

A property often considered fundamental for a dried coating film is certainly hardness.

The “harder” a paint film is, the better it will be in fact the resistance of the treated surface to scratching, impact, softening caused by heat and other stresses to which furniture can be subjected in the course of their normal daily use.

Measuring hardness is therefore essential to choose a product or to improve it in the case of manufacturers of these raw materials.

But what is hardness? And how can it or should it be measured?

The working group 7 of the Italian standardization committee 22 of UNI (Wood and Furniture) is dealing with these two questions for some years.

The purpose of this group is to address these issues in depth, clearly identifying which measurement methods should be used and which reference values can be adopted by the market in the case of coated furniture.

With these brief notes we want to briefly describe the work that is conducting the GL7 also considering the current complexity of the tests that are currently used by the market for the assessment of “surface hardness”.

First of all, we would like to remember that the hardness of a coating material can be defined as the “resistance opposed by a dried film to scratching or to superficial deformations due to pressure”. The definition of hardness taken from an old Unichim manual on paints and varnishes also states that the hardness determinations that can be performed with different methods are rarely comparable with each other.

The need to tackle this issue in the context of standardization works exactly derives from the evidence that there are various methods that can be used to carry out assessments of the “hardness” of a surface of a piece of furniture and that the data deriving from them are not always concordant.

The UNI working group has therefore decided to initially consider the various existing methods by providing preliminary experiments using all the methods identified on the same samples.

For this purpose, a study day was recently organized at Catas that involved all the companies that are part of the UNI working group. The methods studied on a dozen samples prepared ad hoc by the paint manufacturers, were the following:

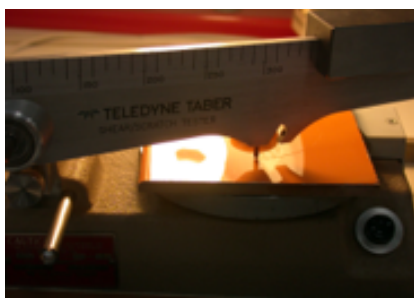
1. PEN METHOD (UNI EN ISO 1518 STANDARD).

A metal tip with a diameter of 1 mm is pushed against the test surface with a force determined by a proper spring. The formation of a sign on the surface in relation to the applied load is visually evaluated.



The hardness of coated furniture surfaces

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2. RESISTANCE TO SCRATCH (UNI EN 15186 / B STANDARD).

A metal tip with a diameter of 90 microns is rotated on the test surface with a load determined by the advancement of a weight opposed to the fulcrum of the arm supporting the tip. The test consists in verifying the load necessary to cause a continuous scratch on the surface.

3. KONIG AND PERSOZ PENDULAR HARDNESS (UNI EN ISO 1522).

In this case, the damping speed of a pendulum oscillating on the surface under test is measured. The measurement provides a time or in any case the number of oscillations made by the pendulum.



4. PENCIL HARDNESS (UNI 10782).

The test is performed with a series of pencils of different hardness. The result is expressed by the value of the hardest pencil that does not affect (scratch) the surface under test.

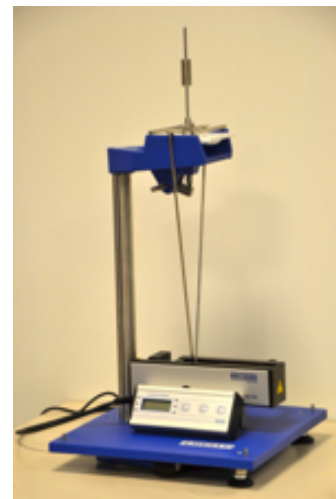
5. MICROSCRATCHING (CEN TS 16611).

A disk of abrasive material loaded with a certain weight is rotated on the surface under test for a determined number of cycles. At the end the gloss difference is measured before and after the test.



6. HAMBERGER TEST.

This method is carried out pushing the edge of a metal disk against the surface being tested. The result is expressed by the load that causes scratching and the removal of the surface coating.



All these methods, available at Catas laboratories, have shown some interesting peculiar features. For example, some of them have been sensitive to the entire coating system (including the substrate), while others appear to be more influenced by the characteristics of the top coat.

It has also been interesting to note that opacity can influence the results of some methods, highlighting their greater relevance towards opaque additives, rather than the “hardness” characteristics of the coating film.

The experiments conducted at Catas have certainly been a useful exercise of knowledge that will lead the group to evaluate soon on which directives to proceed including that, for example, to draw up a sort of guideline on the methods that can be used to evaluate the hardness of a surface with precise indications on which aspects influence the achievable results. A document of this kind could also be useful in the case of defects found in use, in order to reproduce them and to better understand their origin.

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