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Ural Branch
Institute of Technical Chemistry

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AGREED

Head of the Inspectorate of
State Construction Supervision

_____ O.A. Antipova

"20" February 2007

APPROVED

Head of Institute of
Technical Chemistry UB RAS

_____ V.N. Strelnikov

"20" February 2007

PENETRATING WATERPROOFING MIXTURE

HYDROISOL-ITH®

Organization standard

(technical specifications)

Tech.Spec. 2149-007-04740886-2006

Commissioning date: 20 February 2007

AGREED

General manager

POOOOF "TsKS"

_____ V.F. Shardin

"20" February 2007

Российская Академия Наук
Уральское отделение
Институт технической химии

ОКП 214930

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СОГЛАСОВАНО

УТВЕРЖДАЮ

Начальник инспекции
Государственного
строительного надзора
Пермского края



О.А. Антипова

«20» февраля 2007г.

Директор ИТХ УрО РАН



В.Н. Стрельников

2007г.

**СОСТАВ ПРОНИКАЮЩЕЙ ГИДРОИЗОЛЯЦИИ
ГИДРОИЗОЛ-ИТХ**

Стандарт организации
(Технические условия)
ТУ 2149-007-04740886-2006

Дата введения 20 февраля 2007г

СОГЛАСОВАНО

Генеральный директор

ПОООФ "ЦКС"



В.Ф. Шардин

" 20 " 2007 г.

Взам. инв. №

Подп. и дата

Инв. № подл.

These specifications apply to the dry construction waterproofing mixture of penetrating (capillary) action HYDROISOL-ITH®.

HYDROISOL-ITH® is designed for treatment of concrete and reinforced concrete surfaces in order to increase water resistance, frost resistance and durability of concrete structures. HYDROISOL-ITH® is used for waterproofing during construction, repair and reconstruction of concrete and reinforced concrete structures of I, II, and III categories of crack resistance (with crack opening in structures up to 0.4 mm), exterior and interior surfaces of enclosing structures of residential, public and industrial buildings, hydraulic and purification facilities, filters and drinking water reservoirs.

HYDROISOL-ITH® protects concrete and reinforced concrete structures from the effects of water: sewage, groundwater, sea water; aggressive media: acids, alkalis, petroleum products, etc. Increases the corrosion resistance of concrete, prevents corrosion of steel reinforcement.

HYDROISOL-ITH® is applied to the interior or exterior surfaces of the concrete structure, regardless of the side of exposure to fluid media on the concrete object. After applying the product the water-soluble functional chemical additives in the form of an aqueous solution penetrate through the pores deep into the wet concrete. The additives interact with calcium and aluminum oxides to form insoluble needle crystalline hydrates that fill capillaries, microcracks and pores of concrete. The rate of formation of insoluble crystalline hydrates depends on humidity, porosity and temperature of the concrete. As a result of filling the pores of the concrete body the capillary penetration of water into the concrete body becomes impossible and the concrete structure gradually becomes waterproof. Some of the water in the pores of the concrete body is chemically bound into complex crystalline hydrates, resulting in the formation of a low-porous structure that allows the concrete to retain its vapor permeability. The vapor permeability of the concrete further contributes to the removal of the remaining moisture from the body of the concrete, which leads to its gradual "drying out".

Example product entries in other documents and when ordering:

Penetrating waterproofing mixture HYDROISOL-ITH® - Specifications 2149-007-04740886-2006.

Specifications can be used as a regulatory document for product certification.

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			Develop.	Вальцифер			Penetrating Waterproofing mixture HYDROISOL-ITH® Technical specifications	Letter	Sheet	Sheets
								A	2	15
			Contr.	Дорохова			ITCh UB RAS			
			Appr.	Вальцифер						

1 Technical requirements

1.1 Penetrating waterproofing mixture HYDROISOL-ITH® must meet the requirements of these technical specifications and manufactured according to the technological regulations, which contain requirements for the manufacture and quality control at all stages of the production process.

1.2 Main characteristics

1.2.1 HYDROISOL-ITH® consists of Portland cement, aggregates and active chemical additives.

1.2.2 HYDROISOL-ITH® is a dry mixture of gray color with white inclusions, which is mixed with water for application to the treated concrete surface. When mixed with water, the functional chemical additives in the mixture interact with the subsequent formation of aqueous solutions of complex salts.

1.2.3 Application of the penetrating waterproofing mixture HYDROISOL-ITH® is carried out by hand or by hardware directly on the treated concrete surface at a temperature not below +5 °C. Aqueous solutions of complex salts migrate from the applied surface layer of waterproofing material and penetrate into the pores of the body of concrete. There is a chemical interaction of aqueous solutions of complex salts with calcium and aluminum compounds present in the pores of the concrete body with the formation of insoluble complexes. The formation of supersaturated solutions of insoluble complexes in concrete pores and their further crystallization in the form of needle-shaped structures leads to partial overgrowth of pores in the concrete body, while maintaining its vapor permeability.

1.2.4 Penetrating waterproofing mixture HYDROISOL-ITH® increases the water resistance of concrete and reinforced concrete structures, the strength, wear resistance, frost resistance, corrosion resistance of concrete and reinforced concrete structures due to the growth of needle-shaped elements in the pores of the concrete body.

1.3 The properties of HYDROISOL-ITH® correspond to the main physico-chemical indicators and properties of the treated concrete.

1.3.1 The main physico-chemical parameters of HYDROISOL-ITH® must meet the requirements specified in Table 1.

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Table 1 - The main physico-chemical parameters of HYDROISOL-ITH®

Parameter	Specifications of HYDROISOL-ITH®	Validation
1. State of aggregation	Dry powder of grey color with white inclusions	Visual control
2. Humidity, %	Less than 1	p. 4.4, Tech.Spec. 2149-007-04740886-2006
3. Apparent density of unconsolidated mixture, kg/m ³	1300±150	p. 4.5, Tech.Spec. 2149-007-04740886-2006
4. Increase of the grade of waterproofness of treated concrete in comparison with untreated, W	Not less than 3	p. 4.6, Tech.Spec. 2149-007-04740886-2006
5. Increase in compressive strength of treated concrete from the initial value, %, at least	5	p. 4.7, Tech.Spec. 2149-007-04740886-2006
6. Setting time, min: -start (no less) -end (no more)	40 160	p. 4.8, Tech.Spec. 2149-007-04740886-2006

1.4 Requirements for the initial components of HYDROISOL-ITH®.

1.4.1 The materials used for the manufacturing of penetrating waterproofing mixture, should pass the incoming inspection according to State Standard 24297, meet the requirements of the regulatory documents for these materials and provide waterproofing with the specified characteristics.

1.4.2 It is necessary to use cement binder on the basis of Portland cement and high aluminate clinker or mixed mineral binders, Portland cement 400 D-O, 400 D-20 according to State Standard 10178, sand according to State Standard 8736 with particle size of 1mm according to State Standard 6613, grid No.1 to prepare waterproofing penetrating mixture HYDROISOL-ITH®. Also, as the initial raw materials can be used dry mortar mixture, which meets the requirements of technical

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specifications 5746-005-12032152-98 or other similar mortar mixture consisting of cement and sand.

1.5 Marking.

1.5.1 The marking of HYDROISOL-ITH® is made on the label in any easily accessible place of the container.

1.5.2 The marking inscription must contain:

- name of the manufacturer, legal address;
- name of the product;
- designation of technical specifications;
- batch number and date of manufacture;
- net weight;
- brief description, conditions of transportation and storage of the product;
- designation of the regulatory document.

1.6 Packaging.

1.6.1 HYDROISOL-ITH® is supplied in hermetically sealed plastic buckets according to State Standard R 51760 of domestic and imported production with a capacity of 1 to 50 liters. In agreement with the manufacturer, the product may be packed in another container that ensures the tightness of the package. The net weight of the composition in the package must correspond to the weight indicated on the package, with a maximum deviation of ± 1%.

2 Safety and environmental requirements

2.1 HYDROISOL-ITH® is non-toxic, fire and explosion-proof, according to the degree of exposure to the human body and animals according to State Standard 12.1.007-76 belongs to the class of low-hazard substances (hazard class 4, MPC 50 mg / m³).

2.2 HYDROISOL-ITH® does not have a harmful effect on the environment and human health during storage, transportation and operation under ambient temperature conditions.

2.3 When carrying out work, it is necessary to follow the safety rules set out in Building Codes and Regulations 12-04.

2.4 In case of contact of HYDROISOL-ITH® with skin and eyes rinse with water, in case of severe irritation consult a doctor.

3 Acceptance Rules

3.1 The product must be accepted by the technical control service of the manufacturer.

3.2 Acceptance of the product is carried out in batches.

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allowed to settle for (180 ± 5) s, the volume V , cm^3 occupied by the powder is determined.

4.5.3 Processing of results.

The apparent density of unconsolidated powder in free-fill ρ_H in kilograms per cubic meter is calculated by the formula:

$$\rho_H = m / V,$$

where m - actual weight of the powder sample, g;

V - the volume occupied by the powder sample after sedimentation for (180 ± 5) s, cm^3 .

4.6 Determination of the increase in the grade of water resistance of concrete.

Increase in water resistance grade of the concrete treated with the HYDROISOL-ITH® in comparison with untreated concrete is determined by the "wet spot" according to State Standard 12730.5.

In the course of the tests, the waterproof grades of control concrete samples and concrete samples treated with HYDROISOL-ITH® are compared.

4.6.1 Equipment and materials.

Measuring instruments and devices according to State Standard 12730.5;

Scales according to State Standard 53228 with a margin of error of no more than 0.01 kg;

A caliper according to State Standard 166;

A wide brush for coating by HYDROISOL-ITH®;

A container with stands for water saturation of samples;

Plastic film;

Manual sprayer.

4.6.2 Preparation of test samples.

For testing, a control volume of concrete of a class of at least B22.5 (State Standard 26633) with a water resistance of at least W6 (State Standard 12730.5) is selected. A series of samples (18 samples-cylinders with a diameter of 150 mm and a height of 150 mm) are made from this volume of concrete, from which 6 samples - control and 6 samples - will be selected according to density for applying HYDROISOL-ITH®.

All samples are marked and kept for 28 days in a normal hardening chamber (temperature 20 ± 2 °C, air humidity at least 95%).

After 28 days, the average density of all concrete samples is determined according to State Standard 12730.1. The average density of samples should not differ from the maximum by more than $50 \text{ kg} / \text{m}^3$. If this requirement is not met, the samples are discarded. It is necessary to leave 12 samples for testing.

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Further, the selected 12 samples are cleaned of the upper end side (upper during concreting) from cement milk using a grinding and angle grinder with an installed abrasive stripping wheel or any other method.

Next, all samples are placed in a container with water (temperature 20 ± 2 °C) for 48 hours. The samples must be completely submerged in water.

After moistening, all samples are taken out and wiped with a dry cloth.

6 samples are selected for the coating by HYDROISOL-ITH ®.

HYDROISOL-ITH ® is mixed with water in a ratio of 3:1 - 5:1 (by mass) to obtain a sour consistency. Prepared mixture is applied with a brush to the upper damp grinded face surface of concrete samples. Consumption of HYDROISOL-ITH ® is 0,8-1,3 kg/m² which corresponds to the thickness of the applied layer of 0.5 - 1 mm.

Then 6 control samples and 6 samples coated by HYDROISOL-ITH ® are placed in two different containers with water. Samples are placed in the container with the lower end surface, the water should cover 135 mm of the sample height. Tanks with samples are covered with a polyethylene film and the upper end faces are moistened abundantly with a hand sprayer 2 times a day. In this way all the samples (6 control and 6 with HYDROISOL-ITH ®) are kept for 19 days.

Then all samples are placed in room conditions (temperature 20 ± 2 °C, humidity $55 \pm 5\%$) for 7 days.

After that all samples are dried at 60°C to constant weight. The mass is considered constant if the difference between two consecutive weighings of the sample is less than 0.2%. Weighing is carried out no more often than after 4 hours.

Before determining the water resistance of the samples, the applied layer of HYDROISOL-ITH ® is removed from the machined end surface using a grinder-angled machine with an abrasive scraper wheel or any other method.

Water resistance of concrete samples treated with HYDROISOL-ITH ® and control samples is determined by the method "by the wet spot" according to State Standard 12730.5. Samples are placed in metal cylinders and the side surfaces are sealed with waterproof material (for example, technical paraffin). Samples treated with HYDROISOL-ITH ® are set in the testing unit so that water supply was carried out from the side of the end, not treated with HYDROISOL-ITH ®). Water pressure is increased in steps of 0,2 MPa within 1-5 minutes, the exposure time of samples at each step is 16 hours (temperature in the room is 20 ± 5 °C, relative humidity at least 60%).

It is necessary to test all the samples (6 control and 6 with the applied HYDROISOL-ITH ®) until the appearance of water filtration in the form of wet

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drops or wet spot on the upper end surface of the sample and record the amount of water pressure and time after which at this pressure water filtration was observed.

4.6.3 Processing of results.

The water resistance of each sample is evaluated by the value of the maximum water pressure at which no water has yet been observed penetrating through the sample. The water resistance of a series of samples is evaluated by the maximum water pressure at which no water penetration is observed in four out of six samples. If the tests do not observe water penetration through any of the six samples of the series, and the transition to the next stage is not possible due to the technical characteristics of the test equipment used, and the maximum test stage of not less than W16 is achieved, the minimum allowable value of the increase in water resistance is taken as a value of 2 stages.

Concrete grade of water resistance is taken according to State Standard 12730.5. The test results are recorded in the journal, where the marking of samples, the composition of the concrete mixture, density and date of manufacture of samples, test date, the value of the water resistance of individual samples and a series of samples indicating the time and pressure at which water penetration was observed through each sample, increasing the grade of concrete water resistance.

4.7 Determination of the degree of increase in the strength of concrete.

Determination of the increase in the strength of concrete treated with the HYDROISOL-ITH ® is carried out by experimental comparison of the chosen indicator in the treated and untreated sample of concrete.

In the process of testing compare the strength of concrete samples treated with the HYDROISOL-ITH ® and control concrete samples prepared from the same mixture.

4.7.1 Equipment and materials.

Measuring instruments and devices according to State Standard 12730.5;

Scales in accordance with State Standard 53228 with a margin of error not exceeding 0.01 kg;

A caliper by State Standard 166;

A wide brush for application of HYDROISOL-ITH ®;

A container with stands for water saturation of samples;

Plastic film;

Hand sprayer.

4.7.2 Preparation of test samples.

For testing, a control composition of concrete of a class of at least B22.5 (State Standard 26633) is selected. A series of samples (6 samples of cubes 100x100

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5 Transportation and storage

5.1 HYDROISOL-ITH ® can be transported by any types of transport that ensures safety in accordance with the Rules of transportation of goods, operating on the relevant types of transport.

5.2 Transportation and storage of HYDROISOL-ITH ® is carried out in a package at a temperature of - 50 ° C to +50 ° C.

6 Instructions for use

6.1 It is necessary to clean the concrete surface from dirt, paintwork, lime, efflorescence, cement laitance, oil products and any other substances that prevent the penetration of the chemical components of HYDROISOL-ITH ® into the pores of the treated concrete surface. Existing concrete defects and static cracks must be expanded, moistened and repaired. Immediately before applying HYDROISOL-ITH ®, the surface is abundantly wetted with water.

6.2 When performing work with HYDROISOL-ITH ®, it is necessary to be guided by the Building codes and regulations 12-04 "Labor safety in construction. Part 2. Construction production", State standards and technical specifications. When working with HYDROISOL-ITH ® at facilities subordinate to the Gosgortekhnadzor of the Russian Federation, it is necessary to be guided by the "Rules for the design and safe operation of steam and hot water pipelines".

6.3 HYDROISOL-ITH ® can be used at air temperature from +5 to +35°C. During processing it is necessary to exclude the influence of direct sunlight, strong wind and rain on the treated surface. Apply only on the moistened concrete surface.

6.4 Before using HYDROISOL-ITH ® should be mixed with tap water in a ratio of 3:1 - 5:1 (by weight) using a low-speed drill (no more than 400 rpm) with a screw nozzle. Continue stirring until the mixture becomes homogeneous without lumps. The ready-to-use mixture has a creamy consistency. The lifetime of the prepared mixture is 10 -20 minutes.

6.5 HYDROISOL-ITH ® is applied to a moistened base with a brush, a stiff brush or a plaster spray. On horizontal surfaces HYDROISOL-ITH ® is applied in one layer, on vertical surfaces it is necessary to apply 2 layers. The second layer can be applied after setting the first, but not earlier than 1-2 hours. The second layer is applied perpendicular to the previous one. For the preparation of the HYDROISOL-ITH® mixture, when applying the second layer, it is recommended to use the minimum recommended amount of sealing water, especially at low application temperatures. Immediately before applying the mixture, its short-term mixing is required to achieve working viscosity. The consumption of HYDROISOL-ITH ® is 0.8-1.3 kg/m².

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**List of normative and technical documents referred
in the technical specifications.**

№	Document designation	Title of the document
1	State Standard 12.1.007	SSBT. Hazardous substances. Classification and general safety requirements.
2	State Standard 450	Technical calcium chloride. Technical specifications.
3	State Standard 166	Calipers. Technical specifications.
4	State Standard 53228	Scales of non-automatic action. Part 1. Metrological and technical requirements. Tests.
5	State Standard 26633	Heavy and fine-grained concretes. Technical specifications.
6	State Standard 12730.1	Concretes. Density determination methods.
7	State Standard 6613	Woven wire meshes with square cells. Technical specifications.
8	State Standard 8735	Sand for construction work. Test methods.
9	State Standard 8736	Sand for construction work. Technical specifications.
10	State Standard 10178	Portland cement and slag-Portland cement. Technical specifications.
11	State Standard 12730.5	Concretes. Methods for determining water resistance.
12	State Standard 24297	Input control of products. The main provisions.
13	State Standard 310.3	Cements. Methods for determining the normal density, setting time and uniformity of volume changes.
14	State Standard 25336	Laboratory glassware and equipment. Types, basic parameters, sizes.
15	Building Codes and Regulations 12-04	Labor safety in construction. Part 2. Construction production.
16	Technical specification 5745-005-12032152-98	Dry mortar mixtures.

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