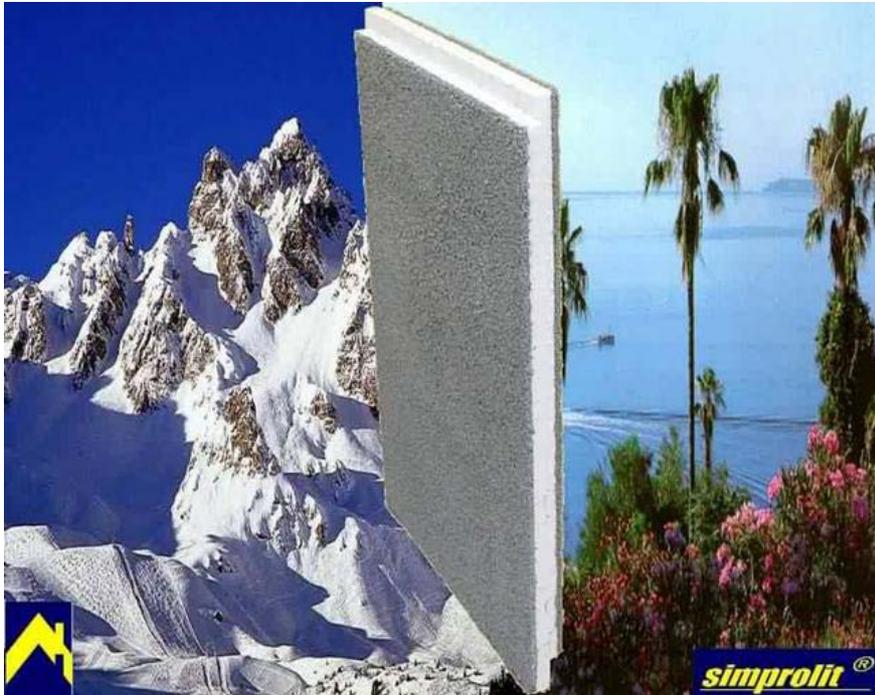




# **SIMPROLIT INSULATION PLATES**

## SIMPROLIT THREE-LAYER PLATES (SUP) AND SIMPROLIT SINGLE-LAYER PLATES (SOP) FOR FACADE INSULATION



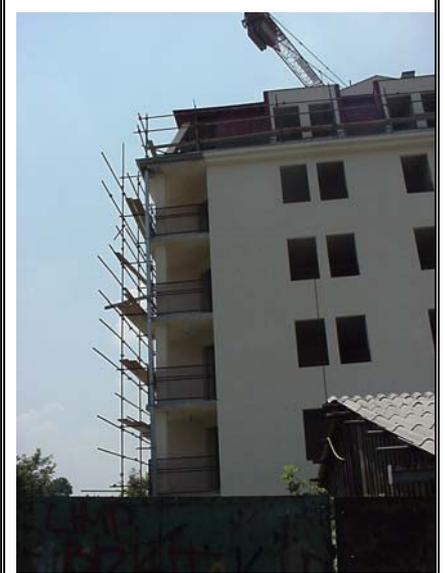
### Basic properties

Simprolit insulation plate – is a composite product consisting of styrofoam, cement and special admixtures and it represents a part of Simprolit system for facade thermo-insulation.

Simprolit plates are easy to work with, they are characterized by excellent adhesion between composite layers, having also good frost-resistance (a structure made of Simprolit SUP plates prevents joints from freezing), as well as exceptional high temperature resistance. All these facts are very important for the complete durability of a thermally insulated facade in any climate region (it is a well known fact that the temperature measured on the facade surface could amount to 80 °C, depending on its color and rate of exposure to the direct sun light).

Simprolit plates are mostly applied for facade thermo-insulation of already constructed buildings.

Also, Simprolit plates may be applied as an intermediate layer between concrete and formwork, acting as a thermal protection of concrete facade walls, beams and columns. After dismantling of the formwork, concrete elements protected with Simprolit plates may be plastered immediately, or just skimmed without additional reinforcement or «rabic» netting.



Application of Simplolit plates in upper floors and attics construction is also very practical. Namely, these plates can be used as both thermo-insulation and suspended ceiling plates, which could be just skimmed with cement paste mixed with fine sand, or with cement-based glue right after mounting. Upon request, they may also be plastered using a thin (3-5 mm) layer of cement-lime plaster, or just primed and painted.

The application of Simplolit plates as a part of Simplolit system for facade thermo-insulation brings significant work and cost reduction, no matter if it is a reconstructed or new facade.

## Simplolit system for facade thermo-insulation

Simplolit system represents a system for thermo-insulation of existing and new buildings that satisfies a whole spectrum of engineering physics' requirements, such as: thermo-insulation, steam permeability, fire resistance, impact resistance, strength, resistance to extreme climate conditions and durability (unequaled by other similar materials).

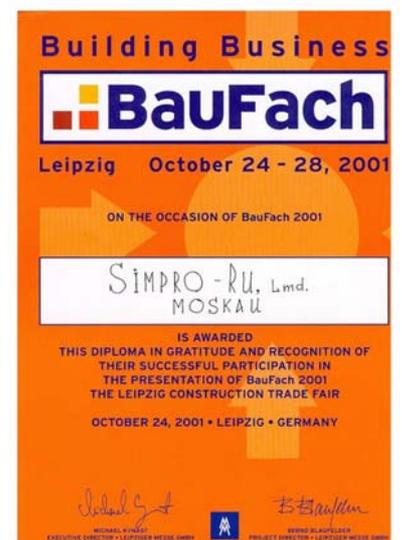
Simplolit system consists of following elements:

- Simplolit single-layer plates (SOP);
- Simplolit three-layer plates (SUP);
- Simplolit fireproof barriers (SPPR);
- connecting elements (glue, plugs);
- strengthening elements (angle profiles);
- reinforcing elements (glass-plastic net);
- covering elements (skimming or thin plastering);
- finishing elements (facade coating).

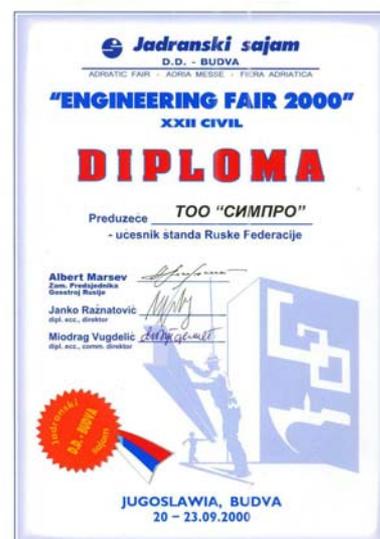
Except the above-mentioned elements, upon special design request it is also possible to produce other decorative elements (such as crowns, arches, ornaments, etc.) based on Simplolit polystyrene concrete.

Each of the above listed elements has a specific function in the Simplolit system, based on its physical-mechanical properties. For instance:

- SOP plates are usually used for thermo-insulation of the plinths, around facade elements (crowns, arches, etc.), for edge surfaces of facade openings, but also for strengthening of building's corners, facade decoration and so on.



- SUP plates are mostly applied as economical and good quality elements for facade thermo-insulation. Besides, they are successfully used for facade covering of panel structures, as a permanent solution for tight-sealed facade panel joints.
- Simplolit fireproof barriers (SPPR) are fire-resistant strips made of Simplolit monolith or Simplolit single-layer plates coated with cement plaster or glue (5 mm thick). They are usually installed around facade openings or at places where the facade thermo-insulation approaches the fire non-resistant roof structure. If there is a high risk of fire, SPPR plates could be placed at each slab level around the whole building, in accordance to the design and fireproofing regulations.
- The basic purpose of connecting elements is to fasten Simplolit plates to the wall, but also to fulfill other requirements defined by the Simplolit system, such as: steam permeability, frost resistance, fire resistance, durability, etc. Connecting elements include: cement-based glue, plastic plugs with special pegs made of self-extinguishing ABS plastic, plugs with metal or stone pegs (if so determined by the design and fireproofing regulations concerning high fire risk buildings) and bolts. All these elements must have appropriate quality certificates.
- Strength of Simplolit plates (and especially SOP plates) has no match between analog products. If the designer decides it, facade elements can be strengthened at certain places using Simplolit plates, especially at building's corners that may be subjected to impact. Strengthening elements also include «Г» profiles made of perforated aluminium or galvanized sheets. Lately, there are new materials, such as glass-plastic, applied for production of these elements.
- Basic function of plaster reinforcement is to avoid crack appearance. The cracks may occur at different parts of the thermo-insulation layer: at the plate joints, around facade openings, at the junctions between thermo-insulation and facade ornaments, at different materials' intersection, or as a result of too quick drying of the plaster layer. Normally, a glass-plastic net is used as the reinforcement, but additional metal «rabic» net may also be applied as a special protection against vandalism.



- Basic function of the plaster layer is to protect the surface of Simplolit plates from mechanical influences by strengthening the outer layer of a plate. Simplolit system does not require a thick plaster layer; on the contrary, instead of applying a 3-5 mm cement-lime plaster layer, Simplolit plates could be skimmed using just cement paste mixed with fine sand or standard ceramic-tile glue. If the thermo-insulation layer has no openings for steam conduction, the final plaster layer must be steam-permeable (for this purpose, standard cement-lime plaster may be applied, as well as ordinary steam-permeable cement based glue).
- Basic function of the finishing layer – facade coating - is to protect the thermally insulated facade from the atmospheric influences, especially from the rain. The choice of the material to be applied as the finishing coat depends only on its steam permeability and moisture resistance.

It is recommended to start the thermo-insulating of the facade by coating the walls from the footing going up to the roof using Simplolit single-layer SOP plates. This procedure provides undisturbed steam circulation through the system, having in mind that Simplolit polystyrene concrete possesses much better steam permeability than the styrofoam which is a middle layer in Simplolit SUP plates.

The main qualities and advantages of Simplolit system in comparison with other similar thermo-insulation systems (except for the expensive ventilated facade system) are its steam permeability (Simplolit system eliminates the condensation effect), together with its fire resistance, moisture resistance, strength, durability and cost-effectiveness. Besides, Simplolit system represents a homogenous system consisting of the same-origin materials with all advantages resulting from this fact (as a counter example we could take facade thermo-insulation with styrofoam, where fireproofing joints are usually made of mineral wool, which is the main reason for later crack appearance on the facade surface).

## Comparison with other thermo-insulation systems

When compared to other widely spread thermo-insulation systems using so called «effective» plates (three-layered panels made of styrofoam, mineral wool, etc.), insulation with Simplolit system has many advantages, such as:



- **cost-effectiveness:** production complexity and production costs, together with installation costs of Simplolit system elements are between 25 – 50% smaller than the costs of other similar materials. Simplolit plates are produced in dimensions and weights that are very convenient for installation. The fact that Simplolit system does not require smooth wall surfaces for installation (which is the basic condition in other systems, especially for thermo-insulation with mineral wool which requires a hard and flat wall surface) also represents a particular advantage. This becomes even more obvious if we add that very often a contractor spends up to 3 times more glue or plaster than necessary (according to the producer's instructions) in order to level the walls of an old building prior to installation of the new thermo-insulation.
- **steam permeability:** is an exceptionally important advantage of the Simplolit system. Namely, a wall insulated by Simplolit system can «breathe», which significantly improves the ecological conditions during the exploitation of the building. This is achieved on account of balanced conditions of moisture distribution through the layers of the thermally insulated facade and the final result are more comfortable living conditions. On the other hand, thermo-insulation systems using mineral wool or styrofoam are based on application of polymer-cement, which is a material with a high coefficient of steam-permeability resistance. As a result, a large amount of steam remains inside the thermo-insulation layer (and it is a known fact that mineral wool, with just 1% humidity increment, loses almost 20% of its thermo-insulation ability; also, mineral wool has particular ability to absorb water which in time dissolves mineral salts forming extremely aggressive solutions - consequently causing corrosion of metal connecting elements);
- **exploitation stability:** the fact that the temperature at a facade wall surface could reach even 80 °C (depending on its position and facade color) is often forgotten by thermo-insulation system designers. This has a negative influence on any heterogeneous facade thermo-insulation system, significantly reducing its durability. For instance, when subjected to the temperature higher than 70 °C styrofoam starts to dry out and evaporate. At the same temperature, there is usually crack appearance between the styrofoam plates, i.e. in the area of mineral wool fireproofing joints;



- **durability:** good steam permeability, no condensation effect, homogeneity of the system and moisture resistance have direct influence on durability of the applied thermo-insulation system. Lately, there is an increased number of scientific papers and studies on this subject. According to these papers, the durability of standard mineral wool is limited to 30 years, whereas the pure styrofoam (depending on the place and method of its installation) may last for no more than 20 years. On the other hand, Simplolit system showed satisfactory results after 50-years durability test, and currently there is a 100-and-more-years test running;
- **ecological cleanliness:** problem of mineral wool's aging is a well known fact - due to increased moisture content and oxidation processes in time mineral wool becomes needle-like dust which is extremely health hazardous. On the other hand, when subjected to the same conditions high-class styrofoam may also produce harmful substances, especially when a low-quality production material or inadequate technological process is applied. Sanitary-epidemiological testing of Simplolit plates showed the presence of only 3 harmful substances (among 20 possible), and these 3 were found in minor quantities - which were up to ten or more times smaller than allowed.
- **strength:** strength and mechanical impact resistance of Simplolit thermo-insulation system elements are much better than the same properties of analogue materials.
- **fire resistance:** according to the testing results of the Russian Ministry of Defense Research Center, after 90 minutes of fire-resistance testing of 110 mm thick 3-layer Simplolit panel (the middle layer was made of 30 mm thick styrofoam), at maximum temperature of 1000<sup>0</sup>C, limit state of integrity loss and thermo-insulation ability loss did not occur - according to GOST 30247.1!
- **working with standard materials:** existing thermo-insulation systems usually need a special polymer plaster to be applied over styrofoam or mineral wool plates, as well as special finishing materials, special technological procedures and consequently special work crews. On the other hand, Simplolit plates can be plastered using standard procedures, applying standard cement-lime plaster with just 3-5 mm thickness. Also, they can be just skimmed with cement paste containing fine sand or with steam permeable cement-based glue.



- **possibility of previous preparation:** Simplolit plates can be previously prepared and adopted so that the finishing may follow right after their mounting to the facade (some of the operations such as grounding and skimming may be partially done before mounting of the plates).

## Dimensions and types of Simplolit plates

**Simplolit plates** are produced in standard dimensions - length 1000 mm, width 750 mm and various thicknesses: 30 mm, 50 mm, 80 mm, 100 mm, 120 mm and 150 mm. Upon request, plates with other dimensions may also be produced.

Dimensions of standard Simplolit plates are defined in accordance to the following criteria: optimum weight of the elements during mounting process, structural relation between width and length of elements being 3:4 – which reduces the deformation of plates, simple manipulation, proximity to standard spans with minimum dispersion (for example, for thermo-insulation of attics the plates could be built in between the roof beams almost with no waste of the material).

Principally, 2 types of Simplolit plates are produced:

- Simplolit «**SOP**» single-layer plates and
- Simplolit «**SUP**» three-layer plates.

**SOP - Simplolit single-layer plates** are completely produced using Simplolit monolith of class D 350. In comparison with three-layer Simplolit plates, the single-layer plates have lesser thermo-insulation ability, but on the other hand larger strength, steam permeability, fire resistance and impact resistance. In accordance to that, Simplolit single-layer plates are used for thermo-insulation of plinths, staircases, buildings' corners, around window and door facade openings, as well as at other appropriate places. Because of all the above stated facts, Simplolit SOP plates represent an important part of the Simplolit facade thermo-insulation system.

Simplolit single-layer SOP plates are produced without folds, in one of six standard types: «**SOP3**»; «**SOP5**»; «**SOP8**»; «**SOP10**»; «**SOP12**» and «**SOP15**», where **SOP** stands for Simplolit single-layer plate, and numbers (3,5,...15) represent the plate thickness in cm (for instance: **SOP5** stands for 5 cm thick Simplolit single-layer plate).

Upon designer's request, plates with other dimensions may also be produced.



## SUP – Simplolit three-layer thermo-insulation plates

Comparing thermal properties - heat transfer coefficient (K) and heat transfer resistance coefficient (R) of Simplolit SUP plates with thermally equivalent full and hollow bricks, the conclusion can be derived that 31 cm thick full-brick wall can be replaced with 3 cm Simplolit plate (SUP3), and 218 cm thick full-brick wall can be replaced with 15 cm Simplolit plate (SUP15).

The middle layer of three-layer Simplolit SUP plates consists of styrofoam with 12-15 kg/m<sup>3</sup> density, and outer layers are made of 10 mm thick Simplolit polystyrene concrete - class D300.

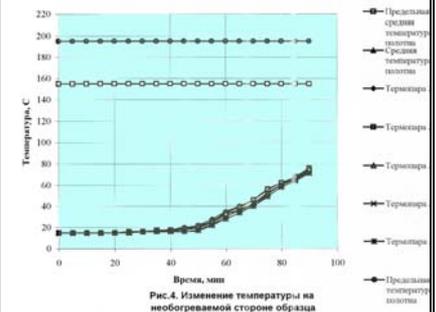
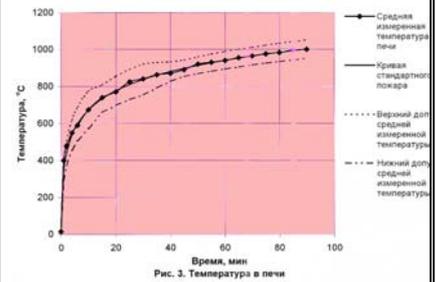
Simplolit thermo-insulation plates are produced in two kinds (with or without folds) and in many various types (thicknesses).

Simplolit facade thermo-insulation plates with folds (**SUP**) are produced in following standard types:

- «**SUP5**» - 5 cm thick Simplolit thermo-insulation plates with folds;
- «**SUP8**» - 8 cm thick Simplolit thermo-insulation plates with folds;
- «**SUP10**» - 10 cm thick Simplolit thermo-insulation plates with folds;
- «**SUP12**» - 12 cm thick Simplolit thermo-insulation plates with folds;
- «**SUP15**» - 15 cm thick Simplolit thermo-insulation plates with folds.

Simplolit facade thermo-insulation plates without folds (**SUP\_r**) are produced in following standard types:

- «**SUP3r**» - 3 cm thick Simplolit thermo-insulation plates without folds;
- «**SUP5r**» - 5 cm thick Simplolit thermo-insulation plates without folds;
- «**SUP8r**» - 8 cm thick Simplolit thermo-insulation plates without folds;
- «**SUP10r**» - 10 cm thick Simplolit thermo-insulation plates without folds;
- «**SUP12r**» - 12 cm thick Simplolit thermo-insulation plates without folds;
- «**SUP 15r**» - 15 cm thick Simplolit thermo-insulation plates without folds.





Description:	<b>THERMO INSULATION PANELS</b>			
Purpose:	THERMO INSULATION OF FACADES, CEILING, FLOORING, WALL PANELING, MANSARDS			
Mark:	<b>SUP 3</b>	<b>SUP 5</b>	<b>SUP 10</b>	<b>SUP 12</b>
Size:	<b>75x100x3 cm</b>	<b>75x100x5 cm</b>	<b>75x100x10 cm</b>	<b>75x100x12 cm</b>
Heat conductivity coefficient $\lambda$	<b>0,061 W/m<sup>0</sup>C</b>	<b>0,051 W/m<sup>0</sup>C</b>	<b>0,045 W/m<sup>0</sup>C</b>	<b>0,041 W/m<sup>0</sup>C</b>
Surface mass:	<b>11,5 kg/m<sup>2</sup></b>	<b>11,8 kg/m<sup>2</sup></b>	<b>12,4 kg/m<sup>2</sup></b>	<b>12,6 kg/m<sup>2</sup></b>
	(weight of 1 m <sup>2</sup> of panel)			
Composition:	<b>(1+1+1) cm</b>	<b>(1+3+1) cm</b>	<b>(1+8+1) cm</b>	<b>(1+10+1) cm</b>
	(simplolit + styrofoam + simplolit)			
Adhesion:	Adhesion <sup>(minimal)</sup> = <b>0,066 MPa</b>		Adhesion <sup>(medium)</sup> = <b>0,076 MPa</b>	
	Adhesion <sup>(maximal)</sup> = <b>0,085 MPa</b>			
Certifikat:	<b>№. 13094 / 03.10.2001.</b>			

	<b>SUP 3</b>	K=1.544 W /m <sup>2</sup> C <sup>0</sup> R=0.648 m <sup>2</sup> C <sup>0</sup> / W	3 cm	
			31 cm	4,18 x
			25 cm	8,33 x
	<b>SUP 5</b>	K=0.881 W /m <sup>2</sup> C <sup>0</sup> R=1.135 m <sup>2</sup> C <sup>0</sup> / W	5 cm	
			62 cm	12,40 x
			51 cm	10,20 x
	<b>SUP 10</b>	K=0.425 W /m <sup>2</sup> C <sup>0</sup> R=2.353 m <sup>2</sup> C <sup>0</sup> / W	10 cm	
			140 cm	14,00 x
			114 cm	11,40 x
	<b>SUP 12</b>	K=0.352 W /m <sup>2</sup> C <sup>0</sup> R=2.841 m <sup>2</sup> C <sup>0</sup> / W	12 cm	
			172 cm	14,33 x
			139 cm	11,58 x



**SIMPROLIT**

**FULL BRICK**  
 $\lambda=0.64 W /m^2C^0$

**HOLLOW BRICK**  
 $\lambda=0.52 W /m^2C^0$