Environmentally friendly building materials for residential high-rise construction

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Abstract. Materials, products and systems used as finishing of external surfaces and/or interior rooms when erecting or reconstructing buildings and structures should: protect the person in the room finished with these materials from the pathogenic effects of materials, products and building systems; if possible, do not exert pathological physiological and/or activity loads on people carrying out production or life activities in rooms finished with these materials and/or equipped with products and systems. As a result of the research, it was found that the source of 80% of the chemicals found in the air environment of the apartments is used construction and finishing materials. Currently, the quality of raw materials for building materials and the building materials and structures themselves are determined by GOST and Technical Specifications. A civil engineer is required to correctly select a material, product, or structure that has sufficient strength, reliability, and durability for specific conditions. Safe in themselves, finishing materials, products, and systems in the composition can acquire and demonstrate new properties. Therefore, the study of this problem is an urgent task of the near future and one of the directions of construction anthropotechnology, in particular, when implementing high-rise construction projects.

1 Introduction

Wallpaper is the material used for interior walls for more than four centuries; is a strip (roll) of paper, the front side of which has a painted or embossed design of different tones on a single-color or multicolored background selected for the interior. Special types of wallpaper have coatings from various artificial materials, natural fabrics, metal foil, etc. Decorative wallpaper coating can simulate the texture of wood, texture of fabrics, metal surface and other materials. The picture of the wallpaper can be expressed by nature (flowers, plants, birds, animals, etc.) or stylized (ornaments) images, grids and small forms creating a common background [1-4].

Quality wallpaper on stiff paper is different and can have:

- imitation of different tissues;
- relief fragments ("embossed");

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● background and painted design, printed with colorful compositions containing as a pigment a metallic (aluminum or bronze) powder of natural color or pre-colored ("metallized" wallpaper) powder;

● coatings to give wallpaper a high resistance to the exposure of moisture and washing solutions.

Wallpaper effectively complements the overall interior decoration and hides small wall defects. To decorate ceilings, ceiling wallpaper is used.

2 Materials and methods

Wallpaper is systematized according to:

● water resistance: ordinary (do not even withstand wet rubbing); water resistant (can withstand a limited number of rubs of dirty places with a wet sponge or cloth without the use of washing solutions); washable (withstand washing with water and washing solutions).

● surface type: plain wallpaper; with a relief design; with a deeply embossed design.

● paper weight: light-weight (weight is less than 80-100g/m^2); heavy-weight (weight is 100-150g/m^2); fabric, multi-layer, special (weight is more than 150g/m^2).

● decor: plain single-color, not requiring the trim of stripes along the vertical wall during the wallpapering; with a repeating design, requiring the trim of the stripes during the wallpapering; with a non-repeating design, requiring the special trim of the stripes during the wallpapering.

Plain, with sparkle finish, light, and with shallow texture wallpaper requires careful preparation of the surface (base). In this case relief wallpaper is more suitable: such wallpaper hides small surface variance of walls and ceilings [1-4, 8,9].

Paper prints is divided into primed and unprimed. Primed wallpaper is printed on pre-covered with special soil paper. Unprimed wallpaper is printed on white or color paper.

Primed wallpaper is divided into marks:

● A, Av - printed (paper weight 80-90g/m^2);

● B, Bv - printed embossed (paper weight 150 g/m^2);

● C, Cv - printed crimped (paper weight 120-150g/m^2);

● D, Dv - duplicated (paper weight 70-120g/m^2).

The index "v" in the designation of the wallpaper brand means "moisture resistant", made with an adhesive layer on the back (rubber-coated) or without it.

Choosing wallpaper, take into account that:

- under natural light, wallpaper looks different than with the artificial;
- a small length of wallpaper does not give a complete impression of the overall tone of the interior;
- wallpaper on the wall looks much darker than a small length of wallpaper;
- it is necessary to take into account the dimensions of the room to be trimmed (area and height).

Wallpaper is produced in rolls of length 6; 10.5; 12 or 18m., which is due to the multiplicity of the most common height of the room. By order of construction organizations, the length of the roll can reach 500-700m. The width of rolls is often 500, 560 or 600mm, less often 530 or 750mm, with borders and without them; sometimes the border is cut at the factory. The useful width of the wallpaper (i.e., with the cut border) is reduced by 2-3cm and with a width of the roll 500mm is 470-480mm, with a width of 560mm is 530-540mm, with a width of 600mm is equal to 570-580mm. The gage material, type of wallpaper, catalog number and other data are indicated on the reverse side of the wallpaper or on the border [1-4, 8-16].

3 Results

Wallpaper is divided into two grades. Wallpaper of the 1st grade should not have border breaks, wallpaper with border breaks is attributed to the 2nd grade. Wallpaper of the 2nd grade can consist of two parts (pieces) identical in design and shade, the short part should be at least 2.5m. Wallpaper should be stored in a dry place in a vertical position. Wallpaper consumption depending on the area of the room at a height of 3.2 m is given in Table 1. The number of rolls respectively increases or decreases by 0.25 in accordance to room's heights more or less than 3.2 m [1-4,8-10].

It is recommended light wallpaper with a small, soft design (grid or background) for small rooms (area from 9 to 12m^2). Such walls decoration contributes to a visual increase of the room's size.

Table 1. Dependence of wallpaper consumption on the room's area at a height of 3,2 m.

Length of wallpaper in roll, m	Room's area, m^2											
	5	7	9	13	15	17	19	21	23	25	27	29
	Number of rolls											
6,0	9	10	11	14	15	17	18	19	20	21	23	25
10,5	6	7	8	10	11	12	14	15	16	17	17	18
12,0	4	5	6	7	8	9	10	11	12	13	13	14
18,0	3	4	4	5	6	6	7	8	8	8	8	9

If the room's area is 15-20m^2, wallpaper with a larger design in close-in tone colors is recommended for its decoration. If the room's height is 2.5-2.7 m, to visually increase its height, it is recommended to use wallpaper with a clearly expressed vertical design (strip, etc.). If the rooms are high, but small in area, it is advisable to use wallpaper with a horizontal layout, as this visually reduces the height of the room.

Wallpapering has an advantage over its coloring: wallpapers not only decorate but also insulate the room, it is durable; many kinds of wallpaper can be wiped with a wet cloth or washed. The durability of the wallpaper depends on the intensity of operation of the room, lighting conditions, humidity, and temperature. Average durability of ordinary wallpaper is 6 years, water resistant is 8 years.

Table 2 shows which operations for gluing surfaces are applicable to the surfaces to be cleaned in the interior of buildings.

Friezes and borders - strips of paper with a longitudinal design are produced for decorating (pasting) the upper and lower cut of the wallpaper.

Friezes are produced with the widths of 240, 290 or 480mm and the length of 12m.

Borders are produced with the width of 15 to 160 mm and the length of 6 m (by special order up to 25 m length).

In Russia, there is GOST 6810-86 "Wallpapers", which defines the technical requirements for wallpaper: weight, resistance to light from burning out, steam conductivity, resistance to wet rubbing. The unification of the basic wallpaper qualities is the International Association of Wallpaper Manufacturers.

Base layer is a leveling layer on the walls of thin paper, newspapers and other waste paper, which does not have oil and ink marks; it flattens rough surfaces, creates a solid texture of the substrate, which is very important for thin wallpaper materials, protects wallpaper from the impact of new growths (rust, efflorescence, pitch, etc.) on plastered, wooden and other surfaces. On the substrate from newspapers and paper for recycling, the wallpaper does not show individual irregularities and is firmly put up.

Table 2. Operations.

Operations	on plaster and concrete			on dry plaster (drywall)			on wood		
	Wallpaper		lincrusta	Wallpaper		lincrusta	Wallpaper		lincrusta
	Light-and medium-weight	Embossed and heavy-weight		Light-and medium-weight	Embossed and heavy-weight		ight-and medium-weight	bossed and heavy-weight	
• surface preparation	+	+	+	+	+	+	+	+	+
• Boarding with cardboard	-	-	-	-	-	-	+	+	+
• Pasting joints	-	-	-	+	+	+	+	+	+
• Surface gluing	+	+	+	+	+	+	+	+	+
• Surface cleaning	+	+	+	+	+	+	-	+	+
• Grinding of pasting places	+	+	+	+	+	+	-	+	+
• Grinding with pumice stone	-	-	+	-	-	-	-	-	-
• Surface gluing	-	-	+	-	-	+	-	-	+
• Pasting with paper	+	+	-	-	-	-	+	+	-
• Pasting with wallpaper:									
-overlap;	+	-	-	+	-	-	+	-	-
- end-to-end	-	+	+	-	+	+	-	+	+

Glues based on flour, starch, carpentry glue, synthetic resins, latex, rubbers and other adhesives that have acceptable technological properties (colorlessness, necessary adhesion, setting time) are used for putting up wallpaper. The industry produces glues in pre-packaged form with instructions for preparation and use. Glutinous compounds can be prepared from flour, its waste, potato, or cornstarch.

A paste is prepared from starch or rye, wheat, oat flour, sifting them and pouring in warm water. To make 5l of paste, take 250g of flour, 0.25l of a five percent joiner's glue and 0.1% of borax (for protection against insects). Add to the stirred flour or starch boiling water until a homogeneous liquid mass is formed, into which the hot carpentry glue is gradually poured. The mixed mass is cooked on fire until a two-time boil, filter, and the paste is ready for use. Don’t add joiner glue to the paste to make light tones of wallpaper.

Glue based on CMC-H (sodium salt of carboxymethyl cellulose) is a white powdery mass, which when "closed" with water forms an adhesive of the required quality for substrate priming (newspapers, waste paper) and wallpaper. The glue (5%) is poured into water (95%) and left for 14 hours to completely dissolve the binder. The storage time of made glue is up to 10 days.

Polyvinyl acetate glue (PVA) is prepared on an aqueous dispersion of PVA (2.5 kg of dispersion mixed with 1 liter of water). The storage time in sealed containers is up to 10 days.

Glue "Bustilat" is produced in the form of mastics up to 3.5 kg in plastic jars. Before the working consistency, it is bred according to the instructions. It is applied for paper wallpapers and synthetic films.

Perchlorovinyl glue is used for gluing lincrusta and synthetic films. In addition to these materials, domestic and foreign industry produces a wide range of glues of different modifications.

Lincrusta (GOST 5724-75) is a roll material with a relief texture (design), consisting of a plastic mass based on synthetic resin (glyptal polymer or polyvinyl chloride) with a filler applied to the paper sub-base. The length of the paper web in a roll is not less than 12 m; useful width (without borders) is 500, 600, 750 or 900mm; the minimum thickness (along the borders) is not less than 0.5 mm, the maximum thickness (according to the relief) is not more than 1.2 mm. The width of the borders of the blade is from 3 to 20 mm. The main property of lincrusta is flexibility. Therefore, when testing for bending on a rod with a diameter of 20 mm, there should be no cracks. The face of the lincrusta is not stained during production. The relief design should be clear throughout the entire area of the paper web, there should be no tears, creases, holes, cracks, rips, and shells on the front surface. Before use, lincrusta can be kept indoors for up to two days. It is used for interior decoration of walls at a temperature not lower than +15 °C in rooms with a normal temperature and humidity regime of operation. After sticking on the walls, lincrusta is usually painted with oil or synthetic paint [1-4, 8-17].

Paper-based decorative laminate is made by pressing special paper impregnated with synthetic thermosetting resins. Plastic is used for cladding the walls of accommodations, public and industrial buildings, vehicles, trade equipment, door leaves, etc. The advantages of this facing material are a small mass, hygienic, and lightfastness. Due to sufficient chemical resistance, it does not deteriorate from the action of various detergents, normal solutions of acids and alkalis, organic solvents, and mineral oils. Paper-based decorative laminate withstands heating to 130 °C, depending on the quality of the front surface and physical and mechanical parameters.

Paper-based decorative laminate is divided into brands:

- A - for use in conditions requiring increased wear resistance;
- B - for use in less rigid conditions;
- C - for use as an ornamental material.

Plastic sheets are produced in lengths from 400 to 3000 ± 5mm, from 400 to 1600 ± 5mm wide and 1 thick; 1.3; 1.6; 2; 2.5 and 3mm with an accuracy of ± 0.15mm (for plastic thickness of 2mm) and ± 0.2 mm (for plastic thickness of 2 mm and more) [1-4, 8-19].

4 Discussion

Paper-based decorative laminate has one decorative surface (one-sided), which can be monophonic or with a printed design. The face of plastic sheets should be glossy or matte, smooth (without blisters). The average density of paper-based decorative laminate is not less than 1.4g/cm^3, the tensile stress at tension is not less than 63.6 MPa, and when bending is not less than 98MPa (for A grade not less than 117.6 MPa).

Plastic sheets are laid in pairs on the front surface inwards and packed in wooden solid or latticed boxes. Plastic can be transported by any type of transport, protecting it from pollution, mechanical damage and the effects of atmospheric precipitation. The sheets should be stored in a covered clean room and laid horizontally on flat pallets. Before use, plastic is recommended to stand for at least three days laid in a foot in a room with a temperature of at least 20 °C and a humidity of no more than 60%.

Paper-based decorative laminate can be drilled by hand and electric drilling devices and cut with hacksaws or guillotine shears. At the same time with the cutting borders, you need to remove the sticking resin in time. When cutting, dust is obtained that is flammable, irritates the upper respiratory tract and requires the use of protective equipment [1-4, 8-16,17-19,20,21].

For gluing paper-based decorative laminate to wood surfaces, glues MF-17 and FR-12, as well as diphenolic mastics, are used. For gluing paper-based decorative laminate to the concrete and plastered surface glues KN-2 mastics and diphenolic mastic are used. By

moving the brush in one direction, the glue is applied with a thin even layer on both glued surfaces. The room should be heated up to 15-25 °C. Then the surfaces to be glued are immediately connected and kept under pressure throughout the day. When fastening sheets of paper-based decorative laminate to the crate between the sheets, leave a gap of 3-4mm, taking into account the possible deformation of the sheets when the temperature and humidity in the room change. For the same reason, when fastening the sheets with screws, the diameter of the screw hole is slightly larger than the diameter of the screw. The gaps are covered with layouts.

Rigid PVC sheet (sheets of non-plasticized PVC according to GOST 9639-71 *) are made from a non-plasticized polyvinylchloride composition with additives (stabilizers, lubricants, etc.) by film compression or extrusion. Rigid PVC sheet is used for lining internal walls of industrial buildings, which are affected by acids and alkalis. The temperature range of operation of sheets is 50-60 °C if they are not subjected to mechanical influences (vibration or shock) [1-4, 8-16,17,19,20,21].

Depending on the purpose and methods of manufacturing sheets, the following brands from rigid PVC sheet are produced:

VN - non-transparent, unpainted or colored sheets produced by compression;

VNE - non-transparent, unpainted or colored sheets produced by extrusion;

VP - transparent unpainted or colored sheets made by compression or extrusion;

VD - decorative monophonic sheets made by compression or extrusion and used as a covering material;

VLL - non-transparent white-painted sheets made by compression from non-plasticized or partially plasticized polyvinyl chloride.

The sheets must be flat and have a rectangular shape with evenly cropped borders. There should be no cracks, bubbles, shells, and metal inclusions on the surface of the sheets. Dimensions of sheets: length is not less than 1300mm, width is 500mm, thickness is 1-20mm. The permissible deviations in the length and width of the sheets should not exceed 100 mm. Physical and mechanical properties of viniplast sheet:

Medium density, g/cm^3	1,38
Yield strength ultimate tensile strength, MPa, not less	50-55
Relative lengthening at rupture, %, not less	10-15
VST softening temperature, °C, not less	70-85
Resizing in pre-heating, %, not more	5-8

Sheets for transportation are packed in wooden boxes, containers or other types of packaging that ensure the safety of the product and store it indoors at a temperature not exceeding 35 °C at a distance of at least 1 m from heating appliances. During the transportation and storage of sheets at temperatures below 0 °C, it is not permissible to throw and subject them to shocks. Sheets transported or stored at temperatures below 0 °C must be kept at room temperature for at least 24 hours before opening the container.

Rigid PVC sheet is glued to the facing surfaces with KN-2 or KN-8 mastics.

Sheet HIPS (high-impact polysterene) is made by copolymerization of styrene together with a styrene-soluble butadiene styrene or polybutadiene rubber. The sheets used as the facing material; their color may be light blue, white or ivory. Depending on the decorating of the front side, the sheets are made glossy or matte. Sheet dimensions (mm): length is 700-1500, width is 700-1000 or 1250-1450, thickness is 1.4-2.0 or 2.0-6.0.

Sheets of high-impact polystyrene have high physical and mechanical properties: tensile stress at stretching along the extrusion of 20-40 MPa, elongation at break of 10-35%, shrinkage in the direction of extrusion (depending on the thickness of the sheets) is not more than 6-18%.

Decorative polystyrene panels "Poliform" are produced in sizes of 500 × 500 ± 2 mm, thickness of 10 mm with decorative finishing, imitating the texture of valuable species of

wood, stucco designs and other designs. On all four borders of panels, there are tides with an aperture in the center for fastening panels with nails or screws. The average density of panels is not more than 1 g/cm^3, shrinkage to 0.5%, water absorption is not more than 0.65%. Panels "Poliform" are used for finishing walls and ceilings of premises of cultural and public buildings and administrative buildings (halls, offices, halls, etc.).

Decorative polyvinylchloride panels "Polydecor" (TU 400-1 / 410-109-76) are made of rigid polyvinyl chloride by vacuum molding. Panels are produced in sizes of 1850 × 955 ± 10 mm, 1810 × 915 ± 10 mm, and a thickness of 0.6 mm. On the face surface, dirt, creases, cracks, and blisters are not allowed. Panels "Polydecor" are applied for the decoration of walls in the halls, halls of cultural and community buildings and office buildings.

Decorative films and fabrics are used for facing walls, partitions, door leaves, built-in furniture and other structural elements in accommodations, public and administrative buildings. The industry produces various decorative facing films and fabrics: polyvinyl chloride decorative films PPSO and PDO, Isoplen, Penoplen, Vinisten, Texoplen, Devilon, and others.

In accordance with GOST 24944-81, polyvinylchloride decorative decorating film is made by the roll-calendar method from polyvinyl chloride, plasticizers, pigments, and various additives. The film is designed for decorating pre-prepared interior surfaces of walls of accommodations and public buildings, door leaves, built-in furniture, panels and other elements of interior spaces, except for evacuation routes in public buildings.

The film can be of two types: PDO - without an adhesive layer and VDSO - with an adhesive layer on the back, protected by special paper. The film is produced in rolls of the following sizes: for PDO - length is 15m, width is 1500 and 1600mm, thickness is 0.15mm, for PDSD – length is 15m, width is 450mm and 500mm, thickness is 0.15mm, and length is 8m, width is 900mm and thickness is 0.15mm.

The film is manufactured in multi-color with printed design, with a smooth or embossed face. On the front surface of the film, foreign inclusions, scratches, shells, creases, strips, distortion of the design and paint splashes visible from a distance of 1 m from the surface of the film are inadmissible. Special paper for the protection of the adhesive layer of the PDSD film should be glued over the adhesive layer on the entire surface of the film.

Physical and mechanical properties of polyvinyl chloride decorating film:

- breaking tensile stress in the longitudinal direction, 11.8 MPa;
- breaking elongation in the longitudinal direction, not less 130%;
- peel resistance, not less 1,96 N/cm;
- change in linear dimensions, not more: in the longitudinal direction 6%, in the transverse direction 1%.

The PDO film is wound into rolls by the face surface outward on cardboard spools of internal diameter up to 100 mm, wrapped with paper and twine. The PDSD film of 15 m length is wound into rolls without bobbins with a face surface outward and laid in cardboard boxes. The PDSD film of 8 m length is wound into rolls on metal sleeves with the front surface outward, wrapped with paper and twine. The film is transported by all kinds of transport in conditions that exclude the possibility of its wetting, pollution, mechanical damage, and subject to direct sunlight. The film rolls must be unpacked at a temperature of at least 15 °C. If the rolls were transported at a temperature of 0-10 °C, they should be rolled out after 24 hours and at a temperature below 0 °C no earlier than 48 hours after at a temperature of not less than 15 °C. The surfaces covered with PDO and VPSO films can be subjected to wet cleaning at room temperature. The use of solvents, soaps and detergents is unacceptable [1-4, 17-19].

Polyvinylchloride films on a paper sub base "Izoplen" are made by pasting method from polyvinyl chloride, plasticizers, fillers, pigments, and various additives. Films are designed

for interior decoration of walls and built-in furniture in the accommodations, public and industrial buildings with a normal temperature and humidity regime.

According to the type of the front surface of the film, there are three types:

A – single-color;

B – multicolor with printed design, protected with transparent polyvinyl chloride layer;

C - multicolor with printed design, pasted to the front surface of the film.

The film "Isoplen" is produced in rolls with a length of 10.5; 12; 18 and 25m ± 2%, a width of not less than 470mm and a thickness of not more than 0.45mm. There should be no tears, creases, cracks, blisters, spots, streaks, changes in design, and spray from the paint on the front surface of the film. Films exposed to detergents (a solution of soap or foaming synthetic detergent) should not change their color and texture.

"Isoplen" rolls of one type, color and design are packed in cardboard boxes (no more than 10 rolls). In case of transportation at a negative temperature, rolls, packs and boxes of films must be kept at a positive temperature of at least 24 hours before use. The film is stored in dry rooms at a temperature of 10-25 °C in a horizontal position must be kept not more than 1 m in height, at a distance of not less than 1 m from heating appliances. The film "Isoplen" is glued with a 6% solution of glue CMC or mastic "Gumilax".

According to TU 21-29-23-80, polyvinylchloride foamed films on the paper sub base "Penoplen" are double-layer material, the upper layer of which consists of polyvinyl chloride, plasticizers, stabilizers, blowing agent, pigments and dyes, and the bottom layer is made of paper. The film "Penoplen" is intended for interior decorating of accommodations (kitchens, corridors, hallways, toilets), public (cabinets, hotel rooms) and auxiliary rooms of production buildings with normal temperature and humidity conditions. It is forbidden to decorate evacuation routes (staircases, corridors, vestibules, halls in the foyer), rooms full of people, children's institutions, and hospitals with "Penoplen".

Depending on the field of application, thickness and nature of the front surface "Penoplen" is produced in rolls of three types:

- length of 6m,12m and 20m ±3 %, width of from 500 to 1300 ± 5mm, thickness of from 0,8 to 1,1mm («Penoplen-1»);
- length of 6m,12m and 20 m ±3 %, width of from 500 to 1300 ± 5mm, thickness of from 1,4 to 1,8mm(«Penoplen -2»);
- length of 6m,12m and 20 m ±3 %, width of from 500 to 1300 ± 5mm, thickness of from 4,0 to 4,6mm («Penoplen -3»).

It is made in one-color (different colors) or multicolored with a smooth or embossed front surface. There should be no rips, creases, cracks on the front surface of "Penoplen". "Penoplen" should have a uniform color throughout the area and be color-stable. The breaking strength for "Penoplen-1" and "Penoplen-2" is not less than 0.18 MPa, and for "Penoplen-3" not less than 0.21 MPa. "Penoplen" is wound into rolls face-in and set to the vertical position for transportation and storage. It is glued on a smooth wooden, particle board, concrete and other bases, as well as painted surfaces.

To glue "Penoplen", it is used:

- PVAD (polyvinyl acetate dispersion);
- mixture of 7% CMC solution and polyvinyl acetate dispersion, taken in the ratio 1: 1;
- glues "Bustilat-M", "Gumilax". The consumption of adhesive for 1m^2 is 300-400g.

Glue on the paper sub-base and the surface is applied with a thin layer with a brush or roller. Webs are pasted end-to-end and smoothed from top to bottom. The adhesive is removed with a wet cloth. During the operation activity, "Penoplen" can be cleaned with a sponge soaked with a solution of synthetic detergents or soapy water.

According to TU 17-739-69, "Povinol" is polyvinyl chloride film on a fabric basis. The front surface of the film can be smooth or embossed, matte or glossy. The film is produced in rolls with length of 25-40m, the width of 1m and the thickness of more than, 0.5-0.9mm.

The walls of buildings with increased sanitary-hygienic and decorative requirements are decorated with "Povinol".

Polyvinylchloride decorating material "Vinisten" is a roll decorating material with a relief surface that is manufactured by extrusion or on a fabric basis (TU 400-1 / 51-91-73). It is used for decorating walls and partitions in rooms equipped with efficient combined extract-and-input ventilation of public buildings with short-term stay of people in them. "Vinisten" is produced in rolls with the length of 12 m, the width of 1200 m and the thickness of at least 1-2 mm. There should not be any dents with an area of more than 0.2 cm^2 in the number of three per 1 m^2 on its front surface.

Physical and mechanical properties of "Vinisten": change in linear dimensions is not more than 0.3-0.5%; breaking stress is not less than 8-9 MPa; relative elongation at break is not less than 120-140%.

"Vinisten" of the same color and design is rolled by the front surface inside with an inner diameter of at least 80 mm. During transportation and storage, the rolls are placed in a vertical position in one row in height. After transportation at a temperature of 0-10 °C, the material must be stored upright in one row in height for at least 24 hours and at a temperature below 0 °C for at least two days after putting it to a warm room. "Vinisten" is pasted to the wooden or concrete level dust-free base with KN-3 mastics at a temperature of at least 15 °C. It is impossible to trim the surface with hidden heating devices and possible permanent moistening with this material. During operation, dust and other contaminants are removed from the surface with a wet cloth and soapy solutions. The use of solvents for these purposes is unacceptable [1- 4, 8-21].

5 Conclusions

At present, the organizational and anthropotechnical reliability of the habitat in the process of construction, operation and repair of buildings and structures is one of the fundamental tasks of construction anthropotechnics. The study of this problem is an urgent task for the near future [5-7, 17-22].

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