

TEST REPORT

3.11.2017

Version 0.0.1

Furniture door material –
Determination of elasticity and
resistance to wear

ENV 13696:2000

1 HISTORY

| Date | Version | Author | Changes |
|-------------|----------------|---------------|----------------|
| 3.11.2017 | 0.0.1 | | - |

2 ABSTRACT

The European Prestandard was presented by Technical Committee CEN/TE 175 "Round and sawn timber" the secretariat of which is held by AFNOR. This prestandard is one of a series of standards related to requirements and test methods for wood and parquet flooring. It includes the resistance to wear of wood flooring and parquet as well as the elasticity of its lacquer.

The wear of flooring with or without lacquered needs to be examined. The choice of any wood and parquet flooring cannot be decided by aesthetic considerations, it should be based on the resistance to wear. Because the wear affects the appearance and the slip resistance of the flooring, causing safety risks in use. Even though the floorings have undergone surface or in depth treatments, the final quality is replied on the wood species which can cause the decrease in wear such as the loss of material, the change in appearance and in properties.

The prestandard specifies requirements and test methods for testing the resistance to wear. There were three kinds of coating materials coated on MDF-based pieces. They were tested to find out the loss in weight after using abrader with a set of rotations. The weight loss records of test pieces were evaluated by weight loss method in order to calculate Taber wear index and to compare the abrasion resistance among three coating materials.

TABLE OF CONTENTS

| | | |
|-----|---------------------------|---|
| 1 | HISTORY..... | 1 |
| 2 | ABSTRACT | 2 |
| 3 | INTRODUCTION | 4 |
| 3.1 | In general | 4 |
| 3.2 | Test equipment..... | 4 |
| 3.3 | Meaning of the test | 4 |
| 3.4 | Personel | 4 |
| 3.5 | Timetable | 4 |
| 4 | TEST PREPARATIONS..... | 5 |
| 4.1 | Test pieces..... | 5 |
| 4.2 | Coating types | 5 |
| 5 | TESTING..... | 5 |
| 5.1 | Weight loss method | 5 |
| 5.2 | Testing | 5 |
| 6 | TEST RESULTS..... | 6 |



3 INTRODUCTION

3.1 In general

- Customer: Kensapuu Oy
- Ordered: Timo Mäkelä
- Contact person in Centria R&D: Elisa Saarela
044 4492 635

3.2 Test equipment

- Taber Industries Abraser 5131 - rotary platform abrasion tester
- Taber Industries Calibrate H-18 – standardized abrasion test wheels
- Taber 500 GR – testing weights
- Precisa XB 4200C -scale
- Vaisala HM141 ja HMP42 -temperature and moisture meter
- Taber Industries Abraser Refacing Disc S-11 - sandpaper tape
- Taber Industries Abraser Vacuum Unit - vacuum cleaning device

3.3 Meaning of the test

Meaning of the test is to calculate the Taber wear index based on weight loss records of test pieces and to compare the abrasion resistance among three different coating materials coated on MDF-based pieces.

3.4 Personnel

Test was carried out by Elisa Saarela and Hong Diep Bui.

3.5 Timetable

The testing was carried out on 2.11.2017.

4 TEST PREPARATIONS

4.1 Test pieces

This test was done with MDF-based test pieces which was delivered by customer. There were three different types of coating materials (material 1, material 2 and material 3) which had been already coated on test pieces. Test pieces were in square-shaped with a side of 100 mm. Based on the ENV 13696:2000, a hole with (6 ± 0.5) mm diameter was bored at the center of the test piece. For each coating material, three test pieces without damaged on the coated surface were selected to be tested. The temperature condition in the testing room was 21.1°C and the humidity was 20.1%.

4.2 Coating types

Three types of coating materials had been already coated on MDF-based test pieces. Material 1 is White 201 Matt, material 2 is 201 White and material 3 is White High Gloss.

5 TESTING

To evaluating the wear results of three coating materials, the weight loss method was applied.

5.1 Weight loss method

This method is used to compare the results among similar materials that have almost the same specific gravity. The Taber wear index or rate of wear is the weight loss in milligrams per thousand cycles of abrasion for a test which is run under a specific set of conditions. When the Taber wear index is lower, the abrasion resistance quality of the material is better.

$$\frac{\text{Weight loss in milligrams} \times 1000 \text{ cycles}}{\text{the number of cycle test}} = \text{Taber wear index}$$

5.2 Testing

Test pieces were weighed before testing the resistance to wear. After that, test pieces were placed on the abrader and the abrading wheels were closed to the surface of the test piece, the coated side was placed on top and was opposite with the abrading wheels. The revolution counter were set up at 10 cycles and the rotation of the test piece started.

After rotating 10 cycles, the abrading wheels stopped. And then the test piece was took out and weight again to record the weight loss and the number of rotations. Next, the testing continued with another 10 cycles and recorded the results. Until 100 wear cycles, the test start again with other test pieces.

6 TEST RESULTS

The Table 1 is shown the testing parameters and the weight loss values of three different coating materials after abrasion test.

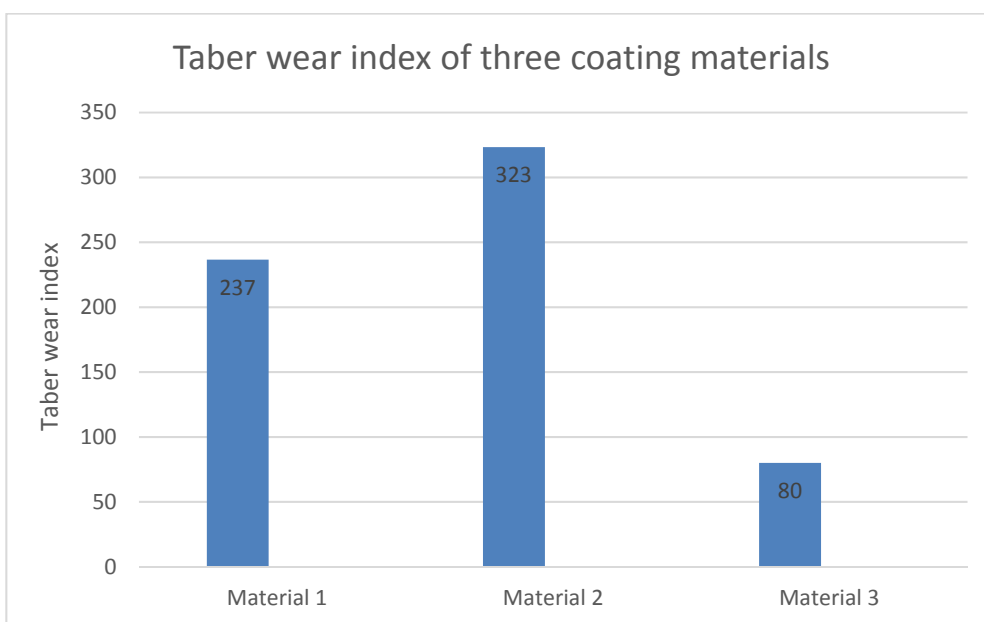
Table 1. The testing parameters and the weight loss values of three different coating materials after abrasion test

| Specimen | Wear Cycles | Weight Before g | Weight After g | Weight Loss mg | Conditioned Temperature °C | Conditioned Humidity % | Date |
|------------|-------------|--------------------|-------------------|-------------------|-------------------------------|---------------------------|-----------|
| Material 1 | 100 | 55.73 | 55.49 | 23.7 | 21.1 | 20.1 | 2.11.2017 |
| Material 2 | 100 | 56.51 | 56.18 | 32.3 | 21.1 | 20.1 | 2.11.2017 |
| Material 3 | 100 | 57.16 | 57.08 | 8 | 21.1 | 20.1 | 2.11.2017 |

According to the Table 1, material 2 has the biggest weight loss (32.3 grams) after abrasion resistance test, followed by material 1 with 23.7 grams of weight loss and the last one was material 3 with the loss of 8 grams.

Based on the recorded results and by using the weight loss method, the Taber wear index was calculated by multiply the weight loss with 1000 cycles, and then it was divided by 100 cycle test. The Taber wear results of three different coating materials are presented in Graph 1.

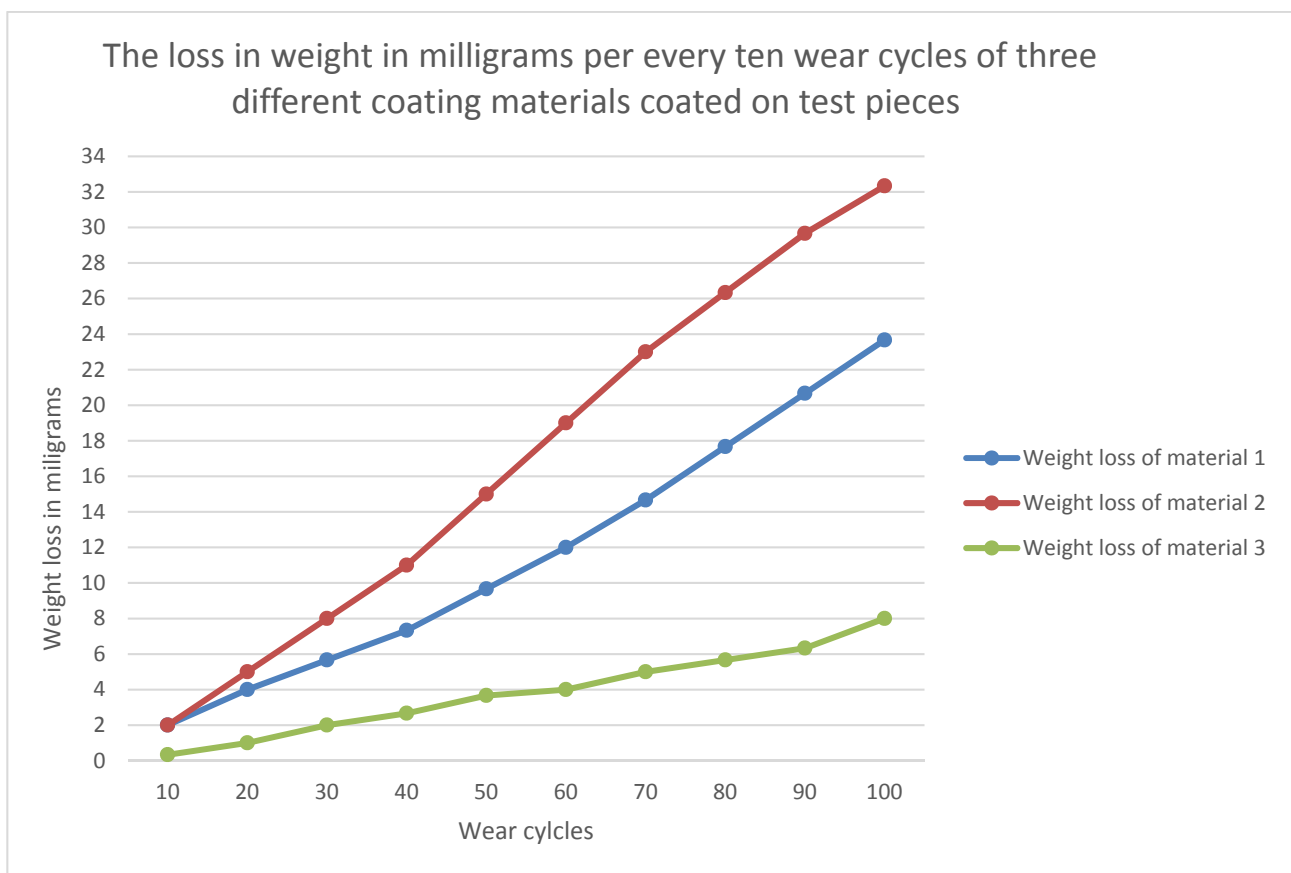
Graph 1. The Taber wear index of three different materials



According to Graph 1, material 3 has the less wear index. Therefore, material 3 has the best abrasion resistance quality with 80 Taber wear index, followed by material 1 with 237 wear index. Because material 2 has the largest wear index, it has the lowest abrasion resistance quality.

During the testing, the results were recorded after test piece was run with every 10 wear cycles. Until it reached to 100 revolutions, the test was begun again with other test pieces. The Graph 2 below displays the amount of weight loss of test pieces after every 10 wear rotations.

Graph 2. The loss in weight in milligrams per every ten wear cycles of three different coating materials coated on test pieces



The Graph 2 shows that material 2 has the biggest number of weight loss per every ten wear cycles (approximate 32 mg) compared to the values of material 1 and material 3, respectively approximate 24 mg and 8 mg.

