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**ANTICORROSIVE MATERIALS FOR COVERING, INSULATION AND OTHER PROTECTIVE SYSTEMS AND MEANS:****CONTENTS:**

- Ground coats
- Varnishes
- Floor covers
- Components and materials for floor covers
- Polymer concrete and polymer concrete products
- System “glassflake”
- Temperature resistant covers
- Laminates (armoured insulations)
- Abrasive, wearing and erosion resistant covers, putties, ground coats, materials “glassflake” on the base of basalt flour, polyester and vinyl-ester resin
- Masonry, floor and wall covers
- Internal protective covers and insulations of metal and concrete reservoirs, facilities for desalted water and waste waters
- Internal protective covers and insulations of stationary metal reservoirs for storage of petroleum products
- Materials for protective covers of metal constructions and facilities (pipelines, pumps, reservoirs etc.)
- Material for making of inflammable floor covers
- Fire proof paint “Antiplam 93”

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*The anticorrosive materials are developed and manufactured by EMAILCHIM JSC on the base of resins and ingredients, additives and others of leading American and European companies:  
DOW Chemical - USA; DEGUSSA - USA; UCB - Belgium, AKZO - Netherland;  
CROS TRADE - Germany and others.*



## GROUND COATS

### **1. Epoxide ground coat**

Two component structure on the base of fluid epoxide resin in combination with solvents, pigments, additives and hardener, which is to be added when applying. Good adhesion to metal and concrete surfaces.

Compatible with other ground coats and varnishes - polyester, polyurethane, vinyl-ester, phenol compositions.

### **2. Epoxide ground coat on water base**

Three component structure of epoxide resin hardener water.

It is used for ground coating of moist concrete (fresh concrete) surfaces with content of moisture not more than four weight percent (8-10). It provides for good adhesion with concretes. Good base for applying of other ground coats and varnishes on base epoxide, polyester, vinyl-ester polyurethane etc.

### **3. Zinc epoxide ground coat**

Highly filled with micronized pulverized zinc (5 microns) ground coat on base epoxide resin, which is used both on cleaned and not well cleaned of rust metal surfaces, including galvanized sheet irons.

### **4. Zinc phosphate epoxide ground coat**

Two component ground coat on epoxide base, containing in its structure zinc phosphate as a filler. The presence of the phosphate ensures good phosphating properties of the ground coat and its application both on cleaned and not well cleaned of rust metal surfaces.

### **5. Epoxide tar ground coat**

Two component ground coat with hardener on base epoxide resins, coal-tar, solvents, additives, fillers.

Application - for metal and concrete facilities, subject to influence of water (technical, waste), petroleum derivatives (gas, crude oil, mazut, naphtha), subterranean corrosion by salts, water, microorganisms, moulds, slightly sour and slightly alkaline media (pH = 5-8)

### **6. Vinyl-ester ground coat, modified with rubber**

Vinyl-ester ground coat, modified with rubber is a two component structure with hardener (fluid or pulverized), which is applied in the moment of use. It is used for ground coating of ferrous and non-ferrous metals, concrete, ceramics, enameled surfaces. It is applied on dry and moist surfaces (concrete). The cover of the ground coat differs from the other used ground coats with the best adhesion and physical and mechanical indicators (compressive, impact, bending, tensile strength, abrasion, erosion). The ratio of linear thermal expansion and the module of elasticity allow that the cover becomes subject to different in strength deformations, mechanical loads and tensions.

### **7. Aluminum containing silicone ground coat**

Single component air drying ground coat on the base of silicone resins in combination with additives, fillers, pigments. It is used for ground coating of metal surfaces. It has a very good adhesion to metal, high speed of surface drying. The cover has a high atmosphere, cold and thermal resistance (-50 up to +400°C), as well as excellent hydro insulating indicators.

### **8. Silicate ground coat**

A medium for impregnation of cement, plaster, wooden, ceramics surfaces with the aim of acquiring water resistance. The treated surfaces have a better mechanical strength, atmosphere resistance and water resistance.

### **9. Zinc silicate ground coat**

Two component: (component A - ethyl silicate, component B - micronized pulverized zinc - 5 microns), highly filled with zinc protective ground coat. It is applied on cleaned and not well cleaned metal surfaces, including galvanized surface with recommended thickness of the film 50 - 80 microns (1-2 layers). It is used as an independent cover and as a base for applying other covers, too. Application area - protection of ferrous metals, bridge, seaport, railroad, energetic, building constructions, pipelines, cisterns, reservoirs with temperature resistance up to 350°C and high atmosphere resistance (UV) rays, vapour, salts.

### **10. Vinyl ground coat**

Single component air drying ground coat on base of the vinyl resin in combination with solvents, pigments, fillers, additives, tixotropic additives. It has a good adhesion to ferrous and non-ferrous metals (aluminum, galvanized surface), concrete, wood, some plastics, ceramics etc. Compatible with other ground coats and varnishes - epoxide, epoxide tarry, polyester, vinyl-ester, polyurethane, acrylic. Advantages - quick drying, possibility for applying and drying in low temperatures (under 10°C).

### **11. Zinc vinyl ground coat**

It combines the advantages of the zinc powder as protector, possibility for application on not well cleaned of rust metal surfaces. It has chemical resistance, plasticity, high atmospheric resistance, low level of aging, hardly inflammable with the good physical and chemical properties of the vinyl resin.

### **12. Aluminum containing vinyl ground coat**

Filled with aluminum vinyl ground coat with high light resistance (UV) rays, light reflecting property, chemical resistance and good physical and chemical properties of the vinyl resin.

## VARNISHES

### **1. Epoxide varnish**

Two component structure on base of different types of epoxide resins with additives, fillers, pigments and hardeners (polyamines, amides, aducts).

It is used as an intermediate cover for exploitation outside and finish surface for exploitation inside of different metal and concrete facilities and constructions, walls etc.

### **2. Vinyl varnish**

Single component air drying structure on base of vinyl resin, fillers, pigments, additives and supplements. It is used as a cover on ferrous and non-ferrous metals, concrete, some plastics, wood, galvanized sheet iron with high atmosphere resistance, light resistance, humidity, water, sea water, heavy industrial environments (oxides, gases fumes of acids and bases, petroleum products, solvents in temperature interval from -30 to +70°C). It has perfect compatibility with alcydic, silicon, polyester, vinyl-ester, acrylic, polyurethane varnishes.

### **3. Epoxide tar varnish**

Two component structure on base of epoxide resins, coal tar fillers, additives, supplements and hardeners (amines, amides, aducts). The varnish finds application in its capacity of protective cover on metal, concrete and other inert surfaces and constructions in hydro and energy construction, chemical industry, petroleum industry, shipbuilding, ecology (purifying stations). The cover is water resistant (sea water, salt water, waste water) rarefied acids and bases, petroleum products etc.

### **4. Polyurethane vinyl-ester varnish**

Two component varnish on base of chemical modified urethane epoxy-vinyl-ester resin in combination with additives supplements, pigments and hardeners-organic peroxide. It combines the advantages of the two types of resins:

- vinyl-ester - chemical and temperature resistant
- polyurethane - atmosphere resistant, with high strength and deformation indicators (tensile and bending strength, stretching, elasticity, ratio of linear and thermal expansion), gloss brilliance.

### **5. Polyester varnish**

Two component structure on base of bisphenol polyester resins in combination with different supplements, ingredients and hardeners - organic peroxides. It is used for cover on metal, concrete, walls and floor covers. It is a good protective substance for protection of rarefied and concentrated acids, bases, salts, acid and alcalic gases, petroleum products, water (desalted water, waste water). The varnish is compatible with different ground coats and varnishes on base epoxide resins, vinyl resins, polyurethane, epoxide tar varnishes.

### **6. Silicone varnish**

Single component air drying material on base of silicone resins in combination with different supplements and ingredients. It is produced in different colours, including type "metallic". The cover is characterized by very good protective properties - atmosphere resistance, thermal and cold resistance (-50 to +400°C).

### **7. Varnish of elastic polyester resin**

Two component varnish on base of elastic (isophtalic) polyester resin in combination with other components and hardeners - organic peroxide. It is used as a protective cover on metal and concrete with good elastic properties (tensile and bending strength, stretching), for exploitation in water, slightly aggressive media - acids, bases, salts, petroleum products.

### **8. Vinyl-ester varnish of type A**

Two component structure on base bisphenol resins in combination with pigments, fillers, additives and hardeners - organic peroxides. Good material for producing both detached protective covers and for use in combination with other protective materials - ground coats, varnishes. It is characterized by a high chemical resistance to rarefied and to some concentrated non-organic and organic acids, rarefied and concentrated bases, petroleum products, water, salts, gases, oxides. It has high chemical resistance indoors and outdoors within a temperature range from -30 up to +100°C.

The protective cover of vinyl-ester varnish has high physical and mechanical indicators (compressive, impact, bending and tensile strength).

### **9. Vinyl-ester varnish of type B**

Two component varnish on base new varnish vinyl-ester resin with fillers pigments, additives and hardeners - organic peroxides. The protective cover and other protective systems on its base differ with very high chemical resistance - resistance in rarefied and concentrated acids, oxides including hypochlorides and other chlorine agents, organic solvents in a wide temperature range with high temperatures. Application - appropriate protective material for covering metal equipments of sulphur purification facilities, gas outlets, coolers, absorbers etc.

### **10. Phenol kit for paneling and masonries**

Two component material on base modified resolic phenolphormaldechide resin and pulverized black graphite with disperged in it catalyst. It is used for producing an acid resistant fastening composition (kit) in its capacity of coarse grouting and jointing material for making of paneling and masonries (horizontal and vertical). It is specified by chemical resistance in rarefied and concentrated acids - salt acid, sulphuric acid, phosphor acid, formaldehyde etc.

### **11. Modified phenol varnish**

Two component structure on base resolic phenol-formaldehyde resin and catalysts. It is used for protection of metal surfaces from acid corrosion.

### **12. Special varnishes of glassflake type**

Two component materials containing glass flakes with thickness 3-5 microns and size of the particles 10 - 4000 microns on base of polyester and vinyl-ester resins and hardeners - organic peroxides. The covers from these materials are characterized by extremely high chemical resistance, adhesion, water and gas impenetrability, high physical and mechanical indicators (low level of abrasion, hardness, shock resistance).

### **13. Epoxide vinyl varnish**

Two component structure combining the advantages of the epoxide and vinyl resins:

- epoxide resins - adhesion, chemical resistance
- vinyl resins - plasticity, elasticity, resistance to atmospheric influences.

## FLOOR COVERS

### Description:

The covers represent systems of resins, hardeners, ground coat, quartz fillers done in the following technological sequence:

- ground coat, resin, quartz filler (sprinkle)
- resin, quartz filler (sprinkle) etc. depending on the requirements on the thickness of the finishing layer.

### Designation:

For protection from corrosion and mechanical loads (low, average, high) of different concrete, cement, ceramic surfaces.

Smooth cover (with finishing sealing layer)

Rough cover (slightly rough, moderate rough, fine, rugged).

Thickness of the layers - 2-8 mm.

### Scheme of the cover:

1. Ground coat
2. Leveling ground coat for concrete (in case of necessity)
3. Single, bi and multilayer sequential application of resins with excessive sprinkling of quartz sand during the jelling of the thermo reactive resins or during air drying of the resins.
4. Removing of the superfluous sand.
5. Sealing with finishing layer

### **Tentative consumption ratio:**

2-2.1 kg/m<sup>2</sup> for thickness 1 mm

including 0.8 - 1.2 kg resin

1.5 - 2 kg quartz sand (in excess)

### Chemical resistance of cover from polyester and vinyl-ester

Sulphuric acid - up to 80% (periodically up to 97%)

Salt acid - up to 37%

Sodium base - up to 50%

Fluor hydrogen acid - up to 20%

Sulphuric dioxide - up to 100%

Chlorine - 100%

Nitric acid - up to 65%

Sulphuretted acid - up to 10%

Temperature range of exploitation from -30 to +100°C

### Physical and mechanical properties of polyester, vinyl-ester and vinyl covers:

- compressive strength MPa - > 100

- tensile strength MPa - > 20

- bending strength MPa - > 35

### **Ratio of linear thermal expansion:**

$2.5 \times 10^{-5} \text{ cm.}^{-1}/\text{cm}^{-1} \times \text{°C}^{-1}$

**Eraseability on Taber:** 1000 gr./1000vol., %-0,38

## **COMPONENTS AND MATERIALS FOR FLOOR COVERS (STRENGTHENED)**

### ***Ground coats:***

- polyester ground coat
- vinyl-ester ground coat modified with rubber
- epoxide ground coat
- epoxide ground coat for moist concrete (moisture more than 4%)
- vinyl ground coat
- epoxide vinyl ground coat
- epoxide tar ground coat

### **Resins:**

- polyester
- vinyl-ester
- vinyl
- epoxide
- polyurethane-vinyl-ester
- acrylic
- water dispersion on epoxide base

### **Fillers:**

Quartz sand with size of the particles - 0,1-1,00 mm

### **Use:**

Indoor and outdoor floors, galvanic workshops of battery plants, boiler-baths and oval surfaces of workshops for acids and bases of steam-power plants, nuclear power plants, chemical and fertilizer plants, petrochemical and petro-processing plants, metallurgical factories, pharmaceutical and machinery construction factories, textile storehouses, terminals, loading stations, unloading sites.

## POLYMER CONCRETE AND POLYMER CONCRETE PRODUCTS

### Description:

Composite construction and chemically resistant material on base of non-saturated polyester bisphenol polyester and epoxy-vinyl-ester resins in combination with different additives, inhibitors, accelerants and a mixture of quartz fillers with different grain-metric composition.

### Designation:

Manufacturing of details, products, facilities (electrolyte baths, grates and covers for inspection shafts, elements of waste water drains, anchorage elements, fundaments, insulators for high tension etc.)

Fields of application - workshops, storehouses, purification stations, in the food industry, chemical, ferrous and non-ferrous metallurgy, textile, cellulose and paper industry, pharmaceuticals.

Application scheme for internal protection of electrolytic baths.

### Structure of the polymer concrete:

Resins - thermo reactive, unsaturated polyester, polyester, epoxide vinyl-ester.

Hardeners - organic peroxides

Quartz fillers with fraction structure from 0,05 to 16 mm.

Polymer concrete is made during the application - pouring in appropriate shapes (dies) with geometry and configuration depending on the requirements.

The ratio resins-fillers is equal to 8-20/92-80 (depending on the type of the resins, the ratio of the fractions of the quartz fillers, the sizes and the configuration of the products, the exploitation requirements).

### Main characteristics of the polymer concrete and its products:

- high resistance in heavily acting aggressive media
- high strength indicators including abrasive resistance
- exploitation within a wide range of temperatures
- lightweight - three times lighter than the cast iron and metal products
- lower price in comparison with the metal ones

### Main characteristics of the polymer concrete made of polyester, vinyl-ester resins:

- density,  $\text{g/cm}^3$  - 1,8 - 2,4
- compressive strength, MPa - > 100
- tensile strength, MPa - > 15
- bending strength, MPa - > 40
- ration of linear thermal expansion -  $1,9 - 2 \text{ cm}^{-1}/\text{cm}^{-1} \times \text{ }^\circ\text{C}^{-1}$

Table for comparative characteristics of regular concrete and polymer concrete

<b>Indicators</b>	<b>Regular concrete</b>	<b>Polymer concrete</b>
Compressive strength, MPa	20-25	>100
Tensile strength, MPa	9	20-25
Bending strength	2-3	30-35
Shrinking by hardening, %	0,1-0,2	0,1-0,2
Water resistant on weight modification, %	5-8	0,1-0,2
Eraseability on Taber on weight modification, %	5	0,38

**Resistance of the polymer concrete in different aggressive media:**

- water - drink water, waste water, technical water, sea water
- acids - salt acid, sulphuric acid, nitric acid, phosphor acid, acetic acid, formaldehyde
- bases - sodium base, potassium base, ammonium base
- salts - chlorides, sulfates, nitrates, phosphates
- petroleum products - gas, crude oil, naphtha, mazut, diesel
- organic solvents - alcohols, acetates, aromatic hydrocarbons

**Scheme for internal protective insulation of concrete and electrolytic baths**

Designation - replace of up to now used protective systems of the baths - lead linings, polymer linings.

Ground coat

System "Glassflake" with thickness of 0,5 mm

Laminate with thickness of 1 mm

Lining with polymer concrete shaped plates, laid on connecting kit.

Common thickness of the internal protective system - 2 cm

## SYSTEM “GLASSFLAKE” FOR PROTECTION OF EQUIPMENTS OF THE SULPHUR PURIFICATION FACILITIES

### Description:

The system includes ground coat and composition structure for multi-layer cover on base of two types of resins:

Type 1 - vinyl-ester resin of new-varnish type

Type 2 - vinyl-ester resin for special new-varnish type

The composition structure for multilayer cover contains mainly the resins, additives, pigments and a special type of “C”-glass made glass flakes with thickness of 3-5 microns and size of the particles 10-4000 microns.

Hardeners for the materials of the system - organic peroxides.

### Designation:

The materials of the system “glassflake” are designed for internal protection of the metal surfaces of sulphur purification facilities (gas outlets and others) against the aggressive influence of high temperatures (140-230°C) of the blast-furnace gases, received by the combustion of coals, mazut (sulphuric dioxide, nitric oxides, carbon dioxide, sulphuric and sulphuretted acid, chlorine-hydrogen etc.)

Thicknesses of protective system “glassflake” depending on the specific parameters (temperature, structure) of the fume gases - 1-3 mm.

Method of applying - non-air, brush, roll.

Requirement for preliminary preparation of metal surface - blasting up to a SA 2,5 level on DIN EN ISO 12944:44

Basic physical and mechanical indicators of the surface of the “glassflake” system

Density of the material, g/cm<sup>3</sup> - 1,2 - 1,6

Theoretical consumption ratio for 1 mm.kg./m<sup>2</sup> - 1,4 - 1,6

Compressive strength, MPa - 80

Tensile strength, MPa - 40

Bending strength, MPa - 60

Hardness on Barcole, not less than - 35

Ratio of linear thermal expansion -  $1,9 - 2 \times \text{cm}^{-1}/\text{cm}^{-1} \times \text{°C}^{-1}$

Eraseability on Taber, %, in loss of weight 1000 g/1000 vol. - 0,017

Maximum working temperature:

Vinyl-ester glassflake type **1** - +180°C continuously and 200°C periodically

Vinyl-ester glassflake type **2** - +230°C continuously and 250°C periodically

Water resistance on weight modification, % - 0,03 - 0,06

Diffusion ratio - 0,008 g/m<sup>2</sup> x mm. Hg/24h

### ***Resistance of the systems “glassflake”***

Fume gases - oxygen, carbon dioxide, sulphuric dioxide, nitric dioxides, water.

Fluid phase - sulphuric acid, salt acid, fluorine-hydrogen acid.

### ***Use of the protective systems “glassflake”***

Internal protection of the metal surfaces of facilities - gas outlets, metal chimneys, contact coolers, scrubbers, absorbers.

## TEMPERATURE RESISTANT COVERS

### Description:

Silicon varnish, silicon acrylic varnish - one component air drying structures on base of silicon resins (polymethylphenyle siloxanes, modified with polyester or with polybutylmetacrylic) in combination with pigments, fillers, including with aluminium stape or aluminium dust for covers of "metallic" type, additives.

### Designation:

They are used for covers on metals, exploited indoors and outdoors under different climate conditions within a temperature range from -50 to +400°C

The cover of silicone varnish is characterized by high atmospheric resistance UV light, resistant to periodical and continuous influences of aggressive media, water and fumes, industrial gases, salt solvents etc.

### Method of applying:

Manually (roller, brush), mechanically (pneumatically, non air spattering).

### Basic technological indicators:

Content of dry substance, %, not less than - 20

Time for superficial drying for recovering (20°C), hour - 2 - 4

Time for full drying for exploitation, 24 hours - 7

Number of layers applied - 1 - 2

Tentative theoretical consumption ration for single layered application and thickness of 30 - 40 microns - 180-200 g/m<sup>2</sup>

### Areas of application:

For cover of drying rooms, ovens, appliances, pipelines etc.

## **LAMINATES (ARMOURED INSULATIONS)**

### **Description**

Protective system consisting of thermo reactive resins and armoring materials (fabrics, glass fabrics of "C" glass, non-woven polyester fabrics)

### **Designation:**

Indoor corrosive protection of metal and concrete facilities - reservoirs, cisterns, appliances, walls, floors and other facilities.

### **Components of the laminate:**

#### **Ground coat**

Epoxide ground coat, vinyl-ester ground coat modified with rubber, vinyl-ester ground coat bisphenol and new varnish type.

#### **Resins**

Bisphenol polyester resin, bisphenol vinyl-ester resin, new varnish vinyl-ester resin, special new varnish vinyl-ester resin, polyurethane vinyl-ester resin.

### **Armouring fabrics:**

Glass wadding - 150 - 600 g/m<sup>2</sup>

Glass veil - 30 - 80 g/m<sup>2</sup>

Non-woven polyester fabric 100-300 g/m<sup>2</sup>

Glass fabric (mat) - 150 - 200 g/m<sup>2</sup>

Carbon flees - 15-50 g/m<sup>2</sup>

### **Characteristics of the laminate:**

Thickness of the laminate - 2-8 mm (depending on the designation)

Number of layers

4-8 layers resin

2-4 layers fabric

1-2 layers veil

### **Characteristics of the laminate:**

Density of the laminate g/m<sup>2</sup> - 1,2-1,7

Compressive strength MPa - > 200

Bending strength MPa - > 190

Tensile strength MPa - > 120

Adhesion, MPa

Steel - > 6

Concrete - > 5

Hardness on Barcole - 35

Ration of linear thermal expansion -  $2,5 \times 10^{-5} \text{ cm}^{-1}/\text{cm}^{-1} \text{ }^{\circ}\text{C}^{-1}$

Maximum temperature of exploitation:

Bisphenol polyester laminate - 70°C

Bisphenol vinyl-ester laminate - 80°C

New varnish vinyl-ester laminate - 100°C

Elastic polyester laminate - 60°C

**Chemical resistance and use:**

Water - desalted water, technical water, waste water, sea water, sour water

Rarefied and concentrated non-organic acids - salt acid, sulphuric acid, phosphoric acid, nitric acid, formaldehyde, acetic acid.

Rarefied and concentrated bases - sodium, potassium, calcium hydro oxide etc.

Salts - sulfates, chlorides, nitrates, ammonia solutions

Chlorine products - hypochlorite, chlorine dioxide etc.

Petroleum products - gas, crude oil, naphtha, diesel, mazut

Organic solvents - ethyl alcohol, xylol.

## **ABRASIVE, WEARING AND EROSION RESISTANT COVERS, PUTTIES, GROUND COATS, MATERIALS “GLASSFLAKE” ON THE BASE OF BASALT FLOUR, POLYESTER AND VINYL-ESTER RESIN**

### **1. Materials of the type “Glassflake”**

#### **Description:**

Materials representing compositions of resins (polyester, vinyl-ester) with additives, supplements, hardener and a special type glass flakes, which constitute during the forming of the cover a specific dense armouring of parallel orientated layers with grate and net structure, with minimum internal tension, which determines the high density, adhesion, gas and fume impenetrability, high corrosion resistance and strength indicators of the cover.

#### **Basic indicators of the cover:**

Density, g/cm<sup>3</sup> - 1,2 - 1,6

Hardness, not less than - 40

Ratio of linear thermal expansion -  $2 \times 10^{-5} \times \text{cm}^{-1}/\text{cm}^{-1} \text{ } ^\circ\text{C}^{-1}$

Abrasion on weight modification on Taber, % - 0,017

Water resistance on weight modification, % - 0,03 - 0,06

Diffusion ratio - 0,0160 g/m<sup>2</sup> x mm. Hg/24h

Theoretical consumption ration per thickness of 1 mm. - 1,2 - 1,6 kg/m<sup>2</sup>

Thickness of cover in a single layer - 100 - 500 mcm

Advantages of the covers of “glassflake” systems

Stability to corrosion and erosion

Exploitation within a temperature range from -30 to +140°C

Ratio of alinear thermal expansion similar to the one of the metals

Way of applying - non air spraying, pallet, brush

Temperature and other conditions when applying the materials

Appropriate temperature range from +10 to +35°C

Surfaces for applying:

Metals - sand-spray processed

Concretes - with prepared surface and moisture up to 4 weigh percent

Materials of the type “glassflake” are used for internal and external covers of steel and concrete surfaces in the atomic power engineering, heat power engineering, metallurgy, chemical and petrochemical industry, cellulose and paper industry etc.

Technological lines and facilities:

- fundaments
- cisterns
- pipelines
- valves
- lining of reservoirs
- neutralization reservoirs
- capacitor boxes
- system for water procession
- ventilator hoods

## **2. Putties and ground coatings on base of polyester, vinyl-ester resin and basalt flour**

### ***Description of materials:***

Filled with basalt flour polyester and vinyl-ester resins in combination with additives, pigments and other supplements.

Ratio of filling 50 - 400 weight %

They combine the properties of the resins - high chemical resistance, high speed of jelling and hardness, high physical and mechanical indicators (shock, hardness, compression, abrasion, tensile, bending)

### ***Basalt flour:***

- exceptional resistance to abrasive wearing
- exceptional acid and alkaline resistance
- low ratio of linear thermal expansion
- resistance to low, middle and high temperature
- high resistance to UV rays
- resistance to ageing

### ***Structure of the putty (ground coat)***

Polyester (vinyl-ester) resin with additives, tixotropic additives, counter depositors.

Hardener - organic peroxide

Basalt flour

### ***Ratio of mixing:***

100 weight parts resin / 2 weight parts hardener / 50 - 400 weight parts basalt flour

Basic indicators of the putty (ground coat)

Density g/cm<sup>3</sup> - 1,6 - 2,4

Theoretical consumption ratio for thickness 1mm, kg/m<sup>2</sup> - 1,5 - 2,4

Thickness of the putty (ground coat) - 1 - 8 mm

## MASONRY, FLOOR AND WALL COVERS

### Description of the protective systems:

Protective system, consisting of lining elements (bricks, plates) and joining material - kits on base of thermo reactive resins and non-organic fillers.

### Designation:

Internal protection of metal and concrete facilities - chimneys, towers, oval forms, boiler - baths, appliances, reservoirs etc.

### Structure of the linings and the putties:

#### Components and elements:

Joining materials (for coarse grouting and joints) - kits on base of thermo reactive resins:

- resolic phenolformaldehyde resin
- polyester resin bisphenol type
- vinyl-ester resin - three types:
  - type 1 - bisphenol vinyl-ester resin
  - type 2 - new varnish vinyl-ester resin
  - type 3 - special new varnish vinyl-ester resin
- silicate kit on base of potassium water glass
- inert fillings - quartz flour, sands, black graphite, basalt flour

#### Lining elements:

- Clinker shamot bricks with sizes:
  - 250 x 123 x 65 mm
  - 250 x 113 x 65 mm
- Ceramic plates - 200 x 100 x 30 mm
- Cast basalt plates - 200 x 200 x 22 mm

#### Connecting materials:

Kits on base of thermo reactive resins for three component structures, including resin, filler and hardener made during the application.

Silicate kit (non-organic) - two component from potassium water glass with specified module and filler with dispersed in it hardener.

Thickness of the layer (coarse grouting) of the kit - 3-10 mm

Characteristics of the joining materials for the linings and the putties:

<b>INDICATOR</b>	<b>Thermo reactive resins /polyester and vinyl-ester ones/</b>	<b>non-organic materials silicate</b>
Density g/cm <sup>3</sup>	1,8 - 2,4	2,0
Compressive strength MPa	80 - 120	35,0
Bending strength MPa	30 - 40	10

## **INTERNAL PROTECTIVE COVERS AND INSULATIONS OF METAL AND CONCRETE RESERVOIRS, FACILITIES FOR DESALTED WATER AND WASTE WATERS**

***For preparation one uses protective systems (covers, ground coats, laminates) on base of the following materials:***

- vinyl-ester ground coat modified with rubber
- polyester and vinyl-ester resins
- elastic vinyl-ester resin
- polyurethane vinyl-ester resin
- epoxide materials
- epoxide tar materials
- special materials of the glassflake type
- vinyl materials

### ***Basic features of the protective systems:***

The protective systems of the above mentioned materials combined in different schemes of performance and in compliance with different factors (compatibility of the materials, exploitation requirements etc.) are characterized with the following indicators:

- Guaranteed chemical resistance in a wide range of aggressive media (Ph 1-14) within a temperature range from -100 to +100°C - water, acids, bases, salts, gases, petroleum products.
- Appropriate physical and mechanical indicators similar to the ones of the base
- Possibility for applying and forming of protections within a temperature range from 0 to +35°C both on dry and on moist surfaces
- The protective systems produce no harmful emissions of potassium, magnesium, iron and others which change the parameters of the salt water
- Repair suitability of the protective systems

### ***Types of protective systems:***

- Covers (ground coats, varnishes)
- Combined systems
- Covers ground coats
- Covers laminates
- Covers ground coats laminates

### ***Application:***

- Metal and concrete reservoirs for desalted and waste water of atomic power plant, steam power plant, ions-exchange filters, purification facilities and stations - civil, industrial of the chemical and metallurgy industry, oil refineries, battery plants, food industry.

## INTERNAL PROTECTIVE COVERS AND INSULATIONS OF STATIONARY METAL RESERVOIR FOR STORAGE OF PETROLEUM PRODUCTS

### *1. Internal protective armoured insulation (laminate) of bottom and first mantel*

#### **Structure of the laminate:**

- 1 layer electrically conductive vinyl-ester ground coat modified with rubber
- 4 - 6 layers vinyl-ester and polyester resins
- 2 - 3 layers glass fabrics (mat and veil)
- Thickness of the laminate 2,5 - 3,5 mm

#### **Scheme of execution of the laminate:**

- sandblasting to the SA 2,5 level of cleaning
- ground coating with a single layer of electrical conductive vinyl-ester ground coat modified with rubber
- execution of reparation works on the metal surface at the bottom of the reservoir - cutting out, filling of the established defects (holes, cracks and others) with appropriate kit
- laying of the system laminate, containing of:
  - 4 layers vinyl-ester resin
  - 2 layers glass mat
  - 1 layer glass veil
- finishing cover layer of vinyl-ester resin:  
common thickness of the laminate - 3,2 mm

#### **Basic exploitation features of the laminate:**

- hardness on Barcole
- compressive strength > 130 mPa
- tensile strength >140 mPa
- bending strength > 200 mPa
- impact strength - 6,5 J

#### **Use:**

1. Scheme of the laminate
2. Scheme of testing by hydrostatic hydro-pressure of a pole with a height of 20 m (pressure 27 800 kg/cm<sup>2</sup>) of insulation with thickness 3,2 mm in a metal bottom with diameter of 30 mm.

#### **Basic designation of the laminate:**

- Instead of replacing a partially corroded bottom of metal reservoir, as well as bottoms with reduced inadmissible thickness of the metal from the point of view of the exploitation with new metal bottom.
- Protection of the bottom and the first mantel of the newly constructed reservoirs for ensuring their long-term protection (15 - 20 y)

### **Basic advantages of the laminate compared to the variant execution of a new metal bottom:**

- Significantly shorter duration of the repair works (for reservoir with bottom of 1000 m<sup>2</sup> - 4 weeks, with a new metal bottom - 2-3 months)
- Significantly less funds (30-40%) necessary for the repair works when compared to the construction of a new bottom and first mantel.
- Significant suitability for repair works, i.e. possibility for carrying out of partially local operations during the repair stays as well as after the expiration of the exploitation time limit.

**Warranty time limit of the protection with laminate - 10 years**

**Exploitation suitability of the laminate 15-20 years**

### ***2. Protective cover of bottom, first mantel and walls:***

#### **Materials for the execution of the cover:**

- Epoxide ground coating
- Epoxide tar ground coating
- Vinyl-ester ground coating modified with rubber
- Polyester and vinyl-ester varnishes
- Epoxide and epoxide tar varnishes
- Polyurethane vinyl-ester varnishes

#### **Structure of the cover:**

1-2 layers ground coat, 2 to 4 layers varnish

Thickness of the cover up to 1 mm

**Exploitation term of the cover approximately 5 years**

#### **Designation of the cover:**

- Protection of the bottom and the first mantel of the newly constructed reservoirs
- Protection of reservoirs after a particular period of exploitation, after a particular period without protection and in case of reservoir corrosion of metal, which is not significant sizes.

## **MATERIALS FOR PROTECTIVE COVERINGS OF METAL CONSTRUCTIONS, EQUIPMENTS (PIPELINES, PUMPS, RESERVOIRS ETC.)**

### **Composition of the coverings:**

#### **Ground - 1-2 layers**

Thickness from 20 to 80 microns

#### **Intermediate layer - 1-2 layers**

Thickness from 70 to 150 microns

#### **Finishing layer - 1-2 layers**

Thickness from 60 to 120 microns

**Total thickness of the cover from 150 to 300 microns**

### **Types of materials for the cover:**

#### **Ground coats:**

##### **Pure:**

Epoxide ground coat, vinyl, epoxide and tar, vinyl-ester ground coat modified with rubber

##### **Zinc containing ground coats:**

Zinc epoxide, zinc phosphate epoxide, zinc silicate, zinc vinyl ground coat

##### **Aluminium containing ground coats:**

Aluminium silicone ground coat, aluminium vinyl, aluminium silicate ground coat

##### **Intermediate layers:**

Polyesteric, vinyl-esteric, vinyl, epoxide tar, polyurethane vinyl-esteric, epoxide with ferrous oxide pigments and mica fillers.

##### **Finishing layers:**

Polyurethane vinyl-ester, vinyl, vinyl-esteric, polyesteric

### **Different types of protective systems, representing a combination of different materials in compliance with the following factors:**

- Type of the metal base
- Stage of cleaning of the metal surface
- Nature of the aggressive influence
- Type of the aggressive environment
- Concentration
- Temperatures
- Location of the site (open or covered)

## **MATERIAL FOR FINISHING OF INCOMBUSTIBLE FLOOR COVERINGS:**

Base of the material - bromine epoxide vinyl-ester resin.

Composition of the material - resin with additives and additions biantimonic trioxide, incombustible oxide pigments (iron, chrome etc.).

Designation of the material - finishing covering layer on a self-spilling epoxide floor covering.

Thickness of the layer - 200-250 microns.

Consumption ratio - 270-330 g/m<sup>2</sup>

Specific feature of the material - excellent compatibility, cohesion and adhesion to epoxide resins.

With the covering layer of the material one significantly improves both the esthetical qualities of the floor covering (brilliance, gloss) and its exploitation indicators (water resistance, resistance to different washing detergents, strength indicators including eraseness).

### **Main features of the material.**

- tensile strength, MPa - 73
- tensile elasticity, % - 5
- bending strength, MPa - 124
- hardness on Barcole - 40
- time for self-extinguishing after removing the flame - 10-15 s

### **Chemical resistance of the covering made of the material:**

- water resistance (all types of water, up to +100°C)
- resistance to non-organic and organic acids
- resistance to bases and salts
- resistance to petrol products
- desactivating solutions

## **FIREPROOF PAINT “ANTIPLAM 93”**

### **Designation:**

Anti-inflammable, fireproof covering for construction elements from steel and concrete, used in closed and open rooms.

Limit of fireproof - 30 min., established with a report for state testing of building constructions by the Scientific Research Institute for Fire Protection of the Ministry of Interior in the Republic of Bulgaria.