study of the effect of the direction of air flow passing parallel with the surface of the knitted fabrics on thermal resistance and water vapour permeability. The results of this extensive and very systematic study, based theoretical assumptions and on recent statistical methods confirmed, that the perpendicular air flow causes in all cases lower thermal resistance and higher water vapour permeability of the studied knits.

From the above survey follows, that the Thesis submitted by Mr. Asif Mangat presents a very original study, such as new theory of thermal contact absorbtivity of fabrics along with its experimental verification, new results on the effect of singeing on their thermal (contact) absorbtivity, the effect of enzymatic treatment on thermal and sensorial comfort of the rib knits, confirmed by subjective evaluation, and last but not least, the effect of the direction of the air flow passing parallel with the surface of the knitted fabrics on thermal resistance and water vapour permeability. During his PhD studies, the candidate exhibited large creativity, originality, patience and high experimental skills. The originality and importance of the achieved results acknowledges the publication of his results in six textile professional journals with high impact factors.

The plagiarism checker detected the 84% agreement with the previous version of the Mr. A. Mangat's dissertation, which is in order, as the new version of the dissertation should be upgraded. The plagiarism level of other parts of the dissertation is lower than 5%, which is acceptable.

However, the Thesis still contains some formal mistakes, but they do not lower the high level of this original and systematic contribution to the area of Textile Science. That is why I recommend the Thesis by Mr. Asif Mangat for the defence at the Faculty of Textile Engineering of the Technical University of Liberec, Czech Republic.

In Liberec, on June 15th, 2020



Prof. Ing. Lubos Hes, PhD, DSc
PhD supervisor