

Important standards for coating furniture and wood indoors

OENORM A 1610-12 : Furniture – Requirements, Part 12: Furniture Surfaces

The currently valid issue of this standard is dated 1.8.2007 and specifies the minimum requirements for hard (rigid) furniture surfaces. Appropriate suitability for use for the purpose of application is meant to be ensured in this manner.

Furniture surfaces may either be untreated, bleached, stained, coloured, printed, coated with bonded or pressed laminations (veneers, papers, films, plastic sheets, laminate sheets) and may be treated with oils, paints, polishes, among others. Moreover, this may also include powder-coated and galvanically treated surfaces.

The requirements of furniture surfaces may be very varied in practice; differentiation is made between 4 *areas of application*:

- I Work surfaces in kitchens, laboratories, workshops and business rooms
- II Tabletops and work surfaces in kitchens, bathrooms, offices and in the real estate field
- III Tabletops and work surfaces in living room areas, fronts and constantly visible surfaces, and those of seating furniture that are exposed to wear and tear
- IV Surfaces not continuously visible

With the help of various tests, it can be determined whether the requirements of the specific area of application are complied with. The requirements are listed in the OENORM A 1610-12 standard, and the corresponding tests are described in OENORM A 1605-12.

Three *mandatory tests* have been specified for the assessment of a furniture surface, namely:

- *Test 1*: Response to chemical reactions
- *Test 2*: Response to abrasion
- *Test 4*: Response to scratches

Table 1 contains a compilation of the minimum requirements for the application areas I - IV for the three mandatory tests; the requirements specified for the respective area of application must be complied with.

Moreover, additional tests may be mutually agreed to between customers and suppliers. The requirements specified for a given area of application in OENORM A 1610-12 are applicable.

Name of the test	Test no. according to OENORM A 1605-12	Rating categories required for the application areas I – IV			
		I	II	III	IV
Response to chemical reactions	1	A	B	B	C
Response to abrasion	2	B	D	E	E
		≥ 350 U	≥ 50 U	≥ 25 U	≥ 25 U
Response to scratches	4	B	D	E	E
		≥ 2.0 N	≥ 1.0 N	≥ 0.5 N	≥ 0.5 N

Table 1: Minimum requirements for furniture surfaces - Mandatory tests

ÖNORM A 1605-12: Furniture – Test Specifications, Part 12: Furniture Surfaces

This standard represents a collection of 20 different test methods for furniture surfaces; the release of OE-NORM A 1605-12 that is currently valid was issued on 1.8.2007.

The test of a furniture surface conforming to standards is conducted earliest 4 weeks after its production. The test environment has been specified as (50 ± 5) % relative atmospheric humidity and (23 ± 2) °C ambient temperature, whereby test specimens must be stored in the climatic conditions already listed for a period of at least 1 week prior to the test. Unless otherwise specified in the test procedure, the test is conducted under the same climatic conditions.

Test 1: Determining the resistance to chemical reactions

This refers to an evaluation method for the resistance of furniture surfaces to different test agents such as acids, alkalis, alcohol and some other organic solvents, various beverages, cleaning agents (or detergents) and disinfectants, oils, certain select foodstuffs and water.

The test is conducted according to OENORM EN 12720 "Furniture - Evaluating the resistance of surfaces to cold liquids".

In order to be able to evaluate the different level of resistance of furniture surfaces, five different rating categories have been defined in the OENORM A 1605-12, ranging from 1-A (highest level) to 1-D (lowest level); these have been illustrated in detail in *Table 2*.

Test agents	Rating category									
	1-A		1-B1		1-B		1-C		1-D	
	Ewd	Rating	Ewd	Rating	Ewd	Rating	Ewd	Rating	Ewd	Rating
1 Acetic acid 10 % (m/m)	16 h	5	6 h	5	1 hour	5	-	-	-	-
2 Acetone	16 h	5	2 min.	2	10 sec.	2	-	-	-	-
3 Ammonia solution 10 % (m/m)	16 h	5	2 min.	5	2 min.	5	-	-	-	-
4 Citric acid 10 % (m/m)	16 h	5	6 h	5	1 hour	5	-	-	-	-
5 Cleaning agent according to OENORM EN 12720	16 h	5	6 h	5	1 hour	5	10 min.	5	2 min.	5
6 Coffee 40 gm, instant per 1 l of water	16 h	5	16 h	5	16 h	5	10 min.	5	2 min.	5
7 Disinfectant ^a Chloramine T 2.5 % (m/m)	16 h	5	6 h	5	10 min.	5	2 min.	5	2 min.	5
8 Ethanol 8.1 96 % (V/V) 8.2 48 % (V/V)	16 h 16 h	5 5	- 6 h	- 4	- 1 hour	- 4	-	-	-	-
9 Ethyl acetate / Butyl acetate (1:1)	16 h	5	2 min.	2	10 sec.	2	-	-	-	-
10 Condensed whole milk (Fat proportion at least 7.5 %)	16 h	5	16 h	5	16 h	5	10 min.	5	2 min.	5
11 Olive oil	16 h	5	16 h	5	16 h	5	-	-	-	-
12 Paraffin oil	16 h	5	16 h	5	16 h	5	-	-	-	-
13 Sodium carbonate 10 % (m/m)	16 h	5	6 h	5	2 min.	5	-	-	-	-
14 Sodium chloride 15 % (m/m)	16 h	5	16 h	5	6 h	5	-	-	-	-
15 Black tea, according to OENORM EN 12720	16 h	5	16 h	5	16 h	5	10 min.	5	2 min.	5
16 De-ionised water	16 h	5	16 h	5	16 h	5	10 min.	5	2 min.	5
17 Red wine	16 h	5	16 h	5	6 h	5	10 min.	5	2 min.	5
18 Light (Lager) beer	16 h	5	16 h	5	6 h	5	10 min.	5	2 min.	5
19 Cola beverage	16 h	5	16 h	5	16 h	5	10 min.	5	2 min.	5
20 Black currant juice Commercially available product	16 h	5	16 h	5	16 h	5	-	-	-	-
21 Benzene, dearomatised (Boiling range 100 °C to 140 °C)	16 h	5	1 hour	5	2 min.	5	-	-	-	-

^a If a surface resistant to disinfectants is required for hygienic areas, the following disinfectants are generally used as the test agent: Ethanol 70 % V/V, formalin solvent 5 % V/V, chloramine T 5 % m/m, p-chlor-m-kresol 0.3 % m/m, alkyl-dimethyl benzyl ammonium chloride 0.1 % m/m.

where:
Ewd Duration of the reaction
Bew Evaluation
m/m Specific (mass-related) concentration
V/V Concentration by volume

Table 2: Determining the resistance to chemical reactions in accordance with OENORM A 1605-12.

To evaluate the test, the test fields of the individual test agents are compared with a reference surface that is not exposed to stress and evaluated in accordance with the classification code described in the following:

Rating 5 No visible changes (no damage);

Rating 4 Minor changes in gloss or colour, visible only if the light source is reflected on or near the marking and reflected directly in the eyes of the person observing the surface, or a few identifiable and definite markings;

Rating 3 Minor markings that are seen from several viewing angles, e.g. an identifiable and almost complete circle or a circular surface;

Rating 2 Clear marking, but however, the surface structure is unchanged to a large extent;

Rating 1 Clear marking, the surface structure is changed, or the surface material is completely or partially destroyed or the filter paper adheres to the surface.

Rating category 1-A is achieved by decorative high-pressure laminated plates; rating category 1-B1 is typically for qualitatively high-class wood coatings (2-component PUR solvent-based coatings, 2-component water-based coatings, UV roller paints rich in solid bodies and water-thinnable UV coatings). Water-thinnable 1-component furniture coatings based on self-crosslinking dispersions achieve rating category 1-B in most cases, and 1-B1 in certain cases. Rating category 1-C is characteristic for purely physically drying coatings such as, for example, nitro-cellulose paints.

The European test standard, EN 12720, is used in several European countries, and also in our neighbouring countries, Germany and Italy. Classification with the help of stress categories is governed nationally respectively; in Germany, DIN 68861-1 is applicable for this purpose and UNI 10944 in Italy.

The stress categories of DIN 68861-1 and UNI 10944 are formulated, in principle, in a manner similar to the rating categories of the OENORM A 1605-12, but they are not identical.

OENORM A 1610-12 does not demand the rating category 1-B1 for any area of application; in practice, however, it is always mutually agreed to time and again between the customers and suppliers (e.g. for coatings of kitchen and sanitary furniture, among others).

Test 2: Determining the response to abrasion

The test and rating is done in line with OENORM EN 438-2 with a so-called Taber abrader.

For this purpose, the friction rollers of the test device are covered with an S-42 smear gel paper (equivalent to Korund sandpaper of grain size 180) and loaded with 500 gm. The resistance to surface abrasion is obtained as the arithmetic mean of the number of revolutions up to 5% fraying (IP value) and, on the other hand, up to 95% fraying (FP value) in three test specimens. In contrast to OENORM EN 438-2, the resistance to surface abrasion is to be specified as the mean value of the test results of the three test specimens rounded to 25 revolutions.

Accordingly, you will find customary furniture coatings in rating category 2-D ($\geq 50 - 149$ U), and particularly abrasion-resistant types in the rating category 2-C ($\geq 150 - 349$ U).

Germany (DIN 68861-2) and Italy (UNI 9115) have similar standards with somewhat different test and rating methods.

Test 4: Determining the response to scratches

The test and evaluation takes place according to a method described in OENORM A 1605-12 with a so-called scratch testing device.

The minimum force in Newton (N) is determined as the rating criterion, which - applied by a diamond tip having a predefined shape - just about leaves a visible and continuous trace of scratch on the furniture surface to be tested. The end result is the mean value of three independent measurements.

In furniture coatings, this method yields measured values in most cases that lie between 0.7 N and 1.3 N. The measured value received depends partially on the property of the substrate. Hence, a comparison of the measured values is meaningful only if the same substrate is available (e.g. with a particle board veneered with beech wood).

The rating category 4-E contains coating types with measured values ranging from ≥ 0.5 N - 0.9 N, and rating category 4-D has coating types with measured values from ≥ 1.0 N - 1.4 N.

In Germany, there is an identical standard existing with DIN 68861-4, and in Italy there is a standard similar to UNI 9428 with somewhat different test methods.

Test 5: Determining the flammability

This test is specifically agreed upon if required, and is used to determine the flammability of furniture surfaces.

For this purpose, the surface to be tested is exposed to a flame for 15 sec. in test equipment that has been developed by the Timber Research Institute, Austria, in Vienna. During the exposure to the flame, the surface should not burn, if the result "not easily inflammable furniture surface" (rating category 5-B or 5-A) needs to be assigned.

The prerequisite for this is that a certain coating system that has this property has a specific selection of raw materials in its formulation.

Furniture surfaces that are not easily inflammable are demanded today for equipment and facilities for hotels, kindergartens, schools, government offices, etc.

In Germany, there had been very similar requirements formerly for so-called not easily inflammable paints in accordance with VTL A-053 or TL 8010-0312 or TL 7100-001/2. These standards are defunct and are no longer valid today.

A choice of other test methods from OENORM A 1605-12, which you can fall back on if required, have only been listed by name:

Test 3: Determining the response to impact loading

The test and evaluation take place in accordance with OENORM EN 438-2 with the impact loading test machine according to Wegner; the measured values are highly dependent on the property of the substrate.

Test 6: Response to cigarette embers

Test and evaluation are done in line with OENORM EN 438-2.

Test 7: Response to dry heat

The test and evaluation are done according to OENORM EN 12722 "Furniture - Evaluating the resistance of surfaces to dry heat".

In Germany and Italy, too, the test is conducted according to EN 12722. The relevant requirements are furnished in DIN 68861-7 or in UNI 10944.

Test 8: Response to wet heat

The test and evaluation are done according to OENORM EN 12721 "Furniture - Evaluating the resistance of surfaces to wet heat".

In Germany and Italy, too, the test is conducted according to EN 12721. The relevant requirements are furnished in DIN 68861-8 or in UNI 10944.

Test 9: Response to steam

The test is conducted according to OENORM EN 438-2 (exposure to steam for one hour).

Test 10: Determining the layer thickness

The determination is done with the help of a measurement microscope with 100 x magnification (the lowest, average and highest values obtained from 10 independent measurements must be specified).

Test 11: Determining the surface gloss

The test and evaluation takes place according to OENORM EN 13722.

Test 12: Determining the surface brightness (Reflection)

The test and evaluation takes place according to OENORM EN 13721.

Test 15: Determining the ductility

The test and evaluation is done according to the method described in OENORM A 1605-12 (impression test using the conical panel developed in the Timber Research Institute, Austria, in Vienna).

Test 16: Determining the adhesive strength

The test of the adhesive strength of films is conducted according to OENORM EN ISO 4624; the assessment of the adhesive properties of surfaces having liquid or powder coatings is done with the help of the cross-cut test in accordance with OENORM EN ISO 2409.

Test 18: Determining the resistance to light under the Xenon arc lamp

According to OENORM A 1610-12, this test is foreseen only for opaque pigmented coats; the test and evaluation is carried out in accordance with OENORM EN 15187.

Test 19: Response to temperature change

The test and evaluation is done according to a method described in OENORM A 1605-12.

Test 20: Determining the plasticization

The test and evaluation is done according to a method described in OENORM A 1605-12.

ÖNORM C 1555: Testing toys for being perspiration-proof, saliva-proof and for rub-fastness

The issue of this standard valid at present is dated 1.4.2004.

The test for being perspiration-proof and saliva-proof serves to determine whether with coloured toys, any paint constituents may get transferred to the mouth, mucous membranes or the skin under the impact of saliva and perspiration. The test for rub-fastness determines the resistance of the colour of toys to get rubbed off on textile materials.

Toys are perspiration-proof and saliva-proof if after 2 h of reaction time at 40 ± 2 °C, no coloration can be detected on filter paper strips moistened with synthetic perspiration and saliva solutions.

Special wood stains under clear coats or coloured coats should not show any signs of fading under these conditions, if they need to be used for surface treatment of wooden toys. At present, this test is also applied for other fields of wood coating.

In Germany, there are very similar, but not identical, pre-standards: DIN V 53160-1 (testing with saliva simulants) and DIN V 53160-2 (testing with perspiration simulants).

ÖNORM EN 71-3: Safety of toys, Part 3: Migration of certain elements

The current issue of this standard is dated 1.4.1995 and represents the takeover of EN 71-3 (Issue dated December 1994) with the status of an OENORM. Minor amendments or corrections to this standard were made on 1.7.2000, 1.3.2001 and 1.10.2002.

OENORM EN 71-3 specifies the requirements and test methods for the migration (in Latin, *migrare* = wander) from harmful heavy metals such as *antimony, arsenic, barium, cadmium, chromium, lead, mercury* and *selenium* used as material for toys.

In this test, any soluble substances present are extracted from the powdered coating material with a simulated gastric juice solution (37 ± 2 °C warm, dilute hydrochloric acid), whereby these soluble substances are equivalent to residue in the digestive tract after swallowing.

The proportion of heavy metals in extractable form is determined using spectrometric methods and should not exceed the low limit values specified.

If these low limit values are not exceeded while conducting the test according to OENORM EN 71-3, you can also somewhat simplistically speak of "*Absence of heavy metals*".

The compliance with the requirements of items being saliva-proof and perspiration-proof according to OENORM S 1555 as well as OENORM EN 71-3 are the prerequisite that a coating system, after disclosure and favourable expert assessment of the detailed formulation (literature research, and, if required, additional analytical analyses) conducted by ofi Technologie + Innovation GmbH, A-1030 Vienna (formerly: Austrian Coatings Institute) is confirmed as being *harmless*.

ÖNORM A 3800-1: Fire behaviour of materials, except building products, Part 1: Requirements, tests and assessments

The current issue of this standard is dated 1.11.2005; on its part, it has been worked out on the basis of the test methods given in the withdrawn pre-standard, OENORM B 3800-1: 1988.

OENORM A 3800-1 contains provisions for testing and evaluating materials, except building or construction products, whereby the flammability, production of smoke and drop formation while burning off are recorded as criteria. A characteristic example for the materials referred to are coated furniture pieces made of wooden materials.

In the case of coated furniture surfaces, the coating system concerned needs to be evaluated in conjunction with the given substrate.

Coating systems can be formulated with specific raw material selection, which satisfies the following criteria in conjunction with a substrate that is not easily inflammable (B1 substrate):

- Flammability class flame-retardant
- Smoke production class Q1: smouldering
- Drop formation class Tr 1: non-drip

For example, particle boards that are not easily flammable, among others, B1 materials, may be used as a substrate that is not easily flammable. At least 15 mm thick solid wood of Oakwood, European beech wood, ash, dark red Meranti, Sipo mahogany and ramin are considered to be not easily flammable without verification.

DIN 4102: Fire behaviour of building materials and components

The test for evaluating the extent of flammability ("Schlyter test") is conducted with test plates that are 80 cm in height and 30 cm wide, which have been exposed to the flame generated by a gas burner. The test is deemed to have been passed, if after exposure to the flame, there is a healthy and unaffected residual length of at least 40 cm up to the upper edge, any flame formed dies out within 1 minute after the flame test, or any smouldering does not continue beyond 5 minutes. A second test plate, which is located in the immediate vicinity, but is not exposed to the flames directly, should not catch fire during the entire test period.

ÖNORM EN 13501-1: Classification of building products and construction types according to their fire behaviour

In Germany, at present, DIN 4102-1 is still applied for the assessment of the fire behaviour of furniture elements, and it is a standard that concerns itself with the fire behaviour of building products and components just as the withdrawn pre-standard OENORM B 3800-1. The requirements of DIN 4102-1 are very similar to those of OENORM A 3800-1, but however, they are not completely identical. You refer to coatings or paints that are not easily inflammable according to DIN 4102 – B1, which, in conjunction with a substrate of building material class B1 (not easily inflammable building materials) must meet the given requirements. If the same coating or paint is applied on other substrates, only DIN 4102 – B2 (normally flammable building materials) is deemed to have been complied with.

For the classification of the fire behaviour of building products (examples for interior decoration: flooring, wall and ceiling panels, doors, among others), OENORM EN 13501-1 (current issue dated 1.5.2007) is applicable in Austria with effect from 1.6.2002. This standard takes the specifications of the European Construction Products Directive, 89/106/EEC, and the associated resolution 2000/147/EC for the execution of

this directive. Construction products, with the exception of floorings, are assigned to one of 7 possible categories or classes according to their fire behaviour: A1, A2, B, C, D, E or F; for the development of smoke, you have the sub-classes s1, s2 and s3, and for the combustible dripping, the sub-classes d0, d1 and d2 are available. There are other classification criteria applicable to floorings; the Euro classes for the fire behaviour of floorings are: A1fl, A2fl, Bfl, Cfl, Dfl, Efl and Ffl; they are supplemented by the sub-classes s1 and s2 for smoke development. The test method for evaluating the fire behaviour according to the Euro classes is specified in separate test standards (e.g. small burner test according to OENORM EN ISO 11925-2, single-burning item test in accordance with OENORM EN 13823 among others).

ÖNORM C 2354: Transparent coating materials for wooden floors and seals manufactured from them, minimum requirements and tests

The current issue of this standard is dated 01.03.2009.

OENORM C 2354 specifies minimum requirements for coating materials for transparent coatings (seals) of wooden floors, which are foreseen for dry indoors.

Basically, differentiation is made between three *stress categories*:

- | | |
|---------------------------------|---|
| A - moderate exposure to stress | slight use with outdoor shoes (e.g. living rooms and bedrooms) |
| B - Severe exposure to stress | customary use with outdoor shoes (e.g. kindergartens and anterooms) |
| C - Extremely severe exposure | constant and continuous use of outdoor shoes (e.g. school rooms, restaurants, offices, sales premises and other rooms open to the public) |

Whether the requirements necessary for the respective stress category are complied with, is determined with the help of four different test methods.

Table 3 contains a compilation of the minimum requirements for the three stress categories mentioned.

The tests given in *Table 3* should commence at the earliest four weeks after application of the final coating material. Prior to each test, the test specimen must be stored for at least 48 h under normal conditions (atmospheric temperature: 23 ± 2 °C, relative atmospheric humidity: 50 ± 5 %).

Requirement	Stress category		
	A	B	C
Ductility (cone designation) before and after the artificial ageing	8	9	9
Scratch resistance	0.5 N	0.7 N	1.0 N
Adhesive strength (cross-cut parameter) before and after the artificial ageing	≤ 1	≤ 1	≤ 1
Resistance to chemicals	1 C	1 C	1 B

Table 3: Minimum requirements of transparent coatings for wooden floors

The stress category of a coating material achieved and the application quantity required for this purpose must be specified by the manufacturer in the technical documentation.

The wood moisture of the test plates must be 9 ± 2 %.

The individual coating materials must be applied in accordance with the processing instructions or guidelines of the manufacturer, whereby a total dry layer thickness of 80 ± 10 μm must be maintained.

The artificial ageing consists of seven cycles of 22 h of storage each at 40 °C in a convection oven and 2 h each of placing a filter paper moistened with a 2% diluted surfactant solution (sodium dodecyl benzol sulphonate) and covered with a culture dish. The ageing must be completed within 14 days.

Testing the ductility:

This test is conducted according to OENORM EN 13696 before and after the artificial ageing.

Testing the scratch resistance:

The scratch resistance test is conducted according to OENORM A 1605-12 (Test 4).

Testing the adhesive strength:

The test of adhesive strength is conducted according to OENORM C 2350 before and after the artificial ageing.

Testing the behaviour with chemical reactions (resistance to chemicals):

The test is performed according to OENORM A 1605-12 and OENORM EN 12720.

The requirements of the stress category C (particularly high level of stress) are met primarily by 2-component PUR solvent-based coats, UV-curable based on unsaturated acrylate resins and by water-thinnable two-component sealing coats on account of the high level of scratch resistance demanded (1.0 N). Water-thinnable single-component sealing coats can be assigned to the stress category B (severe stress) or A (moderate stress) since the scratch resistance of these systems is generally between 0.5 N and 0.9 N.

ÖNORM C 2354, in the current issue, does not place any requirements on the *response to abrasion* of the sealing coat systems, since, based on systematic analyses [1], the conclusion drawn has been that this property has only limited significance with respect to the suitability of use. One option of capturing the response to abrasion in value terms is the determination of the abrasion loss in mg according to DIN 53754 using a Taber abrader (friction rollers covered with S-33 smear gel paper, 500 gm load, 50 U). When measured according to this method, the abrasion values of commercially available sealing coats lie between 20 mg and 110 mg. With qualitatively good water-thinnable sealing coats, you get values between 20 and 50 mg, and with good solvent-containing 2-component PUR sealing coats, the values are between 40 and 70 mg.

In ÖNORM EN 13696 (issue dated 1.3.2009) there are three test methods for wooden floors: The determination of the ductility (impression test with a conical panel), the determination of the resistance to wear and tear (abrasion test with the method of applying sanding agent – falling sand method) and the determination of the resistance to impact load (falling ball test). With the abrasion test mentioned with the help of, for example, the Taber grit feeder device, the required number of revolutions (rounded off to the nearest hundred) is determined until the film of coat frays out. The measured values obtained depend on both the dry film thickness applied and the coating material used; with commercially available sealing coats, the values measured are often about 500 revolutions, and with UV-cured systems, it is very common to obtain values of 2,000 revolutions or even higher. The resistance to impact loads is obtained from the height of fall of a (224 ± 3) gm – steel ball in mm, with which no damage occurs after three immediately successive impacts from the same height. The scope of this standard does not include the classification in stress categories.

The *stress caused by chair castors* is not handled by OENORM C 2354, since this depends not only on the coating material used but primarily on the type of wood used and the property of the castors. For this purpose, the Timber Research Institute, Austria, has issued a data sheet [2] that essentially recommends the use of sealing coats of the stress category B or C on appropriate hard types of hardwood (e.g. Oakwood, European beech wood, birch, maple etc.). For the chair castors being used, the castors should be twin castors whose contact surface is made of soft material made from plastics (e.g. PUR based, shore D hardness 40 – 50, contact surface pressure 3 – 5 N/m²). It is also important that the instructions for preservation and care of the respective floor manufacturer are observed and followed.

It is for similar reasons that the OENORM C 2354 also does not deal with the problem of the side adhesion or bonding. There is a data sheet [3] even for this from the Timber Research Institute, Austria, which provides information on avoiding damage caused by side or lateral adhesion / bonding. Thereby, it is a matter of selection of a dimensionally stable type of wood, in order to maintain the proper installation moisture (8 ± 2 % for readymade parquet and panel parquet, 9 ± 2 % for all other types of parquet), for professional laying and the application of coating materials that are compatible and matched with one another. The end user should, in turn, note that the room climate is not too dry permanently (it would be desirable to maintain relative atmospheric humidity of about 50 % even during the heating periods).

The important characteristics of parquet and wooden floors as well as the suitable test methods for determining these characteristics for the application as flooring for indoor rooms is specified by OENORM EN 14342 (current issue: 1.10.2007).

References

- [1] Barnert H., Grünberger A. and Scheurer W.: Bodenversiegelungslacke im Vergleich. (Comparison of floor seal coatings) *Paints and varnishes* **105** (3), 175 – 177 (1999).
- [2] Timber Research Institute, Austria: Data sheet on the use of wooden floorings exposed to stress caused by the castors of revolving chairs. Issue dated September 1999, Gg/AT.
- [3] Timber Research Institute, Austria: Data sheet for prevention of side adhesion by sealing coats for wooden floors. Issue dated September 1999, Gg/AT.

Some useful addresses and links

- **HFA – Timber Research Institute**, , Franz Grill Strasse 7, A-1030 Vienna;
Tel.: +43 (0)1 7982623-0, Fax: +43 (0)1 7982623-50, E-mail: hfa@holzforschung.at,
Homepage: <http://www.holzforschung.at>;
Department - Surfaces:
Wood used outdoors, wooden floors: Graduate Engineer, Dr. Gerhard Grüll, extension 61,
E-mail: g.gruell@holzforschung.at;
Wood used indoors, furniture: Graduate Engineer, Mr. Andreas Illy, extension 31,
E-mail: a.illy@holzforschung.at
- **IBS – Institut für Brandschutztechnik und Sicherheitsforschung GmbH, (Institute for Fire Safety Technology and Safety Research)**
Petzoldstrasse 45, Post box 27, A-4017 Linz;
Tel.: +43 (0)732 7617-850, Fax: +43 (0)732 7617-89, E-mail: office@ibs-austria.at,
Homepage: <http://www.ibs-austria.at>;
Contact person: Graduate Engineer Mr. Helmut Peherstorfer, Director, extension 835.
- **ofi Technologie & Innovation GmbH**, Austrian Research Institute for Chemistry and Technology, Arsenal, Plot 213, Franz Grill Strasse 5, A-1030 Vienna;
Tel.: +43 (0)1 7981601-0, Fax: +43 (0)1 7981601-8; Homepage: <http://www.ofi.at>.
Department of paints and varnishes & coating materials (ofi Coatings Institute):
Head of the Department: Master's Degree Holder, Dr. Anton Grünberger, phone extension 500, fax extension 700,
E-mail: anton.gruenberger@ofi.at;
Fire tests: Head of the Department: Graduate Engineer, Dr. Martin Englisch, phone extension 490, fax extension 480,
E-mail: martin.englisch@ofi.at.
- **ON – Österreichisches Normungsinstitut (Austrian Standards Institute)**,
Heinestrasse 38, A-1020 Vienna;
Contact person: Tel. : +43 (0)1 21300-805, Fax: +43 (0)1 21300-818, E-mail: sales@on-norm.at;
Homepage: <http://www.on-norm.at> or <http://www.as-plus.at> , Austrian Standards plus GmbH, (in the ON shop, among others, separate directories are provided with search features for all OENORMs, DIN standards and ISO standards available).