

Influence of thermal aging on the decorative properties of LDF boards finished with artificial veneers

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Abstract: *Influence of thermal aging on the decorative properties of LDF boards finished with artificial veneers.* The aim of investigations was determined decorative properties of paneling and the course of their in thermal aging (check cold tests). Properly after 3, 6 and 9 aging cycles were made estimations of aesthetic-decorative features of surfaces and the course of gloss values were registered. On the basis of results of carried out experiments, it was stated among others that the all tasted samples irrespective of the kind used artificial veneers and of hot melt adhesives which were applied in the process of the adhesive bonding, were characterized by profitable values assessment of the aesthetic – decorative. After conducting 1-2 cycles it was stated disconnections of individual veneers from the surfaces of LDF boards.

Keywords: LDF board, HM adhesive, artificial veneer, surface, decorative feature, gloss

INTRODUCTION

In current literature about investigations of the properties of wall panels which were produced from LDF boards, hot melt adhesives and artificial veneers, determined thermo resistance of glue lines (Proszyk, Ślęzak 2013) and resistance of the surfaces to chosen factors (Ślęzak, Proszyk 2014). The other very important parameters there are assessment of the aesthetic – decorative features of paneling. Both assessment of the aesthetic - decorative, as well as functional advantages of the surfaces of wall panels and also their durability are depend on properties used for their production of materials in the form of artificial veneers, LDF boards and adhesives, as well as from the accepted technology in the process of the bonding (Zenkteler 1996, Proszyk 1999). The basic factors for coming into existence of defects of decorated surfaces there are the changeable temperature and hydro – thermal conditions, which are rising both while their transport, storing, as well as also using (Liptáková, Sedliačik 1989, Zenkteler 1996). In the above context, the different finished surfaces are surrendered to testing thermal aging in a procedure check cold tests (Proszyk, Pajdosz 1995). As a results of investigations of resistance of paneling in a procedure check cold tests, it can appear the changes of the gloss, discolorations and different kind deformations which are caused of tensions and then it can appear the stratifications in nano-, micro-, or even a macro scale. The other defects can also appear, for example in the form of scratches, of streaks, shadows and creasing (Pecina, Paprzycki 1997). Moreover taken the investigations, which the aim was determined properties of decorative of paneling and determined thermal aging in a procedure check cold tests.

MATERIALS

For experiments applied the wall panels produced in industrial conditions using LDF boards (thickness 7 mm, density 650 kg/m³, MC 6%), wrapping with 6 artificial veneers in various decorative versions) by 3 HM adhesives (based on EVA copolymers with fillers and without fillers and polyolefin product - PO).

The samples were exposed to the thermal aging in artificial conditions acc. to the procedure described in PN-88/F-06100/07 standard (method A). Properly after 3, 6 and 9 aging cycles were made estimations of aesthetic-decorative features of surfaces and the course

of gloss values were registered. Estimation of appearance surfaces with the visual method according to PN-88/F-06100/01 standard was made. The investigations of gloss carried out with PICO GLOSS apparatus, model 503 (Erichsen firm), making after 10 measurement, in longitudinal and crosswise direction, at 3 angles of incidence of the light, carrying out properly 20, 60 and 85°. This measurements carried out on surfaces samples (150 x 150 mm) and full dimension commercial elements (150 x 1200 mm). In Table 1 the classification of degrees of gloss of surfaces at incidence angle of the light 60° was presented.

Tab. 1 Classification of gloss unit of coating surfaces (Anonymous 2003)

Gloss unit (GU)	Verbal evaluation
< 10	mat
10÷35	half mat
35÷60	half gloss
60÷80	gloss
> 80	high gloss

RESULTS

Assessing the appearance of the wall panels on full dimension commercial elements, which there are not subjected to any thermal aging, appearing of any defects was not stated on the surfaces. All tested samples were characterized by profitable values assessment of the aesthetic – decorative.

In Fig. 1 and 2 showed typing the average values of the gloss of surfaces of veneers, the glancing angle of light 60°, appropriately for longitudinal and crosswise direction, for individual technical solutions included in experiments. Obtained measuring data were characterized by a very great repetitiveness, and appointed coefficients of variation were placed under the 5%.

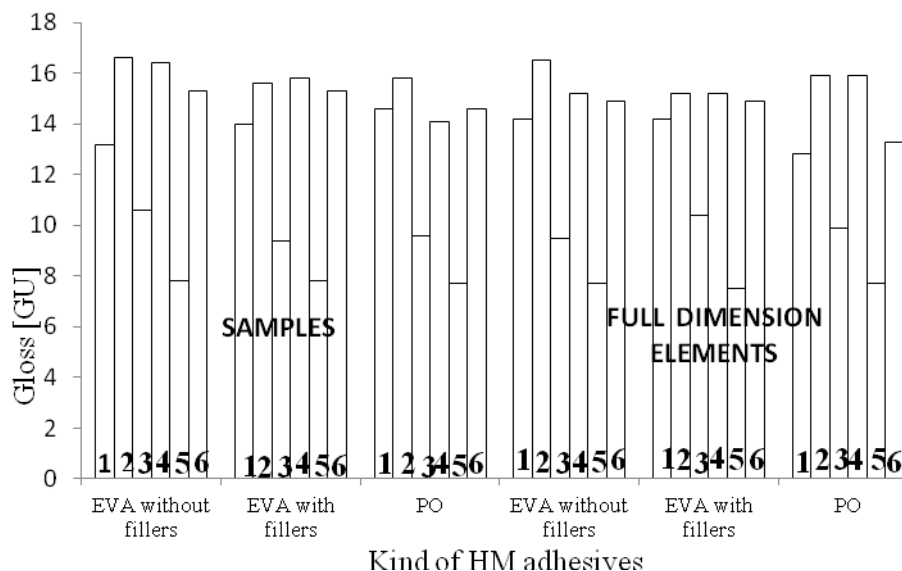


Fig. 1 Comparison of results of gloss surfaces of wall panels (longitudinal direction) produced from various HM adhesives and artificial veneers: 1-pine, 2-natural oak, 3-pine natural, 4-pine antic, 5-marble carrara, 6-ash mountain

Analyzing values of the gloss for panels in the form of samples about dimension 150 x 150 mm, in longitudinal direction with applying EVA adhesives without fillers, it was stated that for individual variants of used artificial veneers appeared mainly in range of values 7.8 –

16.6 GU. In case of crosswise direction the values were recorded also moved close. To sum up, according to criteria given in Table 1, the gloss degree was characteristic of surfaces of veneers included in examinations appropriately - mat or half mat. The next maximum values for crosswise direction in case of EVA adhesives without fillers and PO were for oak natural (14.7 – 14.2 GU). However for panels produced using EVA with fillers, the highest values were recorded for pine antic (15.1 GU). On the basis of results of gloss for full dimension commercial elements of wall panels, it was stated analogies with reference to discussed above samples. In case of longitudinal direction the highest gloss values for oak natural (15.2 – 16.5 GU) and for pine antic (15.2 – 15.9 GU), with the verbal evaluation – half mat. The remaining types of veneers were characterized by minimum values of the degree of the gloss what allowed to categorize some of them to the half mat, while the other samples to the mat version. However, on the basis of an analysis of results of gloss for crosswise direction of the surfaces of panels, it was classified as half mat. In case of EVA adhesives without fillers and with fillers, for oak natural the values of the gloss were placed in the scope 14.2 -14.6 GU and for panels of PO adhesives and for pine antic the value was 14.3 GU.

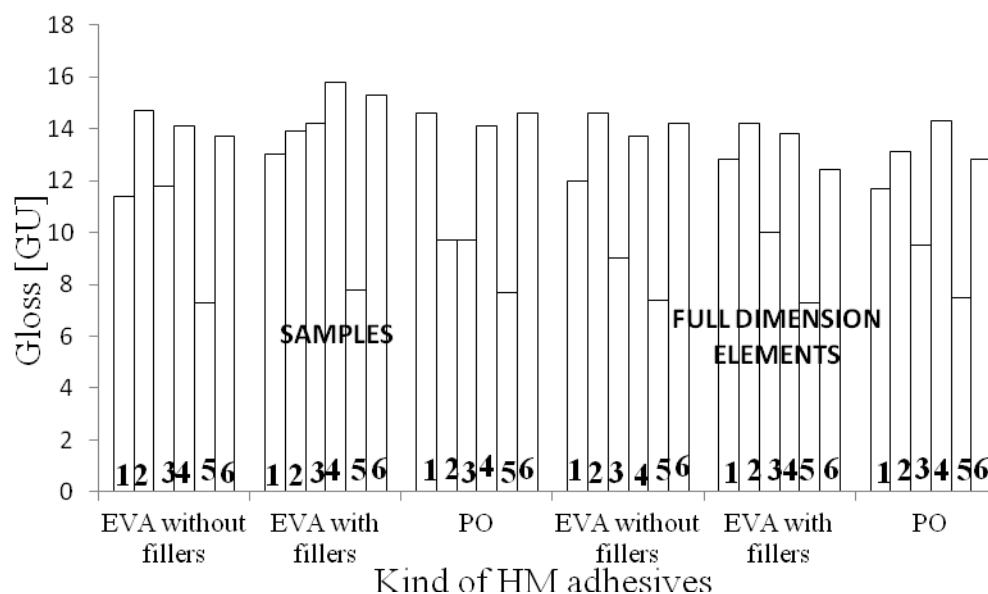


Fig. 2 Comparison of results of gloss surfaces of wall panels (crosswise direction) produced from various HM adhesives and artificial veneers: 1-pine, 2-natural oak, 3-pine natural, 4-pine antic, 5-marble carrara, 6-ash mountain

In the investigations of resistance of paneling for thermal aging in a procedure check cold tests, generally speaking after conducting 1-2 cycles it was stated disconnections of individual veneers from the surfaces of LDF boards.

CONCLUSIONS

1. The surfaces of all tested wall panels, did not demonstrate any defects and the surfaces were characterized by highest values of assessment of the aesthetic – decorative features.
2. The degree of the gloss of surfaces determined for longitudinal- and crosswise directions for individual artificial veneers was repeatable parameter and for individual products were contained in characteristic values in the verbal evaluation for half mat or mat.
3. As a result of thermal aging in a procedure check cold test there were adhesion disconnections of artificial veneers from the surfaces of LDF boards. These disconnections

intensified with the number of conducted cycles and there were recorded the lowest of the gloss degree of the surfaces of individual artificial veneers.

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Streszczenie: *Wpływ starzenia termicznego na właściwości dekoracyjne płyt LDF uszlachetnionych okleinami sztucznymi.* Przedstawiono wyniki badań właściwości dekoracyjnych powierzchni wybranych paneli ściennych produkowanych z płyt LDF, klejów HM oraz oklein sztucznych i ich kształtowanie się w warunkach starzenia termicznego w ujęciu cykli zmiennych temperatur. Określano cechy dekoracyjno – estetyczne oraz stopień połysku. Na podstawie rezultatów przeprowadzonych badań, m. in. stwierdzono że wszystkie poddane testowaniu powierzchnie, bez względu na rodzaj zastosowanej okleiny sztucznej oraz użytego w procesie oklejania kleju HM, charakteryzowały się korzystnymi walorami estetyczno- dekoracyjnymi. Testowane powierzchnie w warunkach oddziaływania cykli zmiennych temperatur, wykazały dyskwalifikujące rozwarstwienia już po przeprowadzeniu 1-2 cykli.

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