



STUDY ON THE TREATMENT OF TEXTILE MATERIALS FOR THE MANUFACTURE OF MATTRESS COVERS

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Abstract: *Changes in the rules for flammability testing have emphasized from the foam used in the contents of mattresses, to their covers, so the prevalence of these additives in current mattress covers is a very important unknown. In the present work, the materials for making two mattress covers (a mattress cover for domestic use and a mattress cover for hotel regime) were treated and tested in order to obtain basic information about the chemical treatment of fibers from the new mattress covers. The constituent components of the two mattress covers were each undersampled by cutting each layer then, it was passed to the collection of samples in small, labeled bags. Each sample was sampled over its entire layer depth, with section areas of about 1 - 2cm. This paper highlights the difference in finishing treatments, depending on the areas of use of knitted materials, intended for mattress covers. Thus, in addition to the differences between the solutions that apply to these materials, we can also see that those intended for domestic use are passed through different surface treatments, compared to those intended for the hotel industry, which require an immersion treatment, in order to obtain that load with 100% to 150% solution. The apparent omission of mattress covers from the criteria for chemical-free mattress certifications suggests that improvements are needed in terms of mattress labelling and also correct consumer education.*

Key words: *mattress cover, fiber, household, short term rental.*

1. INTRODUCTION

The inclusion of flame-resistant fibres in mattresses is driven by the California and US flammability regulations, despite the fact that their use in products poses a potential health risk [1]. Changes in California furniture flammability testing rules have shifted the focus from foam to their covers [2], so the prevalence of these additives in current mattress covers is an important unknown. "Certi-PUR-US" is an industry-based certification program that designates that foam products are free of heavy metals, PBDE, TDCPP or TCEP ("Tris") flame retardant, as well as numerous flame retardant additives [3], [4].

Consumers may think that certiPUR-US certified mattresses have undergone rigorous testing and do not contain hazardous substances.

Flame retardants in the components of the mattress without foam must be labelled if they are for young children or infants [5]. In this respect, it is not clear whether substances such as fiberglass (being considered a hazardous substance) are considered a flame-retardant chemical using current guidelines [6], [7].

However, certification and testing do not seem to include mattress covers [8].

2. EXPERIMENTAL PART

In the present work, the materials for making two mattress covers (a mattress cover for domestic use and a mattress cover for hotel regime) were treated and tested in order to obtain basic information about the chemical treatment of fibers from the new mattress covers.

The constituent components of the two mattress covers were each undersampled by cutting each layer then proceeded to collect the samples in small labeled bags. Each sample was sampled over its entire layer depth, with section areas of about 1 - 2cm.

Sample preparation and analysis were carried out using a standard internal operating procedure for the analysis of the fibrous content of the materials in the two mattress covers.

All samples were made with a Microscope Motic Fig. 1.



Fig. 1: Microscope Motic

Table 1: Mattress cover for domestic

Treatment	Likroll
Supplements	Clean&Fresh
Recipe	Citric Acid 0.2% Elastofin STO501 1.4% Sanitezed TH15-14 0.5%, Temp:150°C
Request width	229-231 cm
Request weight	204-212 gr/m ²
Composition	100% Polyester
Color	Natural, Ciment



Fig. 1: Treated material for home pouch (mattress)

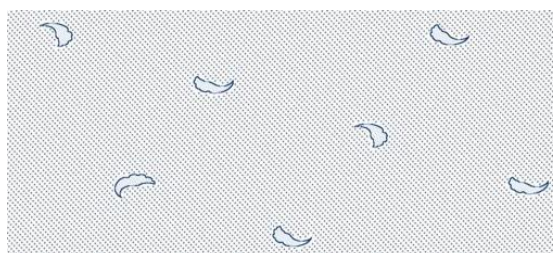


Fig. 2: Material treated for short term rental cover (mattress)



The main components of each mattress cover tested and their observed compositions are summarised in Table 1 and Table 2. The different component parts as a result of the finishing treatments of the two mattress covers, for home use - which were mixtures of: JASMINE AbioFlame 14%, citric acid / pick-up 100% control poids/weight controle, Temp:130⁰C, compared to the covers intended for the hotel industry - which have in their component: AbioFlame JASMINE 14% noer no citric acid / pick-up 100% control poids/weight control, Temp:130⁰C, are different and require immersion treatment, to get that load with 100% to 150% solution.

Table 2: Mattress cover for hotel regime

Treatment	PADDER FR + LIKROLL – COATING FR (on back)
Supplements	Abioflame Polyester
Recipe	AbioFlame JASMINE 14% NO softener NO citric acid / pick-up 100% controle poids/weight controle, Temp:130 ⁰ C
Request width	229-231 cm
Request weight	267-278 gr/m ²
Composition	100%Polyester
Color	Natural, Mimosa

3. CONCLUSIONS

This paper highlights the difference in finishing treatments, depending on the areas of use of knitted materials, intended for mattress covers. Thus, in addition to the differences between the solutions that apply to these materials, we can also see that those intended for domestic use are passed through different surface treatments, compared to those intended for the hotel industry, which require an immersion treatment, in order to obtain that load with 100% to 150% solution.

Although flame-resistant fibers are used in mattress covers to comply with flammability regulations, their compositions are uncertain on labels that can only describe the foam content in the architectural structure of the mattress.

The apparent omission of mattress covers from the criteria for chemical-free mattress certifications suggests that improvements are needed in terms of mattress labelling and also correct consumer education.

REFERENCES

[1] Stapleton H.M., Klosterhaus S., Keller A., Ferguson P.L., van Bergen S., Cooper E., Webster T.F., Blum A. Identification of Flame Retardants in Polyurethane Foam Collected from Baby Products. *Environ. Sci. Technol.* 2011;45:5323–5331. doi: 10.1021/es2007462.

[2] BHGS (California Bureau of Household Goods and Services) Technical Bulletin 117-Residential Upholstered Furniture Standard Fact Sheet. [accessed on 08 aprilie 2022]; Available online: https://bhgs.dca.ca.gov/industry/tb_117_faq_sheet.pdf.

[3] AFPP (Alliance for Flexible Polyurethane Foam Inc.) CertiPur-US Technical Guidelines for Molded Foam. 20 November 2020. [accessed on 08 aprilie 2022]. Available online: <https://certipur.us/technical-guidelines>.

[4] Petreas M., Gill R., Takaku-Pugh S., Lytle E., Parry E., Wang M., Quinn J., Park J.-S. Rapid methodology to screen flame retardants in upholstered furniture for compliance with new California labeling law (SB 1019) *Chemosphere.* 2016; 152:353–359. doi: 10.1016/j.chemosphere.2016.02.102.

[5] SFDE (San Francisco Department of the Environment) FAQ for Retailers Selling Upholstered Home Furniture in San Francisco, Including Information about Flame Retardant



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Chemicals. 2018. (accessed on 08 aprilie 2022). Available online: https://sfenvironment.org/sites/default/files/fliers/files/sfe_th_flame_retardants_faq_for_retailers.pdf

[6] BHGS AB 2998 Frequently Asked Questions. (accessed on 08 aprilie 2022); 2019 Available online: https://bhgs.dca.ca.gov/forms_pubs/ab2998_faq.pdf.

[7] ISPA (International Sleep Products Association) Survey of FR Fibers and Materials Used by Mattress Producers to Meet Federal Flammability Standards. (accessed on 08 aprilie 2022); 2020 Available online: https://bhgs.dca.ca.gov/forms_pubs/20200131_frsurveyreport.pdf

[8] Fiberglass and Other Flame-Resistant Fibers in Mattress Covers Jeff Wagner, Jefferson Fowles, Tracy Barreau Int J Environ Res Public Health. 2022 Feb; 19(3): 1695. Published online 2022 Feb 1. doi: 10.3390/ijerph19031695 PMID: PMC8835476