

Studies upon properties of lacquer coatings from oil – wax products formed on steamed locust wood (*Robinia Pseudoacacia* L.). Part II. Thermoresistance

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Abstract: *Studies upon properties of lacquer coatings from oil – wax products formed on steamed locust wood (Robinia Pseudoacacia L.). Part II. Thermoresistance.* The aim of the work undertaken on an experimental basis was to study the properties of heat resistance of coatings based on oil-wax products formed by native on the surface of thermally modified wood in locust steamed and unmodified versions. Resistance finishes to elevated temperatures in samples of wet and dry heat were tested acc. to EN 12722 and 12721 standards. Resistance to steam water action carried out acc. to PN-88/F-06100/06 standard, studying the course of this parameter during thermal aging. Based on the results of carried out experiments it was stated among others that in relative terms from the oil-wax finishing Osmo characterized slightly higher resistance to steam water action. Thermal aging as a function of the number of cycles of changes temperatures did not influence decisively on the course of this resistance.

Keywords: lacust wood, steamed version, oil-wax product, coating, thermoresistance, steam action

INTRODUCTION

Among the many types of modified wood, the process of steaming is the solution less frequently applied in industrial practice. Work was undertaken investigations upon related to locust wood surface finishing using selected products based on oil - wax. The results of the aesthetic-decorative features of obtained coatings (colour, gloss and metamerism) and their formation in selected processes of aging are presented in the work of Piernik, Proszyk and Nowaczyk-Organista (in press). The analysis of literature data, a particularly important performance characteristics of the finished surface is one of their heat resistance (Paprzycki and Proszyk 1977, Proszyk, Krystofiak and Lis 2005, Proszyk et al. 2006, 2009, Lis et al. 2010, Lis, Krystofiak and Proszyk 2010). Therefore, in the next stage, as a continuation of the topic in particular was an important test in determining the resistance properties of finishings for the thermal factors. The overall aim of this work was to study resistance to high temperature coatings and steam water action and the formation of these values during variable temperature cycles in the "cold check".

EXPERIMENTS

Selection and characteristics of experimental materials and coatings on basis oil-wax products, which are marked as OSMO, BECKERS and ALTAXIN, presented in the article Piernik, Proszyk and Nowaczyk-Organista (in press). Investigations on the resistance to high temperature in versions at "dry- and wet heat" test were done acc. to PN-EN 12722 and 12721 standards during time 20 min. In the case of the variant chosen, respectively, dry temperatures: 55, 85, 100 and 120°C, while the second version: 55, 70, 85 and 100°C. After that time the block was removed and samples were conditioned during 24 h and then the evaluation of surface coatings quality was made, using 5-degree number scale. (5- no visible changes of surface, 1- distinctly changes surface structure). Tests were conducted until the constant temperature was set, at which a visible defects or colour-off appeared.

The test of resistance to steam water action was made acc. to PN-88/F-06100/06 standard on samples of dimensions 70x70 mm, which were put on the holes of the cover a tank filled with

boiled water. Samples were subjected to steam action during 1 h . Then surfaces of the samples were dried with a blotter and conditioned during 24 h and then evaluation was made with 5 degree results scale (1-no visible changes of surface, 5-structure changes). Investigations were done after 3, 6 and 9 cycles of thermal aging in the version of changes temperatures acc. to PN-88/F-06100/07 standard (method A).

RESULTS

Results of experimental data upon coatings resistance on the activity of the warm in the dry and wet heat tests at various temperature were illustrated on Fig. 1. Analysing the dependence obtained was found that tested finishings characterized by high resistance to temperature, and individual assessment were at a comparable level. It was stated that showed almost identical resistance coatings of oil-wax Osmo and Altaxin + Penetrin. Slightly lower resistance and surface samples were characterized by a finished Beckers product. It is worth noting that the coating formed on the wood steamed reached in each case a slightly higher resistance.

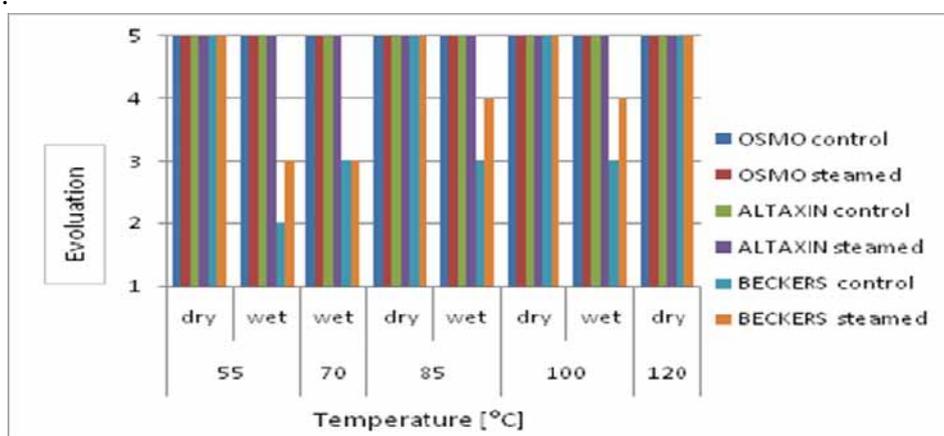


Fig. 1. Resistance to "dry" and "wet" heat of coatings based on oil-wax products

Results of investigations of resistance of lacquer coatings resistance on the steam water action in Table 1 were presented. The analysis of these data showed, that after 1 h action, tested coatings did not show resistances on the steam action.

Table 1. Results of resistance to steam water action of coatings based on oil-wax products

Kind of materials		Number of cycles			
Oil-wax	Substrate	0	3	6	9
		Note (scale 1-5 acc. to PN-88/F-06100/06 standard)			
OSMO	Native wood	3	5	4	4
	Steamed wood	4	3	3	3
BECKERS	Native wood	4	4	5	4
	Steamed wood	4	4	5	3
ALTAXIN+PENETRIN	Native wood	4	4	4	4
	Steamed wood	5	5	5	5

Finishes in versions Altaxin + Penetrin and Beckers showed relatively low resistance to water vapor, in particular, resulted in minor changes in gloss, discoloration and oil stains. And in the case of Osmo oil, tested surfaces were characterized by a slightly higher resistance.

Generally, thermal aging as a function of changing temperature cycles did not have a decisive extent on the development of resistance to steam finishes.

CONCLUSIONS

1. Steamed locust wood surfaces finished with various oil-wax products were characterized by relatively high resistance to elevated temperature, both in an attempt to "dry" and "wet." Slightly lower resistance possessed only oil Beckers.
2. In relative system finishings with oil-wax Osmo characterized a slightly higher resistance to steam water action. Heat aging as a function of the number of cycles of temperature variables did not influence decisively the shaping of this resistance.

REFERENCES

1. LIS B., KRYSZTOFIK T., PROSZYK S., 2010: Studies of the resistance upon some factors of UV acrylic lacquer coatings on MDF boards. Part I. Resistance of heat and cold liquid action, Ann. WULS-SGGW, For. and Wood Technol. 71; 450-453
2. LIS B., KRYSZTOFIK T., PROSZYK S., WOŹNIAK A., 2010: Influence of thermal aging of veneering boards finished PUR lacquers in HC technology upon coatings properties. Part III. Resistance to thermal and chemical factors, Ann. WULS-SGGW, For. and Wood Technol. 71; 458-461
3. PAPRZYCKI O., PROSZYK S., 1977: Odporność powłok lakierowych i laminowych na kontaktowe działanie ciepła, Roczniki AR w Poznaniu 92; 66-77
4. PIERNIK M., PROSZYK S., NOWACZYK-ORGANISTA M., (in press): Studies upon properties of lacquer coatings from oil – wax products formed on steamed locust wood (*Robinia Pseudoacacia* L.). Part I. Aesthetic-decorative features, Proc. IX International Symposium, Šturovo (Slovak Republic) 07-09.09.2011 "Selected processes at the wood processing"; 1-8
5. PROSZYK S., LIS B., KRYSZTOFIK T., DYRCZ A., 2006: The investigation of the properties of lacquer coatings on pinewood protected with blue-stain agents. Part III. Resistance to steam action and high temperature, Ann. WULS-SGGW, For. and Wood Technol. 59; 194-197
6. PROSZYK S., LIS B., KRYSZTOFIK T., TERAKOWSKA K., 2009: Influence of caring agent on utility properties of ash wood surfaces finished with oil-waxes products. Part IV. Resistance to some thermal and chemical factors, Ann. WULS-SGGW, For. and Wood Technol. 69; 203-206
7. PROSZYK S., KRYSZTOFIK T., LIS B. 2005: The influence of the thermal aging upon properties of PVC foils pressed on features elements. Part III. Resistance to steam action and high temperature, Ann. WULS-SGGW, For. and Wood Technol. 57; 161-164

Streszczenie: *Badania właściwości powłok lakierowych z olejo-wosków uformowanych na parzonym drewnie grochodrzewu (Robinia Pseudoacacia L.). Część II. Termoodporność.* Celem podjętej pracy o charakterze doświadczalnym było poznanie właściwości powłok lakierowych na bazie olejo-wosków uformowanych w układzie porównawczym na powierzchni drewna grochodrzewu modyfikowanego termicznie w wersji parzonej oraz niemodyfikowanego. Odporność wykończeń na działanie podwyższonej temperatury w próbach suche i mokre ciepło badano według PN-EN 12722 and 12721. Natomiast odporność na działanie pary wodnej wykonano według PN-88/F-06100/06, badając kształtowanie się tego parametru podczas starzenia termicznego w wersji zmiennych temperatur w funkcji liczby cykli odpowiednio 3, 6 i 9, przeprowadzonych wg PN-88/F-06100/07 (metoda A). Na podstawie wyników przeprowadzonych doświadczeń m.in. stwierdzono, że w ujęciu relatywnym wykończenia z oleju Osmo charakteryzowały się nieco wyższą odpornością na działanie pary wodnej. Starzenie termiczne w funkcji liczby cykli zmiennych temperatur nie wpłynęło w decydującym stopniu na kształtowanie się tej odporności.

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