TREATMENT OF SILICATE SURFACES

Vulmsidizplan

ENVIRONMENTALLY FRIENDLY PRODUCT

WATER-BASED COATING

HEALTHY – ELIMINATION OF HARMFUL EFFECTS ON HUMAN HEALTH

Product description:

Vulmsidizplan is a single-component disperse material used for surface treatment of silicate substrates – concrete, terrazzo, silicates, asphalt concrete, cement and polymer cement screeds etc. It is used as a wear layer and as a coating for wood and wood products. After reaction, it forms a resilient and firm coating with monolithic nature and properties. It has excellent adhesion to the substrate and can withstand moderate to severe mechanical stress.

Use:

Vulmsidizplan is a paint, which is – due to its specific properties – designed for use in the production halls, warehouses, garages, for the treatment and protection of concrete skeletons, fences, floors, etc.

Benefits:

- resistant to water, UV radiation
- good adhesion to the substrate
- withstands mechanical loads

Test data:

Certificates 1301- CPD – 0199

Product data:

colour:	MIPA
appearance:	matte
shelf life:	12 months in original packaging in dry conditions at the temperature of 5 – 35 °C Protect from frost

Physical data:

solids content:	over 60 %
density:	1,45 kg/l

Theoretical capacity:

1,2 – 2,5 m^2/kg depending on the substrate

Processing temperature:

minimum temperature of primer and air:	5 °C
maximum temperature of the substrate and air:	35 °C
maximum relative air humidity:	80 %

Substrate:

The substrate must be consistent and free of dust and dirt, dry and thoroughly degreased. When applying **Vulmsidizplan** coating on floors, the substrate must be at least 1 month old and its moisture content does not exceed 4%. The area is to be flat, slightly rough, without „craters" with a diameter greater than 5 mm and a depth of more than 3 mm, without protrusions and holes over +/- 2 mm in diameter and unevenness with a diameter of +/- 5 mm.

Application methods:

roller, brush, spray

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Instructions for use:

Impregnate the cleaned substrate with a penetrating agent Vulmpropen, diluted in a ratio of 1 : 3 litres of water and allow to dry for approx. 2 hours (depending on climate conditions). After 2 hours, apply the first coat of the diluted **Vulmsidizplan** (ratio with water is 1 : 0,3). Optimally use the cross method of coating. A layer dries for at least 4 hours. Apply the second coating – the material diluted with water at a ratio 1 : 0.2. The layer is walkable after approx. 6 hours and may be exposed to the full load after 24 hours. The recommended total thickness of the coating is up to 1 mm.

Time data for application:

re-coating interval:	approx. 4 hours
paintable:	approx. 4 hours
walkable:	approx. 6 hours
fully loadable:	24 hours

at a relative air humidity of 50% and temperature of 23 °C

Cleaning of tools:

Immediately after use, with water.

Resistance:

- UV, alkali resistant
- resists atmospheric effects of industrial air pollutants
- resists short-term effect of petroleum products and dilute acids and alkalis
- withstands moderate to severe mechanical stress

Warning:

The paint is diluted with water in original state. After hardening it is waterproof and extremely adhesive. It can be removed only mechanically using organic solvents and diluents. Therefore wash the polluted areas with water immediately.

Safety:

Vulmsidizplan – when handling, proceed in accordance with the general safety measures, follow the safety instructions on the packaging labels and on safety data sheets. Data, specifications, directions and recommendations given in this technical data sheet are based on experience gained in modeling of supposed ways of applications, or under specially defined conditions. Their accuracy, completeness or appropriateness under the actual conditions of any intended use is not guaranteed and must be determined by the user. The manufacturer and distributor are not responsible for the results achieved, loss, direct or consequential damages arising from failure to comply with the recommended use of the product, which go beyond the conditions herein.

Name of the test, or the name of the tested characteristics and a number of a standard, or other identifier of the test method, procedure:

capillary absorption and water permeability	STN EN 1062-3 (67 2020)
permeability CO_2	STN EN 1062-6 (67 2020)
behaviour after artificial ageing	STN EN 1062-11 (67 2020), art. 4.2
behaviour after 7 days at 70 °C	STN EN 1062-11 (67 2020), art. 4.1
water vapour permeability	STN EN ISO 7783-2 (67 3093)
resistance to changes in temperature:	
cyclic exposure to storm rain (thermal shock)	STN EN 13687-2 (73 2124)
freezing and thawing cycles with thawing salt	STN EN 13687-1 (73 2124)
adhesion in pull-off test	STN EN 1542 (73 2115)

Details on sampling:

Samples for testing were submitted by the manufacturer at the TSÚS branch (www.tsus.sk) in Tatranská Štrba.

Samples conditioning:

Laboratory temperature 23 °C ± 2 °C

Used test device, its metrological traceability:

air conditioner cabinet Vötsch VC 4034	Z 90 0001
laboratory oven STERIMAT 354.3	Z 90 0002
Q-U-V tester	Z 90 0003
drilling rig HILTI	Z 90 0005
chamber CO_2	Z 90 0014
precision scales SARTORIUS	M 90 0003
Erichsen type 417	M 90 0008
analytical scales SARTORIUS BP 300 S	M 90 0018
digital slide gauge 1 – 150 mm	M 90 0031
kit for measuring boundary conditions (temperature, humidity)	M 90 0032
PosiTest type AT-CM	M 90 0033
apparatus for measuring coat thickness by V-cut	M 90 0037

Deviations from the standardized test procedure and all circumstances that might affect the test result:

composition of the coating system: (coatings by a brush)–The composition of the coating system: (coatings by a brush) – composition is the same for all tests, the thickness of the coating system specified in the results of individual tests

- 1x coating diluted SIDIZPLAN, diluted with water in a ratio of 1 kg : 0,3 l of water
- 2 hours drying
- 2x SIDIZPLAN coat, drying interval between coats 2 hours

Capillary absorption and water permeability:

- psubstrate used: sample with dimensions 137 mm x 142 mm thick. 29 mm, cut from a lime-sand brick
- sealing of unpainted surfaces of samples: 2 x two-component epoxy varnish EPONAL – manufacturer: Chemolak, Smolenice
- samples conditioning before testing: 24 days at laboratory temperature
- after conditioning tested samples were subjected to three ageing cycles: one cycle consists of the following phases:
  24 h stored in water at 23 °C ± 2 °C
  24 h drying in an oven at 50 °C ± 2 °C
- conditioning of samples after ageing cycles: 24 h at laboratory temperature

Permeability CO_2, water vapour permeability

- substrate used: samples in circular form with a diameter of 90 mm cut from unglazed ceramic tiles thick. 6 mm
- samples conditioning before testing: 24 days at laboratory temperature
- after conditioning tested samples were subjected to three ageing cycles: one cycle consists of the following phases:
  24 h stored in water at 23 °C ± 2 °C
  24 h drying in an oven at 50 °C ± 2 °C
- conditioning of samples after ageing cycles: 24 h at laboratory temperature

Adhesion in pull-off test

- substrate used: concrete sample with dimensions 300 mm x 300 mm, thick. 100 mm from concrete type C (0,70) prepared and treated in accordance with STN EN 1766
- samples conditioning before testing: 7 days at laboratory temperature

Adhesion after the test of resistance to changes in temperature – Cyclic exposure to storm rain + freezing and thawing cycles with thawing salt

- substrate used: concrete samples with dimensions 300 mm x 300 mm, thick. 100 mm, from one lot of concrete type MC (0,40) prepared and treated in accordance with STN EN 1766
- sealing of unpainted surfaces of samples: 2 x two-component epoxy varnish EPONAL – manufacturer: Chemolak, Smolenice
- samples conditioning before testing: 24 days at laboratory temperature
- test of resistance to temperature changes according to STN EN 13687-1 and STN EN 13687-2 was performed on the same samples, beginning with a storm rain test

Evaluation of coatings after testing resistance to temperature changes:

Evaluated immediately after exposure:

- degree of blistering by a method according to STN EN ISO 4628-2
- degree of cracking by a method according to STN EN ISO 4628-4
- degree of peeling by a method according to STN EN ISO 4628-5

Evaluated 7 days after the end of exposure:

- adhesion of coatings in pull-off test by a method according to STN EN 1542

Adhesion after ageing for 7 days at 70 °C

- substrate used: concrete samples with dimensions 300 mm x 300 mm, thick. 100 mm, from one lot of concrete type MC (0,40) prepared and treated in accordance with STN EN 1766
- samples conditioning before testing: 24 days at laboratory temperature

Evaluation of coatings after the exposure:

Evaluated immediately after exposure:

- degree of blistering by a method according to STN EN ISO 4628-2
- degree of cracking by a method according to STN EN ISO 4628-4
- degree of peeling by a method according to STN EN ISO 4628-5

Evaluated 24 hours after the end of exposure:

- adhesion of coatings in pull-off test by a method according to STN EN 1542

Behaviour after artificial ageing

- substrate used: fibre-cement board with dimensions: 300 mm x 150 mm
- samples conditioning before testing: 24 days at laboratory temperature

Exposure conditions:

- irradiation of the sample surface by the UV lamps at a temperature of +60 °C (type of lamps: UVA - 340);
- condensation of moisture on the surface of the samples at a temperature of + 50 °C; alternating irradiation by UV radiation and condensation on the surface at 4 hour intervals

Total length of exposure: 2000 h

Evaluation of coatings after the exposure

Evaluated immediately after exposure:

- degree of blistering by a method according to STN EN ISO 4628-2
- degree of cracking by a method according to STN EN ISO 4628-4
- degree of peeling by a method according to STN EN ISO 4628-5

Information on measurement uncertainty:

They are specified in tables of measured values in the form of the extended measurement uncertainty. (Measurement uncertainties are based on the internal procedures from 1996).

Results of measurement:

Capillary absorption and water permeability

Test area: 194,54 cm^2

Sample no.	Coat thickness [µm]	Weight gain of the sample [g]					Speed coefficient of water permeability in a liquid phase [$kg/(m^2.h^{0,5})$]
		after 1 h	after 2 h	after 3 h	after 6 h	after 24 h	
1	905		0,5	0,5	0,5	0,5	0
2	880	0,4	0,5	0,5	0,5	0,5	0,0007
3	895	0,3	0,3	0,3	0,3	0,3	0
Arith. mean	893	–	–	–	–	–	0,0002
Measurement uncertainty	14,5	–	–	–	–	–	0,006

Note: Speed coefficient of water permeability in the liquid phase is a directive of the linear part of the graph of weight gain in kg/m^2 as a function of the square root of time.

Permeability CO_2

Surface of the tested specimen A [m^2]	0,005
Tested samples weighing interval [h]	24
Test temperature [°C]	23
Median ambient barometric pressure during test p_{amb} [kPa]	100,5
CO_2concentration of tested gas in [%] (V/V)	10
Diffusion coefficient of CO_2 in air at 23 °C D_{co2} [m^2/day]	1,38
Difference c in concentration of air without CO_2 and 10% concentration (V/V) at 23 °C [g/m^3]	180
Equivalent diffusion thickness of the substrate $s_{D\,CO2}$ [m]	0,1

Sample no.	Coat thickness d [m]	Change in sample weight in three consequent measurements at const. change in weight [g]	Permeability CO_2 i [$g/m^2.d$]	Equivalent diffusion thickness CO_2 sd [m]	Diffusion resistance factor CO_2 [-]
1	0,000200	0,030	5,958	41,52	$0,21.10^6$
2	0,000240	0,015	2,979	83,15	$0,35.10^6$
3	0,000230	0,020	3,972	62,33	$0,27.10^6$
Arithmetic mean	0,000223	0,022	4,303	62,33	$0,28.10^6$
Measurement uncertainty	$11,3.10^{-6}$	0,011	0,876	12,018	$0,081.10^6$

Water vapour permeability

Surface of the tested specimen A [m^2]	0,005
Tested samples weighing interval [h]	24
Test temperature [°C]	23
Relative air humidity in the test dish [%]	93
Water vapour pressure difference Δp [Pa]	1207
Median ambient barometric pressure during test p [hPa]	1000
Gas constant for water vapour R_D [Nm/(kg.K)]	462
Test temperature T [K]	296
Air permeability coefficient δ_L [g/(m.h.Pa)]	0,000711942
Water vapour permeability of a porous substrate [g/(m^2.d)]	409,6

Sample no.	Coat thickness	The change in mass of the sample per time interval, by which the line is translated	Rate of water vapour permeability per time interval	Arithmetic mean of the rate of sample permeability per time interval	Water vapour permeability	Water vapour permeability coefficient	Equivalent diffusion thickness
1	0,000220	118,4	4,933	4,876	24,825	$5,434.10^{-6}$	0,69
		116,8	4,867				
		115,9	4,829				
2	0,000225	110,4	4,600	4,564	23,145	$5,182.10^{-6}$	0,74
		109,1	4,546				
		109,1	4,546				
3	0,000240	74,5	3,104	3,100	15,441	$3,687.10^{-6}$	1,11
		75,5	3,146				
		73,2	3,050				
Arithmetic mean	0,000228	100,3	4,180	4,180	21,137	$4,77.10^{-6}$	0,85
Measurement uncertainty	$12,1.10^{-6}$	13,155	0,548	1,095	5,778	$1,09.10^{-6}$	0,265

Adhesion of a substrate in a pull-off test

diameter of the test roller 56,4 mm

Measurement number	Adhesion in pull-off test [N/mm^2]	Level of disruption [-]
1	4,4	A : A/B : B/C = 10 % : 45 % : 45 %
2	4,4	A/B : B = 90 % : 10 %
3	4,6	A/B = 100 %
4	4,3	A/B : B = 80 % : 20 %
5	4,5	A/B : B = 90 % : 10 %
Arithmetic mean	4,4	–
Measurement uncertainty	0,102	–

Note:

A – cohesive disruption of the concrete substrate

A/B – disruption of adhesion between the substrate and coating

B – cohesive disruption in the first layer

B/C – adhesion disruption between the first and second layer

Resistance to temperature changes – cyclic exposure to storm rain (thermal shock) + freezing and thawing cycles with thawing salt

The samples were subjected to 10 cycles – cyclic exposure to storm rain (thermal shock), where one cycle consisted of the following phases:

location under the heating element at (60 ± 5) °C for 5 h and 45 min

shower by water with the temperature of (12 ± 3) °C 15 min

Subsequently, the samples were subjected to 20 cycles of freezing and thawing with thawing salt, where one cycle consisted of the following phases:

immersion in a tank containing saturated solution of NaCl at (-15 ± 2) °C for 2 h

location in the tank with water at (21 ± 2) °C for 2 h

Sample no.	Degree of blistering STN EN ISO 4628-2	Degree of cracking STN EN ISO 4628-4	Degree of spalling STN EN ISO 4628-5	Adhesion in pull-off test [N/mm^2]	Level of disruption [-]
1	0 (S0)	0 (S0)	0 (S0)	1,8	B/C = 100 %
				1,3	B/C = 100 %
				1,3	B/C = 100 %
				1,6	B/C = 100 %
				1,4	B/C = 100 %
2	0 (S0)	0 (S0)	0 (S0)	2,3	A/B = 100 %
				2,3	A/B : B/C = 10 : 90 %
				1,8	A/B : B/C = 10 : 90 %
				1,9	A/B : B/C = 10 : 90 %
				1,8	A/B : B/C = 20 : 80 %
Arithmetic mean	–	–	–	1,8	–
Measurement uncertainty	–	–	–	0,23	–

Note:
A/B – disruption of adhesion between the substrate and coating
B/C – adhesion disruption between the first and second layer

Resistance to temperature changes – behaviour after 7 days at 70 °C

Tested samples were subjected to ageing for 7 days at 70 °C

Sample no.	Degree of blistering STN EN ISO 4628-2	Degree of cracking STN EN ISO 4628-4	Degree of spalling STN EN ISO 4628-5	Adhesion in pull-off test [MPa]	Level of disruption [-]
1	0 (S0)	0 (S0)	0 (S0)	4,3	A/B : B = 90 % :10%
				4,4	A/B : B = 85 % : 15 %
				4,2	A/B : B = 80 % : 20 %
				4,6	A/B = 100 %
				4,1	A/B = 100 %
2	0 (S0)	0 (S0)	0 (S0)	3,9	A/B : B = 90 % : 10 %
				4,1	A/B = 100 %
				3,8	A/B : B = 90 % : 10 %
				4,0	A/B : B = 90 % : 10 %
				4,2	A/B : B = 90 % : 10 %
Arithmetic mean	–	–	–	4,2	–
Measurement uncertainty	–	–	–	0,15	–

Note:
A/B – disruption of adhesion between the substrate and coating
B – cohesive disruption in the first layer

Artificial ageing

Total exposure time: 2000 h

Sample no.	Degree of blistering STN EN ISO 4628-2	Degree of cracking STN EN ISO 4628-4	Degree of spalling STN EN ISO 4628-5
1	0 (S0)	0 (S0)	0 (S0)
2	0 (S0)	0 (S0)	0 (S0)
Arithmetic mean	–	–	–
Measurement uncertainty	–	–	–