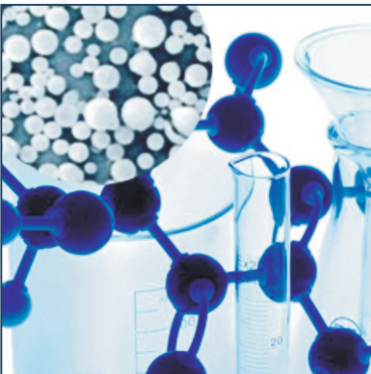


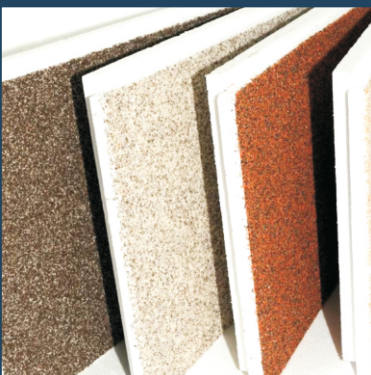


PRODUCTION ASSOCIATIONS
MICROSPHERES



Microspheres • Warm Plaster • Warm Screed • Flexible Stone

Liquid Thermal Insulation Coating • Thermopanel



MICROSPHERE

microcosm of glass beads

Microspheres - spherical, closed, hollow, gas-filled micro particles ranging in size from 1 to 500 microns. It is a modern filler, which uses for produce a lot of materials. **Benefits** - weight reduction; increase in volume of product; cost reduction; gives the thermal insulation, waterproof and fire-resistant properties to materials.

Microsphere combines perfectly with any materials, has a low bulk density. The closed hollow sphere provides water resistance, spherical shape gives good flow, and the gas inside the spheres provides a low thermal and sound conductivity.



1mm=0,001mm



human hair =100mkm

Microspheres of the brand «Penosfera» TY Y 23.9-38711619-001:2014

SPECIFICATIONS		MARK of MICROSPHERES	
Appearance	free-flowing powder	MPII	Plansifter 20-400мкм
Colour	light beige		Bulk density 100-130кг/м³
True density	2,46 g/cm³		Quantity in ton 7,7 м³
Mohs Hardness	7	MPc.20-200	Plansifter 20-150мкм
Compressive strength (50% ruined)	20,2-28,4 kgs/cm²		Bulk density 100-125кг/м³
Coefficient of thermal conductivity	0,04 W/m*K		Quantity in ton 8,3 м³
Initial softening temperature	1040 °C	MPc.20-200GF	Water repency
Melting temperature	1250-1300 °C		Moisture 2-5%
Moisture	0,35-0,45%	MPc.200-400	Plansifter 200-400мкм
Sorption moisture	0,44%		Bulk density 50-60кг/м³
Oil absorption	29,8-30,3%		Quantity in ton 20 м³

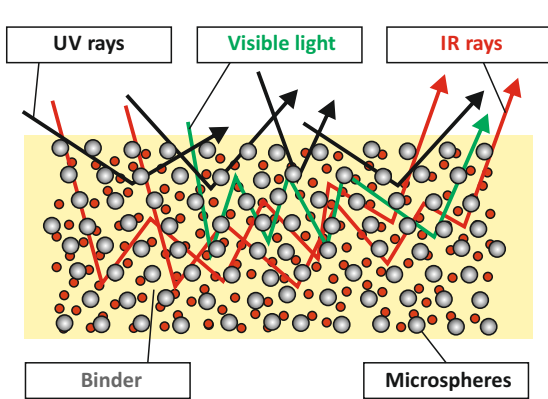
Chem. composition: SiO₂-74,9; Al₂O₃-13,9; K₂O -2,8; Na₂O -1,9; Fe₂O₃-0,9; CaO -1,2; FeO-0,6; TiO₂-0,2, ППП -3,2

Microspheres uses for a lot of manufactures. Our microspheres are base for products like brake pads, an artificial stone, products and materials based on epoxy resins, thermopanel, warm stucco/screed, liquid thermal insulation coatings, etc. Also our microspheres uses in medicine - prostheses, medical mattresses and pillows. The application of the microspheres expand with each passing day.

Our company has established a quality national product which is recognized not only in Ukraine but also abroad.

We produce thermal insulation materials **TermoRon** from microspheres of own production.

THE PRINCIPLE OF OPERATION OF THE MICROSPHERES IN THERMAL INSULATION MATERIALS OF NEW GENERATION



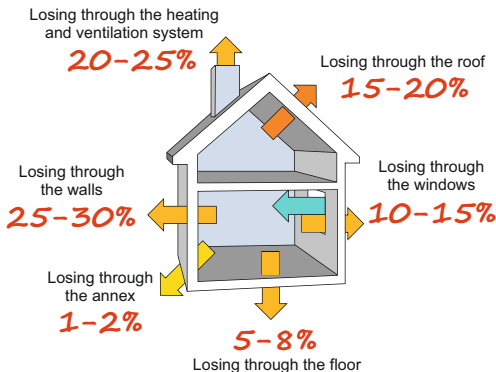
- ① Heat transfer with photons through the binder
- ② Convection through the air inside the microspheres
- ③ Reflects rays from the glass grid of microspheres

In traditional thermal insulation materials is applied the principle of thermal conductivity of the body – heat transfer with photons . Our microspheres run on three principles of heat transfer: with photons through the binder, convection through the air and reflects main types of rays, including thermal.

As the filler for our materials we use silicate microspheres brand "Penosfera" with a thermal conductivity of 0.047 W/mK. This is specially designed product with hollow closed spheres. There are additional closed chambers with gas within each sphere. The reflection effect is enhanced by the presence of intra-chamber glass partitions. Also, the partitions inside microspheres make slow convection on the air within cameras.

The maximum reflection of main types of rays and reducing heat flow is achieved through carefully selected ratio of the amount of filler in the binder, and the number of rows in the reflective layer.

Losing of warmth without thermal insulation



Conserve warmth with thermal insulation systems



1. Warm plaster + liquid thermal insulation coating
2. Warm plaster + Flexible stone
3. Thermopanel

Our thermal insulation systems retain 90% of the heat flows

WARM PLASTER

MIXTURE TERMORON FACADE (Ц.1. ШТ5 ГСТУ Б В.2.7-126:2011)

eco-friendly, lightweight, non-flammable
modification on cement-base with the
addition of microspheres and natural
thermal-noise insulation fillers

TermoRON



For the insulation of external and internal walls of houses and protection a socle, slopes, doorways.

Breathable, does not retain moisture inside the walls. The surface of the plaster is easy to sand.

The plaster has a high adhesion to mineral-based like concrete, brick, gas and foam concrete, cinder block.

FACADE

Operating time with a diluted mixture - 60 min. Thermal conductivity in dry condition - 0.065 W/(m·K). Water absorption coefficient - 0.2 kg/m². Water vapor permeability - not less than 0.25 mg/(m·h·Pa).

Keep in closed packaging. The application temperature from +5 to +22°C at a relative humidity of 55 ± 5%. Dilute with water on 9 kg of dry mix - 7 l.

Recommended thickness of the layer - 1.5 - 2 cm. Consumption: 27 L of the mixture per 1 m².

The layer of warm plaster with thickness of 2 cm reflects 40% of thermal fluxes back to the flat. We recommend the use of thermal insulation system combined with a finishing decorative protective layer of thermal insulation and waterproofing products TermoRon:

**Liquid thermal insulation coating
TERMORON FACADE**



**Thermal insulation flexible stone
TERMORON**



Thermal insulation system - complex "TermoRon" reflects **90%** of thermal fluxes and works at the level of traditional thermal insulation materials as the full protection from thermal loss.

WARM SCREED

MIXTURE TERMORON (Ц.2.СТ1 ГСТУ Б В.2.7-126:2011)

eco-friendly, lightweight, non-flammable modification on cement-base with the addition of microspheres and natural thermal-noise insulation fillers

TermoRON



MONOLITH

Monolithic thermal insulating screed class of lightweight concrete for interior work.

For the device of floors with heating.

For thermal insulation of roofs and floors of houses.

For floors on concrete, reinforced concrete foundations.

Operating time with a diluted mixture - 30 min. Thermal conductivity in dry condition - 0,108 W/(m·K) Index of noise insulation at a thickness of 10cm concrete up to 37 dB. The application temperature from +5 to +22 ° C at a relative humidity of 55 ± 5%. Consumption - 27 L of the mixture per 1 m² at a layer thickness of 2 cm.

Screed requires no additional reinforcement. After drying screed you can put on it any materials like laminate, parquet, tile or install a floor heating system.



If you use warm screed TermoRon as a basis the floor heating system heated faster by 15-20%. This is due to high thermal resistance. A layer of warm screed with thickness of 5 cm reflects to 40% of thermal fluxes.

An effective, lightweight, durable, economical, thermal insulation, soundproofing material for leveling and warming floors.

Plastic, easily applicable, it does not give shrinkage and cracking.

Excellent alternative to the multilayer insulation based on foam plastic and mineral wool.

LIQUID THERMAL INSULATION

PROTECTIVE COATING TERMORON FACADE (1.П.Пі ГСТУ ББ.2.7-233:2010)

MICROSPHERES + polymeric composition

TermoRON

**THERMAL INSULATION
and
WATERPROOFING
coating**



FACADE

Designed for outdoor use, for heat sealing of residential and industrial buildings. The coating has excellent adhesion to various materials: stucco, plaster, foam concrete, brick, wood, plastic, etc. Consumption of 1 liter per 1 m².

Thermal insulating, waterproofing all surfaces that can be painted

- It forms a thermal mirror which reflects thermal fluxes;
- Coating has the effect of self-cleaning - "clean facade";
- waterproofing, without creating a vapor barrier - walls breathe;
- Do not allows the development of fungal formations; Non-toxic;
- Easy to apply in tight spaces. It is easy to be colored;
- Apply with a brush, roller or air spray gun;

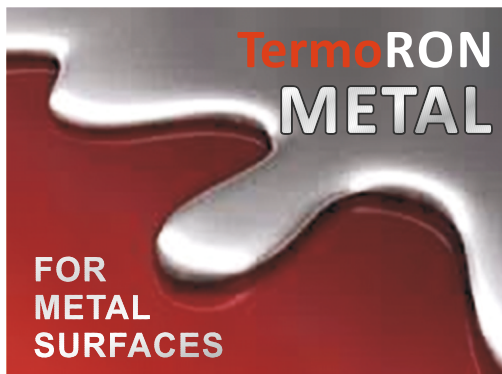
Effectively used as thermal insulation and waterproofing topcoat in a complex TermoRon Facade

- Using liquid thermal insulation in the complex with a warm plaster TERMORON reduces passage of thermal flows by 90%.
- Using the coating for foam plastic and foam polystyrene, not only increases their thermal insulation properties, but also protects against temperature extremes, destruction, cracks and cold joints in the thermoinsulating layer. Protection of the outer surface of the facade from the summer heat reduces the release of toxic substances such materials.

We recommend using coating "TermoRon Facade Beneficial" for the internal surfaces of the walls.

Superelastic thermal insulation coating gives the surface an aesthetic appearance of the painting material. Consumption 1 l per 2 m².

Finish coat with anti-corrosion additives and improved adhesion, designed for thermal and hydroprotection various types of metal surfaces: black metal, brass, aluminum, cast iron, metal, corrugated, etc.



 **PROTECTION**

INDUSTRIAL THERMAL INSULATION

- Normalizes the viscosity of the products in the oil and gas pipelines and tanks at oscillation of ambient temperature.



- Protects manufacturing equipment (furnaces, boilers, compressors, thermal presses, mixers, valves, stop valves) from corrosion and heat loss, and workers from burns.
- Protects parts of cars, trucks, railway, military vehicles, river and sea vessels.
- Reduces energy consumption and increases the efficiency of refrigeration equipment, refrigerators.

MINING AND CONSTRUCTION THERMAL INSULATION



- Protection of window and door slopes, cornices, loggias, balconies, protruding parts of metal and concrete structures;
- Thermal Insulates, protects metal structures, hangars, garages, surface and underground water pipes and heating system from corrosion.

The material can be applied on rusty surface. Application of the coating significantly reduces the expenditure of time, because it does not require special surface preparation.

Recommended to apply as the first layer and for the subsequent layers (to save) to apply "TermoRon Facade." Consumption 1 liter per 1 m².

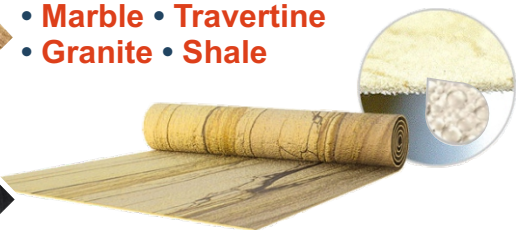
FLEXIBLE STONE

**luxury interior
at affordable prices**

Eco-friendly, flexible, repels
water and dirt,
non-combustible,
lightweight, durable,
vapor permeable

The structure of natural stone:

- **Marble** • **Travertine**
- **Granite** • **Shale**

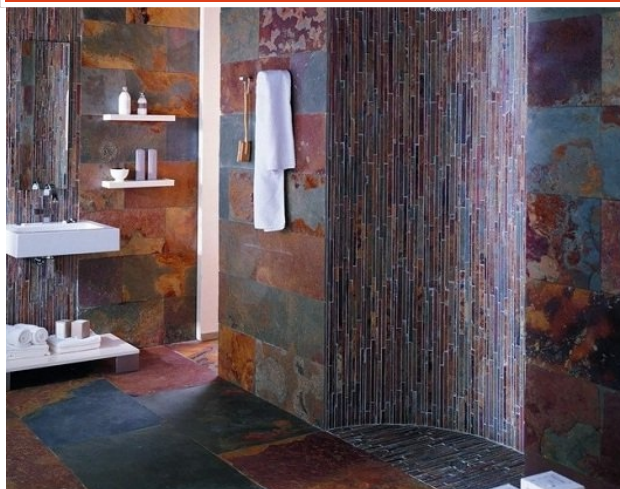


TermoRON

Interior design:

- Walls, floors, stairs
- Fireplaces, columns, arches
- Kitchens and furniture
- Bathrooms

**Imitation leather, drawing murals
Backlight, self-luminescence**



FLEXIBLE STONE EXTERIOR

decorative trim and thermal insulation



Facade, basement, roof
Stairs, terrace
Slopes, openings, arches
Garden barbecue oven
Fences, pools, fountains



Size:

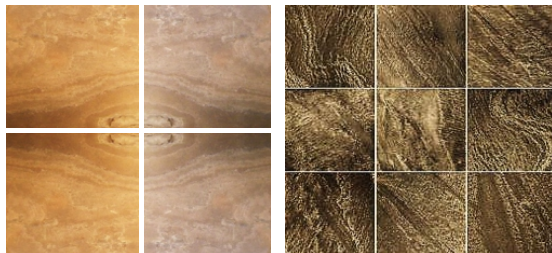
list - 970x570 sm;

tiles - 47x47 cm;

tiles - 25x19 cm;

brick - 10x23,5 sm;

Any architectural design
and non-standard shape
possible on request.



Style of thermal insulation TermoRon is universality of use,
safety and natural beauty.

THERMOPANELS

Thermal insulation
and decoration of facades

TermoRON

- Significant savings of time and labor to the construction works
- Installation of thermal panels is possible in any season
- Long life and attractive aesthetic appearance
- Reduced of prime cost

Foamglass

60x45cm
Weight: 2 kg



45x45cm
Weight: 1,5 kg



Polyurethane foam

100x50cm
Weight : 2 kg



Foam plastic

100x50cm
Weight : 2 kg



Completing materials for thermal panels and a flexible stone:

- Adhesives for flexible stone and thermopanel
- Thermal insulating and waterproofing mastic for seams

COMPARATIVE CHARACTERISTICS OF THERMAL INSULATION MATERIALS

Index	Warm plaster	Liquid thermal insulation	Flexible Stone	Thermopanel's Foaming glass	Thermopanel's Polyurethane foam	Thermopanel's Foam plastic PSB-C-25	Mineral wool
Layer thickness	2 cm	1 mm	4 mm	3 cm	5 cm	5 cm	5 cm
Weight, kg/m ²	9	0,7	2-3,5	6,4	2	2,6	7
Thermal conductivity, W/(m*°K)	0,055	0,034-0,042	0,047	0,045-0,06	0,035-0,045	0,035-0,041	0,036-0,44
Reflection of thermal radiation	40%	50%	50%	96%	92%	92%	94%
Water vapor permeability, (m ³ *h*Pa)	0,25	0,1-0,15	0,1-0,15	0,02-0,05	0,05	0,015-0,05	0,31-0,049 (conditionally)
Flammability / flammability class	not flammable	C1	C1	not flammable	C1 (conditionally)	C1 (conditionally)	not flammable
Isolation of toxins upon decomposition and heating	harmless	harmless	harmless	harmless	styrene, benzene, formaldehyde, toluene	ferulic acid, styrene, nitrogen oxide, benzene formaldehyde	phenol formaldehyde
Term of operation before the start of the decomposition	30 years	20 years	25 years	unlimited	10-15 years	10-15 years	to 10 years
Minuses in using	-	-	-	low water vapor permeability	inflammable, toxic, promotes the formation of fungi	inflammable, toxic, promotes the formation of fungi	shrink, absorbs moisture, toxic
Applying	internal + external	internal + external	internal + external	external	external	external	external

We provide reliable information on the existing insulation systems.
Your right - to choose the best.

MICROSPHERES PRODUCTION ASSOCIATION Limited Liability Company

works successfully in the market of lightweight fillers and thermal insulating materials. The main objective of the company - development and implementation effective materials of new generation.

Our technologies allow to receive quality products with improved performance and a wider application in according to the new needs of the market.

The main areas of activity: the production of microspheres and systems of construction and industrial thermal insulation.

Ultra lightweight silicate microspheres - a modern filler made of natural materials, used to facilitate weight, increase in volume, and also to additional thermal insulation and refractory properties.

Thermal insulating plasters and screeds - lightweight, environmentally friendly products with inclusion of the microspheres and mineral fillers. The layer thickness of 2cm reflects thermal radiation flows by 40%.

Finishing protective coating - ultra thin thermal insulation and waterproofing based microspheres. The layer thickness of 1 mm reflects 50% of thermal radiation flows. Used for construction and industrial thermal insulation.

Flexible stone - universal finishing and heat-insulating material, ultra-thin, lightweight and flexible wall panels based microspheres that repeating texture of natural stone. Reflects 50% of the thermal radiation.

Thermopanel - ready-to-install panels, composed of insulation covered with protective and decorative layer with natural stone texture.

Trademarks: PENOSFERA, TERMORON



PRODUCTION ASSOCIATIONS
MICROSPHERES

Contacts:

MPA, LLC

Perspektyvna St, 3, Kyiv
01042 Ukraine

e-mail: info@microspheres.com.ua

Sales department:

+38 097 058 02 79;
+38 066 314 47 15;

skype: [microspheres_ua](https://www.skype.com/name/microspheres_ua)