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Test Methods of Evaluating the Properties of Wood-based Panels and Surface Decorated Wood-based Panels

人造板及饰面人造板理化性能试验方法

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Test Methods of Evaluating the Properties of Wood-based Panels and Surface Decorated Wood-based Panels

1 Scope

This Standard specifies the methods for testing the physical and chemical properties of wood-based panels and surface decorated wood-based panels.

This Standard is applicable to wood-based panels and surface decorated wood-based panels, and their products.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 250-2008	Textiles - Tests for Colour Fastness - Grey Scale for Assessing Change in Colour
GB/T 601-2002	Chemical Reagent - Preparations of Standard Volumetric Solutions
GB/T 730-2008	Textiles-Tests for Colour Fastness - Quality Control of Blue Wool Reference Materials 1 to 7
GB 845	Cross Recessed Pan Head Screws
GB 846	Cross Recessed Countersunk Head Tapping Screws
GB/T 2406.1	Plastics - Determination of Burning Behavior by Oxygen Index - Part 1: Guidance
GB/T 2406.2	Plastics - Determination of Burning Behavior by Oxygen Index - Part 2: Ambient-temperature Test
GB/T 2408	Plastics - Determination of Burning Characteristics - Horizontal and Vertical Test

temperature of $(20\pm 2)^{\circ}\text{C}$ and relative humidity of $(65\pm 5)\%$ until constant mass. Where the difference between the two weights obtained at 24 h interval does not exceed 0.1% of the specimen mass, the specimen mass is regarded as constant.

4.13.4 Method

4.13.4.1 Measure the width and length of specimen at the center line of its length and width (see 4.1).

4.13.4.2 Place the specimen into the tank with water at $\text{pH } 7\pm 1$ and $(20\pm 5)^{\circ}\text{C}$; the distance from the upper end of specimen to the water level is (75 ± 25) mm. The distances between the specimens, the specimen and the bottom / wall of water tank shall at least be 15 mm in order to allow water to flow freely. Heat the water slowly and uniformly to the boiling point (about 100°C) within (90 ± 10) min, start timing immediately, boil the specimen continuously in the boiling water for (120 ± 5) min where the water keeps micro-boiling to prevent the specimen from erosion by boiling bubbles and strong flow. Replace water for each test.

4.13.4.3 After boiling, take out the specimen and put into the water tank of $(20\pm 5)^{\circ}\text{C}$ immediately to cool for (60 ± 5) min. The specimen surface is vertical to the water level; the distance between the specimens, the specimen and the bottom / wall of water tank shall at least be 15 mm.

4.13.4.4 Take out the specimen, wipe up and flat the specimen in the drying oven of $(70\pm 2)^{\circ}\text{C}$ for (960 ± 15) min.

4.13.4.5 Take out the specimen from the drying oven and cool to the room temperature, then bond the specimen and chuck together.

4.13.4.6 Determine the failure load according to 4.11.4.3 and 4.11.4.4.

4.13.5 Expression of results

4.13.5.1 The internal bonding strength is calculated according to 4.11.5.1. The specimen dimensions before boiling are considered for calculation.

4.13.5.2 The post-boiling internal bonding strength of a panel is the arithmetic average of that of all specimens from the same panel with accuracy to 0.01 MPa.

4.14 Determination of Humidity Resistance - Cyclic Test

4.14.1 Principle

The specimen is subject to three treatments for cyclic test, which includes immersion in cold water, freezing and dry, etc. After circular process and rebalance, determine the thickness swelling rate of water absorption and residual strength.

4.14.2 Apparatus

4.14.2.1 Universal mechanical testing machine (see 4.7.2.1 and 4.11.2.1).

4.14.2.2 Water tank: capable of maintaining the water temperature at $(20 \pm 1)^{\circ}\text{C}$.

4.14.2.3 Refrigerator: capable of maintaining the temperature at $(-12^{\circ}\text{C} \sim -25^{\circ}\text{C})$ and recovering to such temperature range within 1 h after the specimen is put inside.

4.14.2.4 Air dry oven: capable of maintaining the temperature at $(70 \pm 2)^{\circ}\text{C}$ and reaching to this temperature within 2 h after the specimen is put inside.

4.14.2.5 Vernier caliper: 0.1 mm in division value and the measuring range is selected according to the specimen length.

4.14.2.6 Micrometer: 0.01 mm in division value and the measuring range is selected according to the specimen thickness.

4.14.3 Specimen

4.14.3.1 Specimen dimensions

The specimen dimensions for thickness swelling rate of water absorption are detailed in 4.4.3.1;

The specimen dimensions for internal bonding strength are detailed in 4.11.3.1;

The specimen dimensions for static bending strength are detailed in 4.7.3.1.

4.14.3.2 Balancing process of specimen

If necessary, place the specimen at a temperature of $(20 \pm 2)^{\circ}\text{C}$ and relative humidity of $(65 \pm 5)\%$ until constant mass. Where the difference between the two weights obtained at 24 h interval does not exceed 0.1% of the specimen mass, the specimen mass is regarded as constant.

4.14.4 Method

4.14.4.1 Determination of specimen dimensions

Conduct according to the method specified in 4.1. For specimen for thickness swelling rate of water absorption, measure the thickness at the cross point of diagonal lines; for specimen for internal bonding strength, measure the specimen width and length at their center lines; for specimen for static bending strength, measure the width at the center of specimen's long side and measure the thickness at the cross point of diagonals.

4.14.4.2 First cycle

4.14.4.2.1 Soak the specimen vertically into water at $\text{pH } 7 \pm 1$ and $(20 \pm 1)^{\circ}\text{C}$ for (70 ± 1) h; the distance between the specimens, the specimen and the bottom / wall of water

tank shall at least be 15 mm. The upper end of specimen is (25 ± 5) mm away from the water level.

4.14.4.2.2 After immersion, take out the specimen from the water tank, wipe up the water on the specimen surface and put the specimen into the refrigerator at $-12^{\circ}\text{C} \sim -25^{\circ}\text{C}$ for freezing for (24 ± 1) h; the spacing between the specimens is at least 15 mm.

4.14.4.2.3 After freezing, take out the specimen from the low-temperature freezer and put into the air dry oven immediately at a temperature of $(70\pm 2)^{\circ}\text{C}$ dry for (70 ± 1) h; the spacing between specimens is at least 15 mm. The total volume of specimen shall not exceed 10% of the volume of drying oven.

4.14.4.2.4 After drying, take out the specimen from the drying oven and place under the room temperature of $(20\pm 5)^{\circ}\text{C}$ to cool for (4 ± 0.5) h. The spacing between specimens is at least 15 mm.

4.14.4.2.5 During immersion, freezing, drying and cooling, the specimen shall always be kept vertically.

4.14.4.3 Second cycle

After the first cycle, turn the specimen upside down for 180° and keep such state unchanged; conduct the second water immersion, freezing, drying and cooling treatment, see 4.14.4.2.

4.14.4.4 Third cycle

After the second cycle, turn the specimen upside down for 180° (i.e. the vertically standing state in the first cycle) and keep such state unchanged; conduct re-immersion according to 4.14.4.2.1, freeze according to 4.14.4.2.2 and dry according to 4.14.4.2.3.

4.14.4.5 Rebalancing process

Take out the specimen from the oven. If necessary, place the specimen at a temperature of $(20\pm 2)^{\circ}\text{C}$ and relative humidity of $(65\pm 5)\%$ until constant mass. Where the difference between the two weights obtained at 24 h interval does not exceed 0.1% of the specimen mass, the specimen mass is regarded as constant.

Measure the specimen thickness for thickness swelling rate of water absorption at the original measuring point.

4.14.4.6 Determination of thickness swelling rate of water absorption

Determine the thickness swelling rate of water absorption according to 4.4.

4.14.4.7 Determination of internal bonding strength

Determine the internal bonding strength according to 4.11.

specimens from the same panel, accurate to 0.1kJ/m^2 .

4.23 Determination of Low Temperature Impact Toughness Property

4.23.1 Principle

Determine the impact resistance capacity of the specimen under ultra-low temperature.

4.23.2 Apparatus

4.23.2.1 Impact testing machine or universal mechanical testing machine, with the measuring range of $0\text{J}\sim 100\text{J}$ and the accuracy of 1J .

4.23.2.2 Vernier caliper, with the division value of 0.1mm and the measuring range of $0\text{mm}\sim 300\text{mm}$.

4.23.2.3 Micrometer, with the division value of 0.01mm and the measuring range of $0\text{mm}\sim 25\text{mm}$.

4.23.2.4 Ultra-low temperature refrigerator, with the temperature down to -60°C .

4.23.3 Specimen

4.23.3.1 Specimen dimensions

Length $l=(300\pm 2)\text{mm}$; width $b=(20\pm 1)\text{mm}$; thickness $t=(20\pm 1)\text{mm}$ (the panel thickness shall be taken if it is less than 20mm).

4.23.3.2 Balancing process of specimen

If necessary, place the specimen at a temperature of $(20\pm 2)^\circ\text{C}$ and relative humidity of $(65\pm 5)\%$ until constant mass. Where the difference between the two weights obtained at 24h interval does not exceed 0.1% of the specimen mass, the specimen mass is regarded as constant.

4.23.4 Method

4.23.4.1 Measure the width and the thickness of the specimen (see 4.1).

4.23.4.2 Place the specimen in the ultra-low temperature refrigerator of $(-50\pm 3)^\circ\text{C}$ for 3h .

4.23.4.3 Take the specimen out and finish the impact toughness determination within 2min according to the impact toughness determination methods in 4.22.4.2 and 4.22.4.3.

4.23.5 Expression of results

It is same as the impact toughness expression methods in 4.22.5.

The specimen dimensions for water absorption are detailed in 4.6.3.1.

4.26.3.2 Balancing process of specimen

If necessary, place the specimen at a temperature of $(20\pm 2)^{\circ}\text{C}$ and relative humidity of $(65\pm 5)\%$ until constant mass. Where the difference between the two weights obtained at 24 h interval does not exceed 0.1% of the specimen mass, the specimen mass is regarded as constant.

4.26.4 Test methods

4.26.4.1 Accelerate ageing cycle. Specimens shall be subject to 6 cycles of tests. The cycle interruption (e.g. weekend) can only occur in freezing treatment. Each cycle includes the following steps:

- a) Soak the specimen in hot water of $(49\pm 2)^{\circ}\text{C}$ for 1h.
- b) Steam the specimen in steam of $(93\pm 3)^{\circ}\text{C}$ for 3h.
- c) Freeze the specimen in refrigerator of $(-12\pm 3)^{\circ}\text{C}$ for 20h.
- d) Dry the specimen in air dry oven of $(99\pm 2)^{\circ}\text{C}$ for 3h.
- e) Steam the specimen in steam of $(93\pm 3)^{\circ}\text{C}$ for 3h.
- f) Dry the specimen in air dry oven of $(99\pm 2)^{\circ}\text{C}$ for 18h.

After all the 6 cycles of accelerated aging tests are finished, place the specimen in a temperature of $(20\pm 2)^{\circ}\text{C}$ and relative humidity of $(65\pm 5)\%$ for at least 48h, then conduct property test.

4.26.4.2 In the cycle test, the specimen shall be placed on the specimen bracket vertically with certain distance between them. In the soak and steam-injection treatment, at least 25mm shall be left between specimens and between specimen and vessel wall to make the specimen expand freely. In the soak treatment, the upper end of specimen is (75 ± 25) mm from the water surface.

4.26.4.3 In the cycle test, inspections shall be carried out frequently for layering or other damages; if obvious damages exist, they shall be recorded.

4.26.5 Expression of results

4.26.5.1 Determine the static bending strength according to the requirements of 4.7 or 4.8. The specimen dimension may adopt that before or after the cycle treatment according to the requirements of product standards.

4.26.5.2 Determine screw holding capability according to the requirements of 4.21.

4.26.5.3 Calculate the thickness swelling rate of water absorption according to the

Take down a part of specimen from the testing piece and insolate it together with the blue wool standard sample under xenon arc lamp and determine the solarization amount from the change of blue wool standard sample. Compare the insolation and un-insolation specimen and determine the change of un-insolation amount to evaluate the sample's color fastness to light.

4.30.2 Apparatus and materials

4.30.2.1 Xenon arc lamp: air cooled type or water cooled type (see Appendix D). It is parallel to the specimen on the specimen bracket of lamp shaft and any two points on its surface shall not be greater than 10% in irradiance difference. Radiation quantity (radiation energy in unit area) is determined with radiation quantity.

4.30.2.2 Grading lamp box: the in-wall is in neutral grey which is between Grade 1 and Grade 2 discolor grey scales (approximate to Munsell N5); artificial light source capable of producing color temperature of $(6500 \pm 200)\text{K}$ and with the illumination on specimen surface of at least 800 lx is installed on the top. Grading lamp box is placed at a certain position and the surrounding lighting condition has no influence on the specimen observation and evaluation.

4.30.2.3 Coverings: light-tight material, such as aluminum sheet or hard-cards of other materials.

4.30.2.4 Standard materials

Blue wool standard samples 1~7 (conforming to GB/T 730-2008);

Gray scale for assessing change in color (conforming to GB/T 250-2008).

4.30.2.5 Ethyl alcohol: with the volume fraction of 95%; industrial grade.

4.30.2.6 Absorbent gauze.

4.30.3 Specimen

The length and width of specimen shall be determined according to the shape and dimension of specimen chuck. The adopted specimen must cover all the deep and light colors on the sample. In air cooled equipment, the area of commonly-used specimen shall not be less than $45\text{mm} \times 20\text{mm}$. In cold equipment, the area of commonly-used specimen shall not be less than $70\text{mm} \times 20\text{mm}$.

It is recommended that the replicate sample for specimen of each material shall be 3 at least.

4.30.4 Test methods

4.30.4.1 Test condition

Black standard temperature: $(65 \pm 3)^{\circ}\text{C}$; relative humidity: $(50 \pm 5)\%$; or specified in

72h. The mercury lamp for test use shall have a power of 400W, and a wavelength above 300nm.

4.31.4.2 Observe the defects and discoloration on the specimen surface under natural light with normal eyesight (or normal eyesight after correction) at a point about 40cm away from the specimen surface.

4.31.5 Expression of results

Record defects like cracking, bubble, crack and uneven grain etc. and changes of discoloration and luster on the specimen surface.

4.32 Determination of Color Difference

4.32.1 Principle

Obtain the color stimulus function $\Phi(\lambda)=\rho(\lambda)S(\lambda)$ by the spectral power distribution $S(\lambda)$ and the spectral reflection curve of the to-be-tested panel $\rho(\lambda)$, then multiplied by the standard chromaticity observer color matching function $\bar{x}(\lambda)$, $\bar{y}(\lambda)$ and $\bar{z}(\lambda)$ respectively and get the area below three curves which is the tristimulus values of the to-be-tested color. Measure the material color of two panels or two different points of the same panel. Calculate the tristimulus values or difference of material color index of the two measured points.

4.32.2 Apparatus

It is recommended to use photoelectric integrating color to determine the material color. The detection of photoelectric integrating element and the total spectrum sensitivity of the system shall meet Luther conditions as much as possible.

The performance index of color tester:

- a) The optical condition conforms to illumination mode of 0/d, 0/45° specified by the International Commission on Illumination (CIE);
- b) The standard light source conforms to D65 standard light source specified by CIE;
- c) The standard observer's angle conforms to 10° viewing field specified by CIE;
- d) Measuring light area $\Phi 20\text{mm}$;
- e) Repeatability: $\Delta E_{ab}^* \leq 0.15$.

4.32.3 Methods

4.32.3.1 Determine the panel color with photoelectric integrating color measurement (also known as direct reading of stimulus value color measurement).

Grade 2: obvious change in color and/or luster;

Grade 1: bubbling and/or layering.

4.36 Determination of Surface Resistance to Crazing

4.36.1 Principle

Determine whether cracks occur after the decoration layer of the specimen surface is treated under 70°C for certain time.

4.36.2 Apparatus

4.36.2.1 Air dry oven: capable of maintaining the temperature at $(70\pm 2)^{\circ}\text{C}$.

4.36.2.2 Hand magnifier, 6× magnification factor.

4.36.2.3 Lighting equipment, with the illuminance of 800 lx ~1000 lx.

4.36.3 Specimen dimensions

Length $l=(250\pm 2)$ mm, width $b=(250\pm 2)$ mm. The edge of specimen decoration layer is sawed into 45° chamfer which is about 3mm in width, so as to eliminate the influence of edge notch.

4.36.4 Methods

Put the specimen into air dry oven of $(70\pm 2)^{\circ}\text{C}$ to conduct heat treatment, heat for 24h. Then take it out and lay at a temperature of $(23\pm 2)^{\circ}\text{C}$ and relative humidity of $(50\pm 5)\%$ for 24h.

Observe the specimen surface at arbitrary angle with normal eyesight (or normal eyesight after correction) under natural light: observe the specimen surface with 6× magnifier under the lighting equipment of 800 lx~1000 lx in illuminance.

4.36.5 Expression of results

Cracks may be divided into blind cracks and surface cracks: it is hard to see blind cracks with naked eyes, while surface cracks may reach to baseplate through the surface decoration layer and can be seen clearly. The result of crack detection for the specimen surface and back surface is expressed as the following grades:

Grade 5: observe with 6× magnifier, no cracks on the surface;

Grade 4: observe with 6× magnifier, separate blind cracks exist on the surface;

Grade 3: observe with 6× magnifier, randomly distributed blind cracks exist on the whole surface;

Grade 2: cracks less than 25mm in length can be observed with naked eyes besides

4.41.3 Apparatus and materials

4.41.3.1 Glass cover plate (e.g.: watch glass).

4.41.3.2 Wetting agent, e.g.: household detergent.

4.41.3.3 Solvent, such as ethanol, acetone etc.

4.41.3.4 Horizontal test platform, illuminated by the natural light above or the white fluorescent lamp of 800 lx~1 000 lx.

4.41.3.5 Absorbent cotton.

4.41.3.6 Clean soft cloth.

4.41.3.7 Hard nylon bristle, e.g.: nail polish brush.

4.41.4 Specimen

Specimen cut from the sample with any size enough to hold all the contaminants. The specimen shall be kept flat and smooth during test. If there are different surface decoration layers, the test surface shall be designated.

4.41.5 Methods

Place the specimen under normal temperature at first.

Wipe up the specimen surface with absorbent cotton. Drop a small amount of contaminant (e.g.: 2~3 drops) on the upper surface of the two horizontal specimens. Place glass cover plate on the contaminant on the surface of either specimen.

After the contact time reaches 16h, wipe off the contaminant with clean soft cloth and clean with water; then wash with water containing wetting agent, clean the surface with ethanol finally and then dry it with absorbent cotton. As for the plate with reticulate pattern (or embossment) on the surface, the brush may be used to clean the contaminant on the surface.

Place the cleaned specimen under normal temperature for 24h, and then set it on the test platform, and check the surface with normal eyesight (or normal eyesight after correction) from a distance of 400mm.

4.41.6 Expression of results

Influence of test material on specimen surface:

Grade 5: no obvious change;

Grade 4: slight change in luster and/or color;

Grade 3: moderate change in luster and/or color;

There is a hole of 6mm in diameter at the specimen center.

4.42.4 Balancing process of specimen and abrasive cloth

Wipe up the specimen surface with absorbent gauze and weigh; classify it into four quadrants.

Place the specimen and abrasive cloth under a temperature of $(23\pm 2)^{\circ}\text{C}$ and relative humidity of $(50\pm 5)\%$ for more than 72h.

4.42.5 Methods

4.42.5.1 Stick the abrasive cloth to the grinding miller with double side tape or adhesive of similar function.

4.42.5.2 Abrasive cloth standard. Install the standard zinc plate on the abrasion tester; start the dust exhaust apparatus; zero the counter. Install the grinding miller on the support and apply an external force of (4.9 ± 0.2) N to abrade for 500r, then wipe up the standard zinc plate and weigh to the accuracy of 1mg. Change the abrasive cloth and re-abrade for 500r, then wipe up and weigh to the accuracy of 1mg. The total mass loss of standard zinc plate shall be within the range of (130 ± 20) mg. If the mass loss is out of this range, this abrasive cloth shall not be used. The single side of standard zinc plate shall not be used more than 10 times.

4.42.5.3 Install the grinding miller on the abrasion tester, and zero the counter. Clamp the specimen with the specimen clamp and then gently place the grinding miller on the specimen. Start the dust collector and rotate the specimen with an external force of (4.9 ± 0.2) N applied. Inspect the abrasability of the specimen after rotating every 25~50 cycles, and inspect whether the abrasive cloth is filled with fine grains; change the abrasive cloth if it is filled with fine grains or after rotating 500 cycles.

4.42.5.4 When initial abrasion point (IP) occurs, note down the number of revolutions; recover inspection until final abrasion point (FP) is reached and then note down the number of revolutions.

Note 1: IP refers to that the print, floral design, monochrome pattern or papers are obviously ground through, base exposure is found in three quadrants with an area not smaller than 0.6 mm^2 . As for decorative pattern layer, the base exposure refers to that the printing base is exposed; as for monochrome decorative layer, it refers to the first layer of different color is exposed.

Note 2: FP refers to that about 95% decorative pattern layer is ground off within the range of grinding; and as for monochrome decorative layer, it refers to that about 95% bottom layer of different color is exposed.

4.42.6 Expression of results

4.42.6.1 Abrasion resistance of each specimen shall be expressed in number of rotation and calculated according to Formula (26), to the accuracy of 1r:

4.45.5.1 Express the surface resistance to cigarette burn with the following grades:

Grade 5: no obvious change;

Grade 4: slight change in luster and/or with brown spot(s) when inspected from some angle;

Grade 3: medium luster and/or brown spot;

Grade 2: obvious brown spot(s) but surface not damaged;

Grade 1: bubbling and/or cracking.

4.45.5.2 A plate's resistance to cigarette burn is the arithmetic average of the burn resistance grade of 3 cigarettes, to the accuracy of integer.

4.46 Determination of Surface Resistance to Dry Heat - Method 1

4.46.1 Principle

Determine the resistance of the specimen's decorative surface against the dry heat of hot objects. This method is applicable to products like decorative high-pressure laminate with thermosetting impregnated resin paper, surface decorated wood-based plate, etc.

4.46.2 Apparatus and materials

4.46.2.1 Cylindrical aluminum or aluminum alloy vessel: outside diameter (100±1.5) mm, height (70±1.5) mm, wall thickness (2.5±0.5) mm, base thickness $2.5^{+0.5}_0$ mm; coverless; the external wall is fully twined with asbestos yarn; the base shall be flat, smooth and clean.

4.46.2.2 Heating source.

4.46.2.3 Thermometer, -5°C~250°C, with an accuracy of 2°C.

4.46.2.4 Fixed frame, for keeping leveling of the specimen.

4.46.2.5 Stirrer.

4.46.2.6 Stopwatch.

4.46.2.7 Constant temperature humidity chamber, capable of keeping the temperature at (20±2)°C and the relative humidity (65±5) %.

4.46.2.8 Inorganic insulating board, about 2.5mm thick, 150mm long and wide.

4.46.2.9 Urea formaldehyde adhesive containing about 15% filling or other adhesives of the same property.

Unless otherwise specified, before the test, the specimen of dry coating shall be placed at a temperature of $(23\pm 2)^{\circ}\text{C}$ and relative humidity $(50\pm 5)\%$ for at least 48h.

4.47.5 Methods

4.47.5.1 After subject to quenching and tempering, the specimen shall be tested immediately at a temperature of $(23\pm 2)^{\circ}\text{C}$.

4.47.5.2 Insert the thermometer or other temperature measuring equipment in the central hole of heat source.

4.47.5.3 Turn on the dry oven and heat the aluminum alloy (acting as the heat source) to at least 10°C higher than the specified test temperature.

4.47.5.4 Wipe up the test area with soft wet cloth.

4.47.5.5 When the heat source is at least 10°C higher than the specified test temperature, move it onto the insulating pad.

4.47.5.6 When the temperature of heat source reaches to $\pm 1^{\circ}\text{C}$ of the specified test temperature, immediately move it onto the test area.

4.47.5.7 20 min later, remove the heat source and wipe up the test area with soft wet cloth.

4.47.5.8 After the test, separately place the specimen for at least 16h.

4.47.5.9 Dry up each test area with soft wet cloth and observe the specimen. Carefully inspect the damage condition of each test area, such as, discoloration, luster change, bubbling or other defects visible with normal eyesight (or normal eyesight after correction). Use any one of the two light sources (4.47.2.6 and 4.47.2.7) to illuminate the test surface independently so that the light can be reflected into the eyes of the observer; inspect from various angles includes that from the inter-angular section at a distance of 0.25m~1m. Make the light parallel or vertical to the grain direction on the test surface (if any), and compare the test area with the non-test area at each position.

4.47.6 Expression of results

Express influence on test piece surface with the following grades:

Grade 1: no visible change (no damage);

Grade 2: slight visible change in color and luster or with discontinuous moulage only when the light source is projected to the test surface and reflected into the eyes of the observer;

Grade 3: slight moulage, visible from several directions; e.g.: almost integral circular ring or circular moulage;

of 0mm~150mm.

4.51.2.6 High-quality wood shaving board with the surface of excelsior. Length: (230±5)mm; width: (230±5)mm; thickness: 18~20mm±0.3 mm; density: 625 kg/m³~700 kg/m³; water content: 9±2%.

4.51.2.7 Urea formaldehyde adhesive containing about 15% filling or other adhesives with the same properties.

4.51.2.8 Cushion layer, adopting foamed polyethylene: with the width of 300mm×300mm, thickness of 2.5± 0.2 mm and surface density of 75g/m².

4.51.3 Specimen dimensions

Length $l=230\pm5$ mm; width $b=230\pm5$ mm or length $l=300\pm5$ mm; width $b=180\pm5$ mm (in case of width less than mm, the panel width is adopted).

4.51.4 Method

4.51.4.1 As for thin thermosetting resin impregnated paper high-pressure decorative layer pressure panel (HPL panel), stick it on the shaving board with designated adhesive to make into a specimen; as for the HPL panel with the thickness $2.0\text{ mm}\leq t<5.0\text{mm}$, the specimen clamp may be utilized to clamp specimen and shaving board; as for the HPL panel with the thickness $t\geq5.0\text{mm}$, shaving board support is in no need.

4.51.4.2 Place the specimen in an environment with the temperature of (23±2)°C and the relative humidity of (50±5)% at least for 7d.

4.51.4.3 As for HPL panel, clamp the decorative surface of specimen upward in the frame fixture (Figure 47) and place them on the tester base; as for impregnated paper laminate floor etc., place the cushion layer on smooth and level ground, put the decorative surface of specimen upward and on the cushion layer.

4.51.4.4 Specimen surface is covered with a piece of carbon paper in close contact with the specimen surface. At the certain height from the surface of specimen (the height is specified in product standard), drop the steel ball freely and vertically to the surface of specimen. When the ball bounces for the first time, grasp it to prevent continuous bump. Impulse times are specified in product standard, and the distance of all falling points and that of the falling point and specimen edge shall be greater than 50 mm. In arbitration test, each specimen only bumps once and the bump falling point shall be as close as possible to the specimen center.

4.51.4.5 Measure impression diameter, accurate to 0.1mm.

4.51.5 Expression of results

Record falling height, impression diameter and panel surface damage condition.

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