



***Simprolit - Our Breakthrough to the XXI<sup>st</sup> Century***



***Simprolit  
thermo-insulation panels***



Description:	<b>THERMO INSULATION PANELS</b>			
Purpose:	THERMO INSULATION OF FACADES, CEILINGS, 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>
	(simprolit + styrofoam + simprolit)			
Adhesion:	Adhesion <sup>(minimal)</sup> = <b>0,066 MPa</b>		Adhesia <sup>(medium)</sup> = <b>0,076 MPa</b>	
	Adhesion <sup>(maximal)</sup> = <b>0,085 Mpa</b>			
Certificate:	<b>FACULTY OF CIVIL ENGINEERING, BELGRADE REPORT NO. 13094/Oct. 3, 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

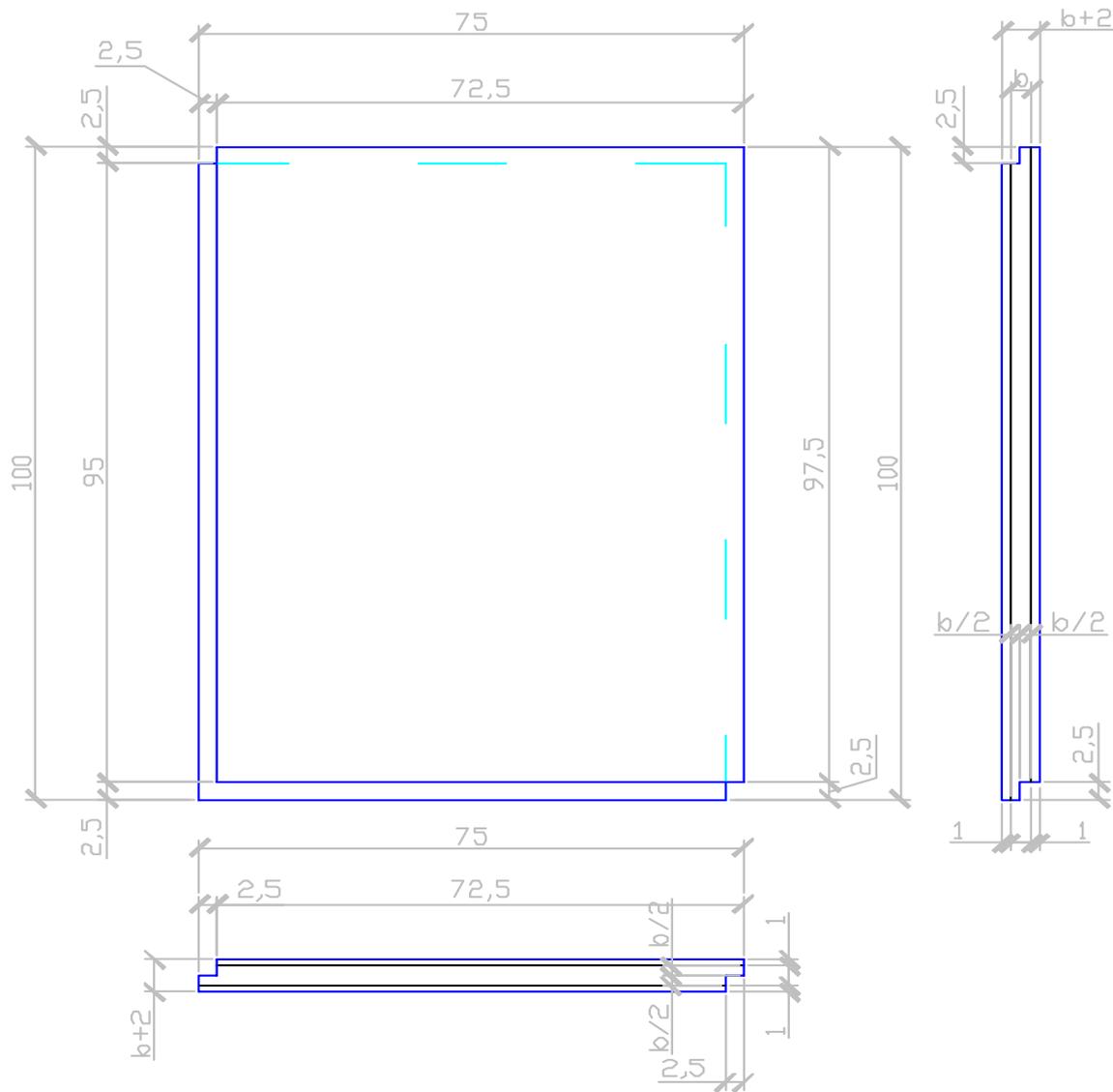


**SIMPROLIT**

**FULL BRICK  $\lambda=0.64$  W /m<sup>2</sup>C<sup>0</sup>**

**HOLLOW BRICK  $\lambda=0.52$  W /m<sup>2</sup>C<sup>0</sup>**

	<p><b>Simpro</b></p> <p>Moscow</p> <p>tel/fax: ++7 095 125 32 81</p> <p><a href="http://www.simprolit.com">www.simprolit.com</a></p>	
	<p><b>Simprolit</b></p> <p>BELGRADE</p> <p>tel/fax: 011 397 32 73 011 397 11 21</p> <p><a href="http://www.simprolit.com">www.simprolit.com</a></p>	



4 types of facade thermo-insulation Simprolit panels (SUP\_ ) are manufactured :

- »Simprolit - SUP 3«
- »Simprolit - SUP 5«
- »Simprolit - SUP 8«
- »Simprolit - SUP 10« and
- »Simprolit - SUP1 2«.

**Simprolit panels** are multi layered structures and are of the following sizes:

- length 1000 mm,
- width 750 mm,
- thickness 30 mm, 50 mm, 100 mm and 120 mm

Panel sizes are selected so that they can be placed between rafters with almost no waste (for attic insulation), and they are placed in combination, by length and by width, they fit almost all modular structure spans, with not waste or with a minimum of waste in cutting.

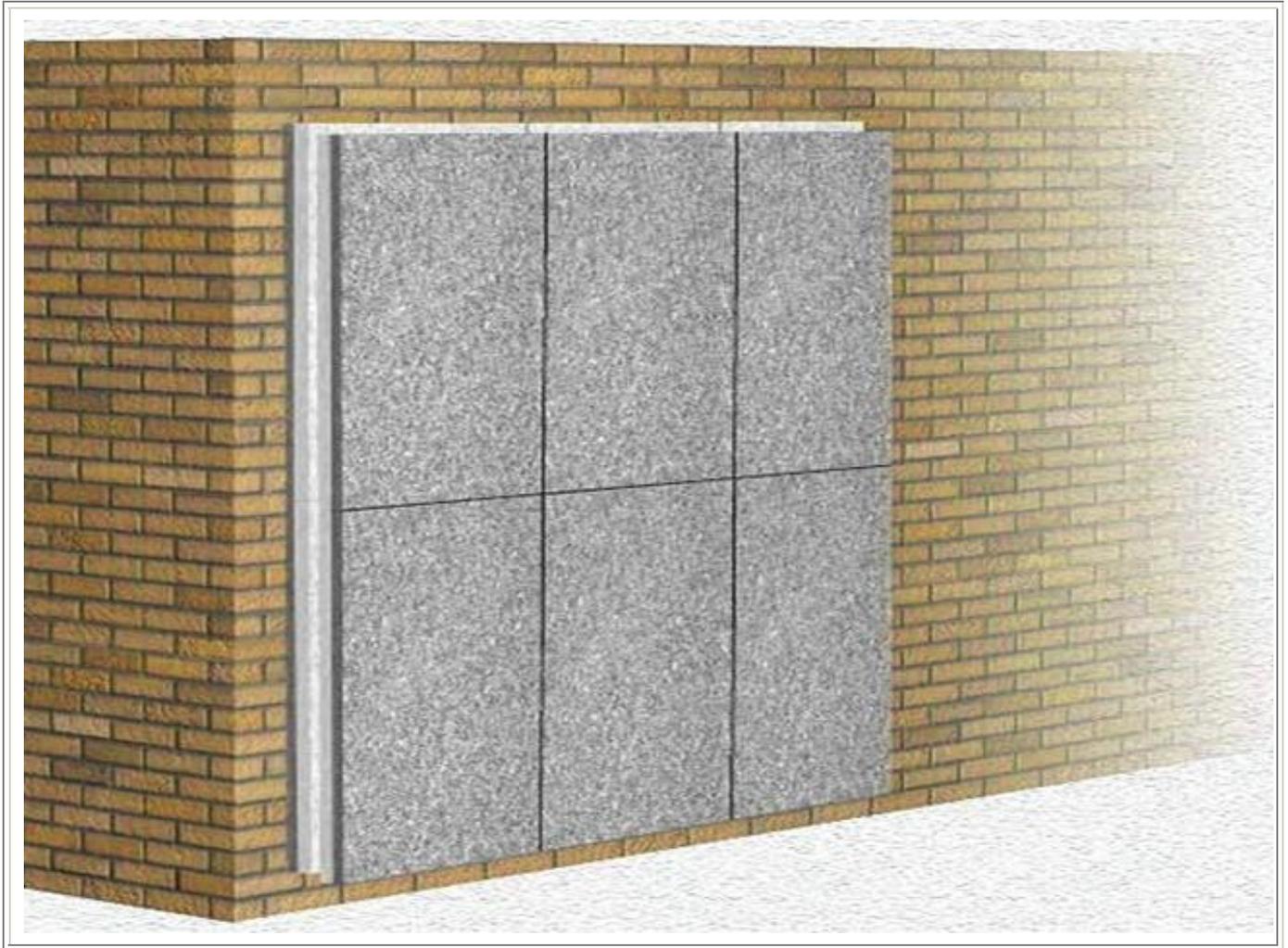
Also, the panels can be manufactured in other thicknesses too, upon request.

Then, the difference in thickness of **Simprolit panels** comes from a different thickness of the styrofoam inter-layer whose thickness in »SUP 3« is  $b=10$  mm, in »SUP 5« it is  $b=30$  mm, in »SUP 10« it is  $b=60$  mm, in »SUP 10« it is  $b=80$  mm, and in »SUP12, it is  $b=100$  mm, and the whole thickness of **Simprolit** (patent-protected polystyrene-concrete) is 10 mm on each side.

**Simplolit panels** have proved successful as suspended thermo-insulation ceilings, which may be plastered with a coat of about 3-5 mm, or may simply be skimmed and painted.

Also, **Simplolit panels** are used in formworks as therm-insulation of concrete beams and columns which can be plastered immediately, with no additional armatures or plaster laths.

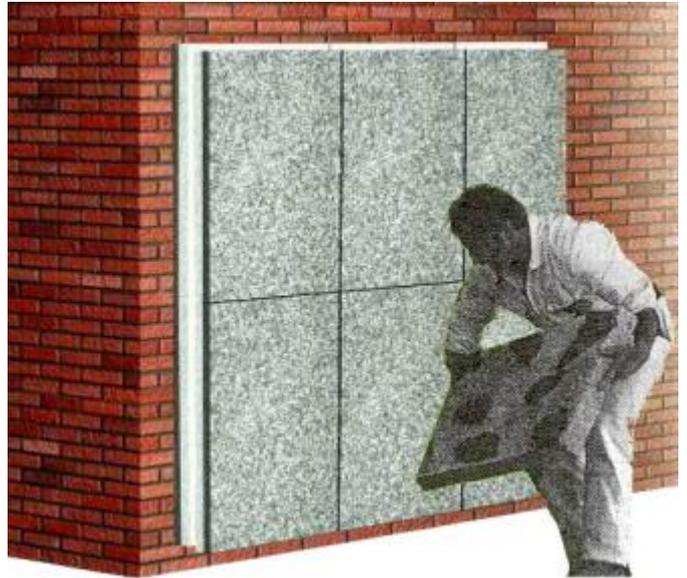
Unlike the existing facade insulation systems, where mineral wool or styrofoam panels are used (with subsequent application of special plaster over a special net, and finishing work at the end), the **Simplolit panels** produced by »SIMPRO« may be plaster coated with a simple cement plaster thick 3-5 mm, or only skimmed with a thicker layer, and can be ready for finishing as soon as they are fixed on the facade, and some of the finishing operations (grunt, skimming) can be partially carried out even before the panels are fixed.



**Simplolit panels** can be fixed in any weather, as their production raw material contains a special additive which makes them resistant to capillary spreading of water, and which also considerably increases the life and exploitation characteristics not only of the facade, but of the structure as a whole.

**Simplolit panels** are fixed on facade in traditional ways – using glue and plastic plugs at fixing stage.

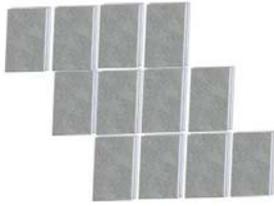
Also, the structure of **Simplolit panels** is such that it does not allow freezing at seams, and the particular advantage that they have is a possibility of panels being coated with a thin coat of plaster, without placing plaster lath on connections, as separation on seams is prevented by gluing the profiled edges using a simple glue for styrofoam or wood.



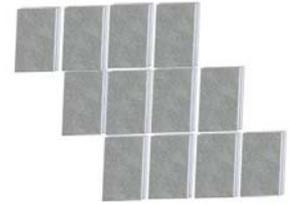
One of the definite advantages of facade thermo-insulation **Simplolit panels** is that the finishing work on them can be carried out with any of facade materials, from those for painting all through to structural coating.

The possibility to be particularly underlined is the one of direct glueing of granite facade panels, owing to the high degree of adhesion existing between the styrofoam layer and both of the **Simplolit** layers.

The application of the facade thermo-insulation **Simplolit panels** considerably reduces the costs of thermo insulation on reconstructed structures and facades of new buildings.



## ECONOMIC EFFECTS IN BUILDING WITH THE APPLICATION OF FACADE THERMO INSULATION SIMPROLIT PANELS



### SIMPROLIT PANELS FOR FACADE THERMO-INSULATION

#### COST REDUCTION WITH THERMO-INSULATION PANELS USED

Thermo-insulation of outer walls has become an imperative in the present day world, in an era of energy saving and environmental protection.

If we decide right away not to consider the building system of double outer walls with thermo filling in between as irrational and costly, particularly on the structures already made, two procedures are customary - to cover the facade with mineral wool or to cover it with styrofoam panels.

Both procedures are much more expensive and technologically more complex than using the **Simprolit panels** on the same facades, particularly if thermally stabilized and weather resistant materials are used, such as the »Rokwool« mineral wool or the »Styrodur« as stabilized and homogenized styrofoam.

For example the price of 1m<sup>2</sup> of facade with mineral wool panels applied as insulation – after the »SYNERGY« type procedure of facade insulation – is two times higher than the price of 1m<sup>2</sup> of facade with the **Simprolit panels** applied.

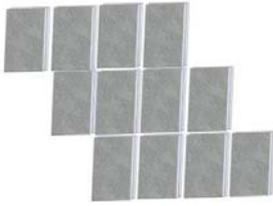
#### COST REDUCTION OF FINISHING WORK

Finishing work can be done directly on the surface of **Simprolit panels**, and any material usually used for finishing work can be applied, which is not possible if mineral wool or styrofoam are used as insulation, as a special reinforced mesh must be used after which the finishing work is done with the imported plaster and paint.

#### REDUCTION OF COSTS IN INSULATION OF ATTICS

For insulation of attics, loggias or ceilings below terraces and open spaces, mineral wool or styrofoam must be additionally protected, and that is usually done by means of wooden matchboarding or gypsum-cardboard panels, because of which the surface above must additionally and very carefully be insulated against water, particularly on installation routes, or in the event of their subsequent rework.

All this is much easier and much more economical with the **Simprolit panels**, which can simply be plastered and painted, with no limitations regarding the choice and treatment of the interiors.



## TECHNICAL ADVANTAGES IN BUILDING WITH THE APPLICATION OF FACADE THERMO INSULATION **SIMPROLIT PANELS**



### FIRE RESISTANCE OF »SIMPROLIT PANELS«

Simprolit panels do not burn, there is no smouldering and no flame. Laboratory tests at the Test Center »Opitnoe« of 26 CNII MO RF (within the Ministry of Defense of the Russian Federation), the **Simprolit panel** 11,0 cm thick samples, during a 90-minute test determined that on the samples tested the ultimate states are not registered for loss of wholeness, i.e. the monolith nature (E), and also for the loss of their thermo-insulating ability (I) according to GOST 30247.1.

### STABILITY OF »SIMPROLIT PANELS«

It is generally known that styrofoam, if not protected against air on both surfaces, would in time evaporate. Besides, the unstabilized styrofoam, particularly in higher temperatures, releases the »styrene« gas which is harmful for human health.

The situation is similar with mineral wool – except for the specially stabilized hard pressed mineral wools of »Rokwool« type (whose price is between 125 and 175 USD/ m3), which in time oxidizes, turns into powder and falls to the ground as fine dust, leaving unprotected air pockets behind.

Special problem arises with unstabilized mineral wool (only that kind is manufactured in our market) which is usually thrown over the wooden matchboarding in the attic – in time, after the process of oxidation, it turns into a fine needle-like dust dangerous for respiratory organs, particularly in children.

All these problems are easily solved with the **Simprolit panels** in which the styrofoam is completely arrested between the two layers of **Simprolit**, polystyrene-concrete with exceptional quality of physical, chemical and biological characteristics.

### LIGHT WEIGHTINESS OF PARTITION WALLS AND SUSPENDED CEILINGS

Partition walls made of **Simprolit panels** are much lighter in weight than gypsum partition walls made of full gypsum panels, and they conform to all requirements regarding the sound and thermo-insulation.

Also, they have many advantages compared with the pre-fabricated partition walls made of two layers of gypsum-cardboard with the mineral wool filling in between.

In addition to the environmental advantage, the most obvious advantage of the **Simprolit panels** is that they can be directly plastered and treated with all, most different finishing materials.

### CONCLUSION :

Based on the advantages enumerated above, it is obvious that by using the **Simprolit panels** the Investor would not only save MORE than 30% in funds, but would get a good quality building, in all parameters.

**THE FULL CORRELATION OF SIMPRO PRODUCTS WITH THE »PRICE-QUALITY« CRITERION MAKES THEIR APPLICATION IN HOUSING PROJECTS VERY PROMISING.**

СИМПРО  
 ПРЕДПРИЯТИЕ ПО ИНЖИНИРИНГУ,  
 КОНСАЛТИНГУ И ОБОРОТУ  
 ПРЕДСТАВИТЕЛЬСТВО В МОСКВЕ  
 ДМИТРИЯ УЛЬЯНОВА 16 / 2 / 316

Санкт-Петербург, 20.11.2001.г.

.....

По Вашему указанию высылаемо Вам пересчитанные и исправленные сметные расчеты для теплоизоляции строительных объектов.

Все сметные расчеты высылаемо одним файлом.

Представлены сметы теплоизоляции, применяемой с материалами типа URSA, которая взята за основу для расчета и по другим сравниваемым материалам.

Данная технология рассчитывалась в сметной строительной программе АРОС, применяемой в строительстве.

Цена материалов взята из журнала Строй бизнес Маркет по Санкт-Петербургу и Северо-западному региону.

Расчеты производились для 100 квадратных метров стены.

Цена теплоизоляции 1 кв. м.

СИМПРОЛИТ	800,84	руб./м <sup>2</sup>	100 %
URSA	1311,60	руб./м <sup>2</sup>	164 %
PAROC	1372,76	руб./м <sup>2</sup>	171 %
ROCKWOOL	1588,48	руб./м <sup>2</sup>	198 %

С уважением,

Скачков В.О.  
 Смирнов В.В.

## SIMPRO

ENGINEERING, CONSULTING AND TRADE  
 MOSCOW OFFICE  
 DMITRIJA ULJANOVA 16/2/316

Saint Petersburg, October 20, 2001.

Upon your request we are sending you the calculated and corrected bills of quantities and priced bills of quantities for thermo-insulation of construction work.

All bills of quantities and priced bills of quantities are in one file.

Bills of quantities and priced bills of quantities shown relate to the thermo- insulation applied on the URSA type materials, and taken as the basis for calculations also for other comparable materials.

The calculations were made in the AROS construction program, applied in the construction industry.

The price of material was taken from the magazine STROJ BIZNIS MARKET (Construction Business Market for Saint Petersburg and the North-West Region).

In this regard, as work time and efforts put in the existing methods of thermo-insulation considerably exceed the time needed for fitment of Simprolit panels (from the point of view of technology) we take the workers' pay as equal to the URSA calculation technology for all calculated bills of quantity, while the workers' pay for fitment of Simprolit panels is reduced, as time spent on fitment of these panels is reduced.

The calculations were made for walls of 100 square meters in size.

The price of thermo-insulation for 1 m<sup>2</sup>

<b>SIMPROLIT</b>	<b>800,84 rub/m<sup>2</sup></b>	<b>100%</b>
<b>URSA</b>	<b>1311,60 rub/m<sup>2</sup></b>	<b>164%</b>
<b>PAROC</b>	<b>1372,76 rub/m<sup>2</sup></b>	<b>171%</b>
<b>ROCKWOOL</b>	<b>1588,48 rub/m<sup>2</sup></b>	<b>198%</b>

Sincerely yours,

Skačkov V.O.  
 Smirnov V.V.

<p align="center"><b>СИСТЕМА СЕРТИФИКАЦИИ В ОБЛАСТИ ПОЖАРНОЙ БЕЗОПАСНОСТИ</b></p> <p align="center"><b>ИСПЫТАТЕЛЬНЫЙ ЦЕНТР «ОПИТНОЕ»</b> 26 ЦНИИ Минобороны России аттестат аккредитации № ССПБ.РУ.ИП.029 зарегистрирован в Госреестре 24.06.1998 г.</p> <p>105179, г. Москва Е-179      ☎ (095) 524-06-40, 524-06-32, 743-17-40, 743-17-41</p>		<p><b>ВИДЫ И ПЕРЕЧЕНЬ ВОЗДЕЙСТВИЙ</b></p> <p><b>РЕЗУЛЬТАТЫ ИСПЫТАНИЙ</b></p> <p><b>ЗАКЛЮЧЕНИЕ</b></p>	<p>В соответствии с ГОСТ 30247.1 и ГОСТ 30247.0</p> <p>Приведены в положительной форме к данному протоколу испытаний</p> <p>За время испытаний, в течение 90 мин., предельные состояния по потере целостности (П) и потере теплоизолирующей способности (И) по ГОСТ 30247.1 образца панели трехслойной на основе галстеклобетона и листового пенополикарбоната не наступили.</p>
<p>Результаты распространяются только на испытанный образец. Протокол испытаний не может являться основанием для выдачи сертификата пожарной безопасности. Частичное воспроизведение и перепечатка протокола допускается только с письменного разрешения ИЦ «Опитное».</p> <p align="center">  </p> <p align="center"><b>«УТВЕРЖДАЮ»</b> Заместитель руководителя ИЦ «ОПИТНОЕ» кандидат технических наук <i>А. Дайлов</i> « 26 » июня 2000 г.</p>		<p>Начальник лаборатории кандидат технических наук старший научный сотрудник</p> <p>Инженер-испытатель кандидат технических наук</p> <p align="right">                     В. Дайлов                  С. Горюнов             </p>	
<p align="center"><b>ПРОТОКОЛ ИСПЫТАНИЯ</b></p> <p align="center">№ 426 ИЦ-00 (на 2 листах)</p>			
ЗАЯВИТЕЛЬ	ТОО «СНМПРО», г. Москва, ул. Дмитрия Ульянова, д. 16, корп.2, офис 303		
ИЗГОТОВИТЕЛЬ	ТОО «СНМПРО», г. Москва, ул. Дмитрия Ульянова, д. 16, корп.2, офис 303		
ОБРАЗЕЦ	Фрагмент трехслойной панели на основе галстеклобетона и листового пенополикарбоната		
ДАТА ПОЛУЧЕНИЯ	16.06.2000 г.		
ДАТА ПРОВЕДЕНИЯ ИСПЫТАНИЯ	21.06.2000 г.		
МЕТОДИКА ИСПЫТАНИЯ	Согласно ГОСТ 30247.1 "Конструкции строительные. Методы испытаний на огнестойкость. Насуши: и ограждающие конструкции".		
ИСПЫТАТЕЛЬНОЕ ОБОРУДОВАНИЕ	Следы № 5.2. Испытание на огнестойкость.		
ПРОЦЕДУРА ОТБОРА ОБРАЗЦОВ	Отбор образцов не осуществлялся.		

**FIRE SAFETY CERTIFICATION SYSTEM**

**»ОПИТНОЕ« TEST CENTER**  
**CNII Ministry of Defense of Russia**  
**Accreditation Attest No. SSPB.RU.IP.029**  
**Registered at Gosregister on June 24, 1998.**

**105179, Moscow E-179**

**tel. (095) 524-06-40, 524-06-32,  
743-17-40, 743-17-41**

The results concern only the sample tested. Test Protocol cannot serve as basis for issuance of Fire Safety Certificate. Partial reproduction and reprinting of Protocol is allowed only with an approval in Writing, given by the IC »Opitnoe«.

**CONFIRMED BY**  
**Test Center »Opitnoe«**  
**Deputy Head**  
**A. Dajlov, MSc.**  
**June 26, 2000**

# TEST PROTOCOL

## No. 626/IC-00

(on two pages)

APPLICANT	»SIMPRO« LTD., Moscow, ul. Dmitrija Uljanova 16/2/303
MANUFACTURER	»SIMPRO« LTD., Moscow, ul. Dmitrija Uljanova 16/2/303
SAMPLE	Fragments of a three-layered panel based on polystyrene-concrete and leaf foam-polystyrene
DATE OF RECEIPT	June 16, 2000.
DATE OF TESTS	June 21, 2000.
TEST METHODOLOGY	In conformity with GOST 30247.1 »Building structures – test methods for fire resistance of supporting and facade structures«
TEST EQUIPMENT	Test bench No. 5.2. Fire resistance tests
SAMPLE SELECTION PROCEDURE	Selection of samples was not made
TYPES AND LIST OF ACTION	In conformity with GOST 30247.1. and GOST 30247.0-
TEST RESULTS	Shown in technical description attached to this Test Protocol.
CONCLUSION	During the 90-minute tests performed on the sample of a three-layered panel based on polystyrene concrete and leaf foam-polystyrene, no border conditions of loss of wholeness- the monolith quality (E) and loss of thermo-insulating ability (I) according to GOST 302427.1 have been registered.

Head of the Laboratory  
V. Judin, MSc  
Senior Scientific Associate

Test Engineer  
S. Gorkunenko, MSc.

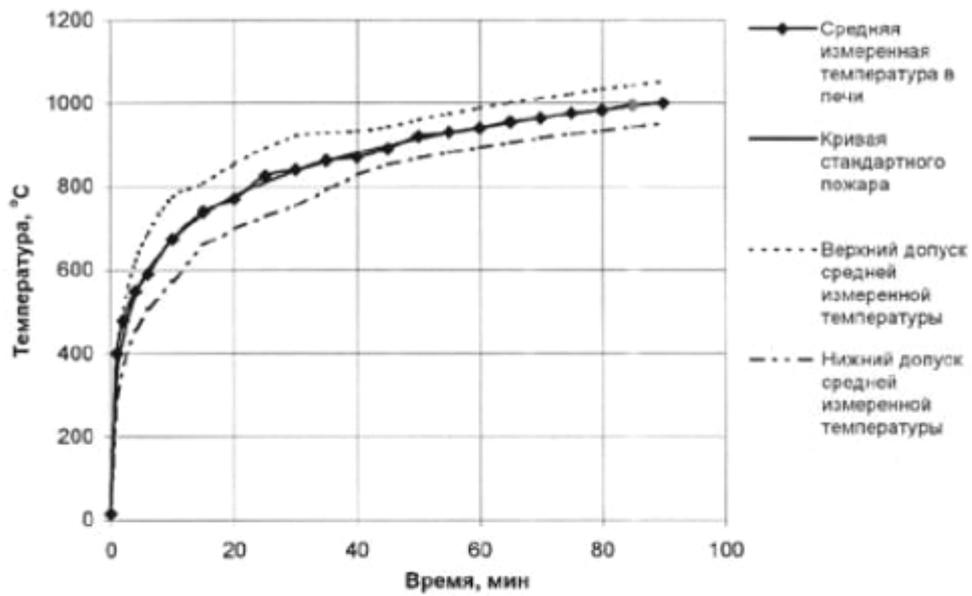


Рис. 3. Температура в печи

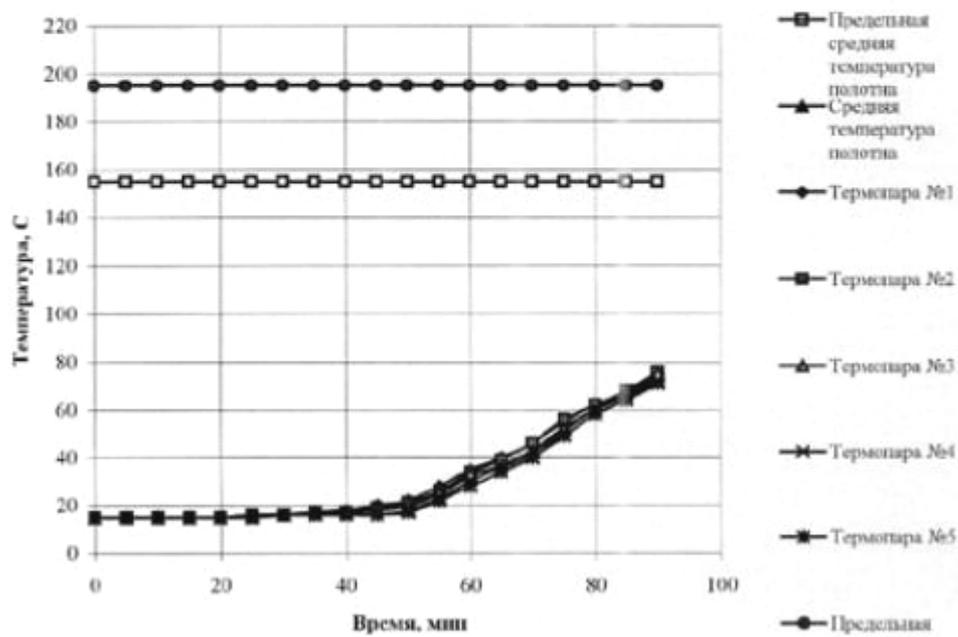


Рис.4. Изменение температуры на необогреваемой стороне образца

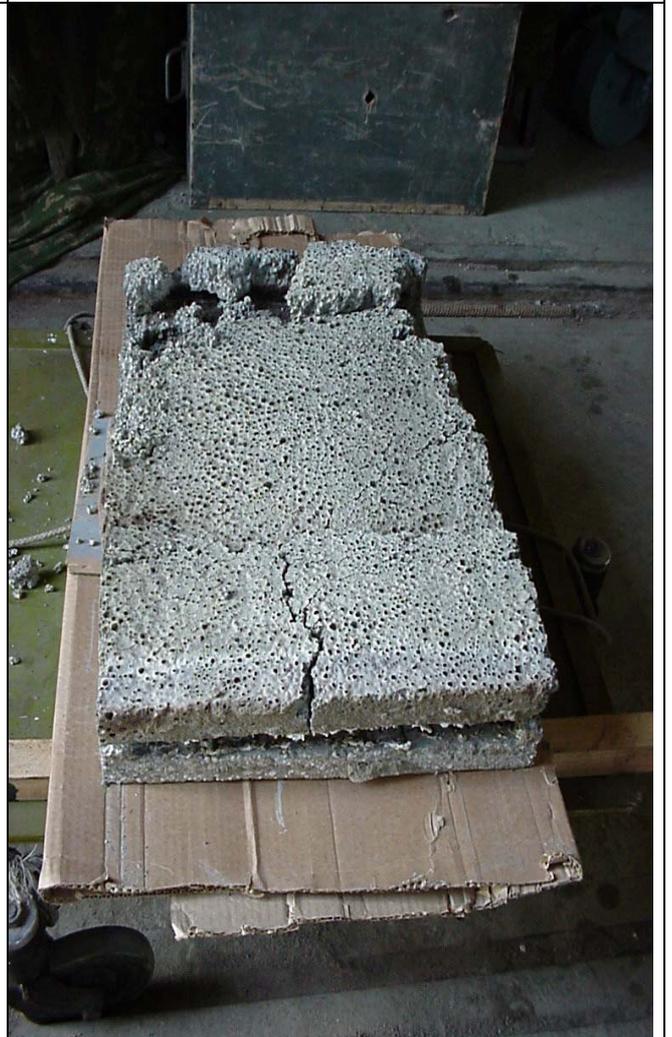
GRAPH 3. TEMPERATURE IN FURNACE

GRAPH 4. CHANGE OF TEMPERATURE ON UNHEATED SIDE OF THE 11,0 CM THICK PANEL SAMPLE.

**СИСТЕМА СЕРТИФИКАЦИИ  
В ОБЛАСТИ ПОЖАРНОЙ БЕЗОПАСНОСТИ**



**ИСПЫТАТЕЛЬНЫЙ ЦЕНТР «ОПИТНОЕ»  
26 ЦНИИ Минобороны России  
аттестат аккредитации № ССПБ.РУ.ИП.029  
зарегистрирован в Госреестре 24.06.1998 г.**



**SIMPROLIT PANEL FIRE RESISTANCE TESTS  
»ОПИТНОЕ« TEST CENTER  
26 CNII Ministry of Defence, Russia**

**IMK** INSTITUT ZA MATERIJALE  
I KONSTRUKCIJE

MATERIALS AND STRUCTURES  
INSTITUTE

Telephone

Telefax

UNIVERSITY OF BELGRADE  
FACULTY OF CIVIL ENGINEERING

Bulevar Kralja Aleksandra  
P.O. Box 825, 11001 Belgrade  
Telephone  
Telefax  
Giro Account No.

ORDERING PARTY:

**SIMPRO**  
Engineering, Consulting  
and Trade Co. Ltd.  
Vojvode Stepe 251, Belgrade

*UNIVERSITY OF BELGRADE  
FACULTY OF CIVIL ENGINEERING  
No. 13094  
Oct. 5, 2001.  
B e l g r a d e  
Bulevar Revolucije 73*

### **SIMPOROLIT INSULATION PANELS QUALITY TESTS REPORT**



**INSTITUTE DIRECTOR**  
Prof. Dušan Najdanović, D.Sc C.Eng.  
**FACULTY OF CIVIL ENGINEERING**  
**D E A N**  
Prof. Branislav Ćorić, D.Sc.C.Eng.

# REPORT

## SIMPROLIT INSULATION PANELS - TESTS OF QUALITY

### 1. GENERAL DATA

- a. Ordering party: SIMPRO, Engineering, Consulting and Trade Co.Ltd. Belgrade, Vojvode Stepe 251
- b. Tests carried out by: the Materials and Structures Institute, of the University of Belgrade Faculty of Civil Engineering.
- c. Subject of tests: Tests of SIMPROLIT insulation panels, for production purposes
- d. Type of Product: a three-layered insulation panels consisting of styrofoam layer of different thicknesses and two layers of EPS concrete made on the basis of cement, water styrofoam granules and corresponding additives.
- e. Sampling made by: Ordering party - SIMPRO, having sent for tests two types of three-layered insulation panels, different only in thickness of the middle styrofoam layer. Styrofoam layer of one type was 2 cm and of the other 4 cm thick.

### 2. TESTS PERFORMED

For the purposes of determination of the quality of the subject insulation panels, the following laboratory tests were performed:

- Check of the measurements and sizes of elements,
- Determination of the surface mass,
- Determination of volumetric masses of individual layers (of styrofoam and EPS concrete)
- Testing of adhesion – connection between the styrofoam and the EPS concrete-

### 3. TEST RESULTS

#### 3.1 CHECK OF MEASUREMENTS AND SIZES OF ELEMENTS

Check of measurements and sizes of elements were carried out on 3 samples of each of tested panel type, submitted by the test orderer. After the measurements taken, average values were calculated of all relevant sizes:

- **Panels A** : size 100x50x6,3 cm with middle styrofoam layer 40 mm thick.
- **Panels B** : size 100x50x4,4 cm with middle styrofoam layer 20 mm thick.

In view of the above values, it is determined that layers of EPS concrete framing the styrofoam are 11.12 mm thick.

### 3.2 SURFACE MASSES

On measuring of mass of the samples provided for tests, the following median values of surface masses:

- **Panels A** : size 100x50x6,3 cm (with styrofoam layer 40 mm thick) – 11,6 kg/m<sup>2</sup>
- **Panels B** : size 100x50x4,4 cm (with styrofoam layer 20 mm thick) – 12,1 kg/ m<sup>2</sup>

### 3.3 VOLUMETRIC MASSES OF INDIVIDUAL LAYERS

- **Panels A** : layers of EPS concrete 385,0 kg/ m<sup>2</sup>  
styrofoam 13,9 kg/ m<sup>2</sup>
- **Panels B** : layers of EPS concrete 496,0 kg/ m<sup>2</sup>  
styrofoam 12,4 kg/ m<sup>2</sup>

Taking the above test results into account, dependence is determined of surface mass of subject insulation panels in the function of the styrofoam layer applied, given an average thickness of EPS concrete thickness of 11,5 mm, as shown on the graph below (Fig.1).

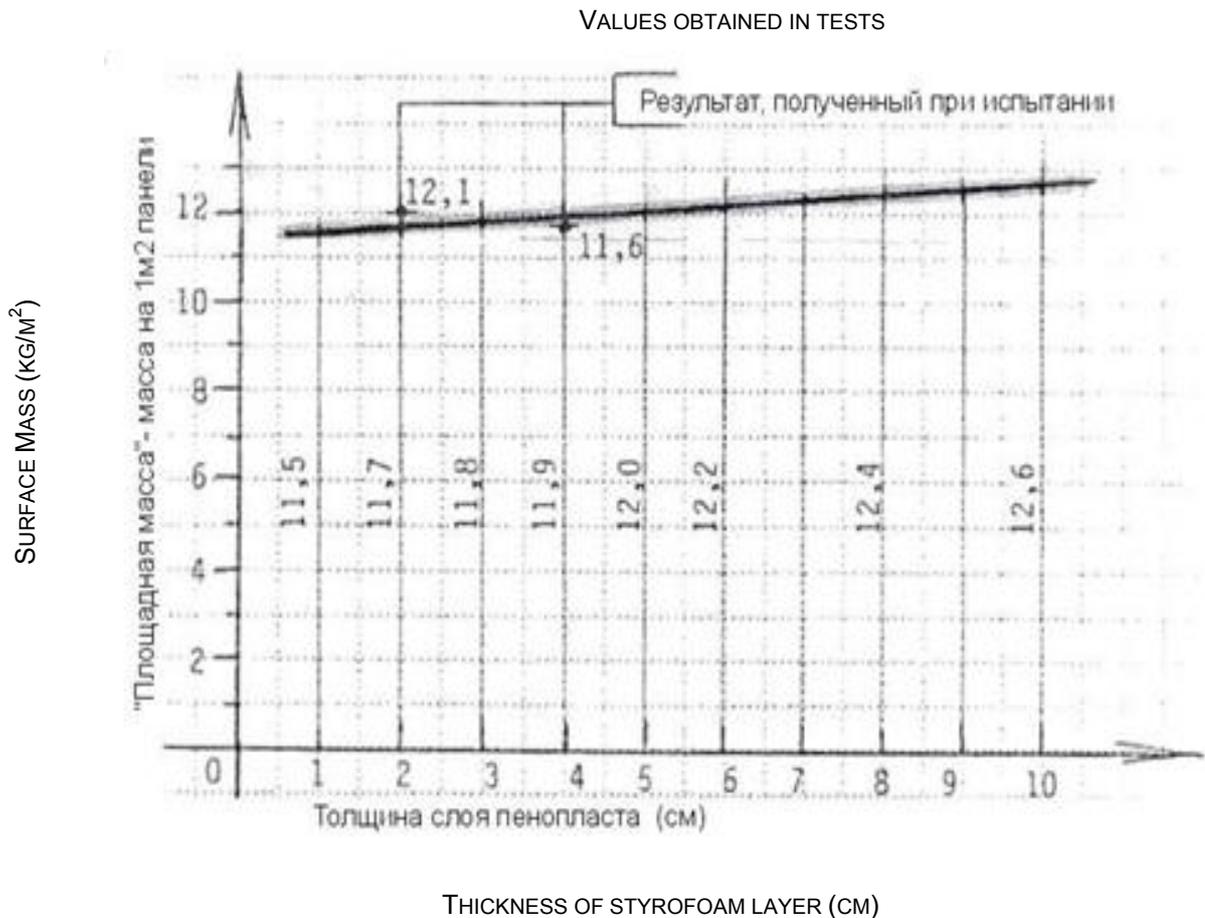


Fig. 1. Dependence of panel surface mass on styrofoam thickness

### 3.4. ADHESION – CONNECTION BETWEEN STYROFOAM AND EPS CONCRETE

Adhesion – connection between styrofoam and EPS concrete was tested on samples – cylinders of 100mm in diameter, cut out of three-layered panels.

These samples were then treated in the manner shown on the drawing below (Fig. 2), which means that on both sides of a sample the steel elements, necessary for applying the tensile forces, were glued by epoxide.

After the glue has hardened (minimum of 48 hours) the axial force was applied on the samples to the breaking point.

During the tests the breakage force was registered, and also the appearance of sample after the breakage, i.e. the nature of rupture was defined.

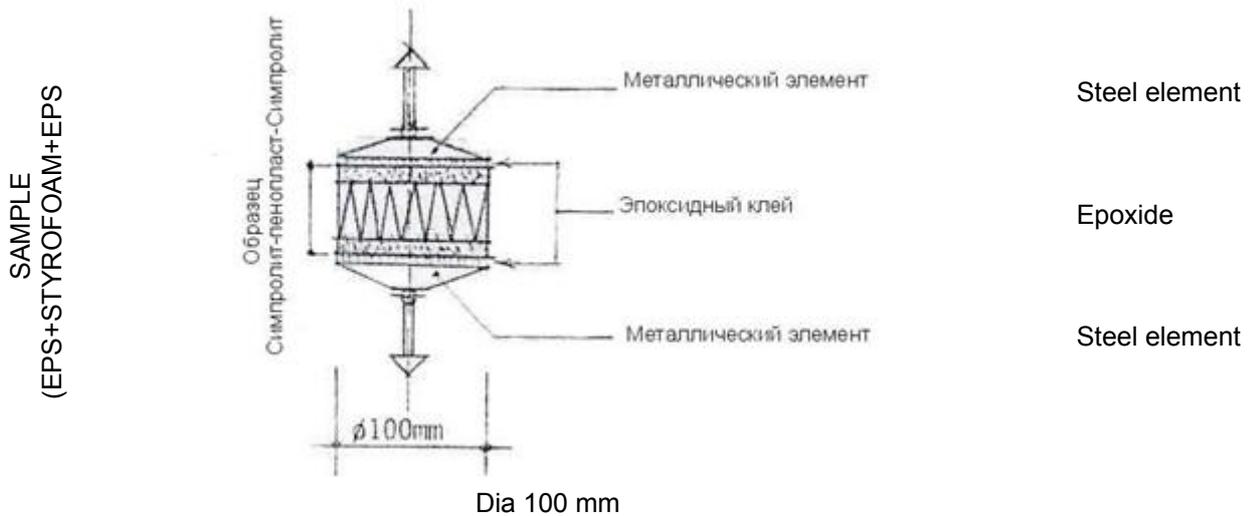


Fig. 2. Disposition of samples in adhesion tests

Results of the subject tests are given in the table below:

PANEL	Sample No.	Adhesion - MPa	Nature of rupture
A	1	0,067	50% on styrofoam, 50% on contacts
	2	0,082	60% on styrofoam, 40% on contacts
	3	0,074	100% on styrofoam
B	1	0,076	50% on styrofoam, 50% on contacts
	2	0,085	60% on styrofoam, 40% on contacts
	3	0.066	50% on styrofoam, 50% on contacts

It is pointed out that rupture on sample always took place partially on styrofoam, and partially on contacts between styrofoam and EPS concrete. In addition to the table above, this is shown also on the attached photograph.

On the basis of the above results, in case of panel A the average adhesion value is 0,074 Mpa, and in case of panel B 0,078 Mpa, and so the average value of adhesion between styrofoam and EPS concrete is 0,076 Mpa.

#### 4. HEAT CONDUCTIVITY OF SIMPROLIT INSULATION PANELS

On the basis of the test results shown above, the procedure of calculation was applied to define the coefficient of heat conductivity  $\lambda$  as **the EPS – styrofoam - EPS** system.

In this analysis the following values of heat conductivity coefficient were applied:

Styrofoam:  $\lambda = 0,04 \text{ W/m}^\circ\text{C}$

EPS concrete :  $\lambda = 0,08 \text{ W/m}^\circ\text{C}$  (this value has been adopted on the basis of volumetric mass obtained in tests).

In calculation analysis carried out, the thicknesses of styrofoam layers varied, while the layers of EPS concrete framing the styrofoam were taken with the thickness of 11,5 mm. The graph below shows the results of the subject calculating analysis (Fig. 3).

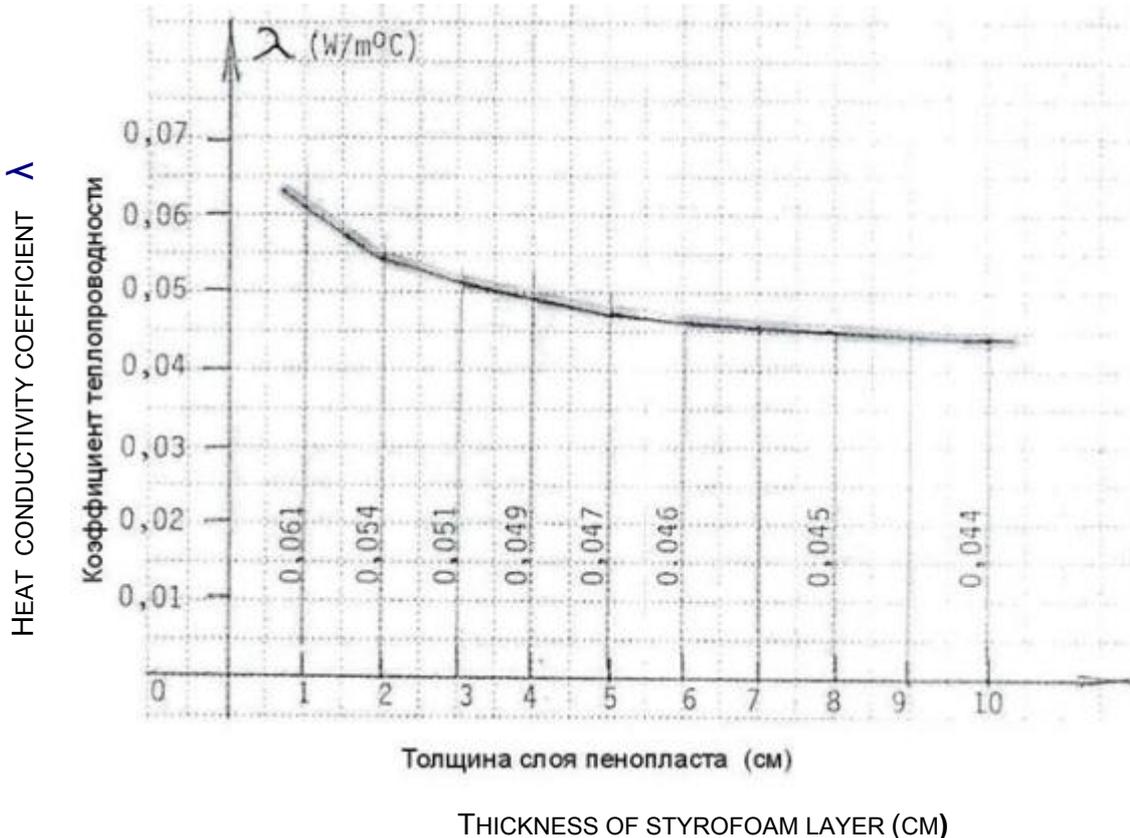


Fig. 3. Dependence of  $\lambda$  on styrofoam thickness in **the EPS-styrofoam-EPS** system.

#### 5. CONCLUSION

In view of the test results presented above, it can be concluded that the **Simprolit insulation panels fully satisfy the requirements of the insulation material.**

The effects of insulation are significantly dependent on the thickness of the styrofoam layer used, as shown in Fig. 3, which can be used in thermo-technical calculations for different styrofoam thicknesses, i.e. also for the styrofoam thicknesses for which tests were not performed (3, 5, 8 cm).

The tested Simprolit insulation panels **fully satisfy the adhesion requirement** – connection between the styrofoam and the layers of EPS concrete. This adhesion is in the greatest percentage in line with the styrofoam tensile strength value, which speaks about sufficiently good connection of layers. This provides not only a sufficiently good mechanical integrity of the **the EPS–styrofoam-EPS** system, but of a high level of panel durability in the usual conditions of exploitation.

Report made by:  
Prof. Mihailo Muravljov, DSc C.Eng.  
Docent Dragica Jevtić, DSc C.Eng.



EXTERIOR APPEARANCE OF SAMPLE  
AFTER ADHESION TESTS  
**SIMPROLIT – STYROFOAM – SIMPROLIT**  
-THREE-LAYERED **SIMPROLIT** INSULATION PANEL



Sastavili:

Prof. dr Mihailo Muravljov, dipl.grad.inž.

Doc. dr Dragica Jevtić, dipl.inž.tehn.

РОССИЙСКАЯ ФЕДЕРАЦИЯ



# СВИДЕТЕЛЬСТВО

НА ПОЛЕЗНУЮ МОДЕЛЬ

№ 16005

Российским агентством по патентам и товарным знакам на основании Патентного закона Российской Федерации, введенного в действие 14 октября 1992 года, выдано настоящее свидетельство на полезную модель

## СТЕНОВАЯ ПАНЕЛЬ

Обладатель(ли):

*Товарищество с ограниченной ответственностью "СИМПРО"*

по заявке № 2000115848, дата поступления: 23.06.2000

Приоритет от 23.06.2000

Автор(ы):

*Виноходов Олег Александрович, Милаш Девид*

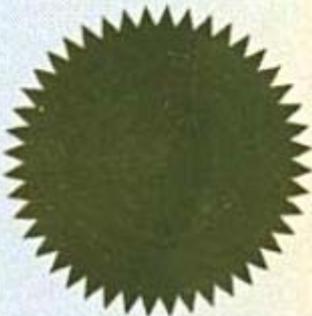
Свидетельство действует на всей территории Российской Федерации в течение 5 лет с **23 июня 2000 г.** при условии своевременной уплаты пошлины за поддержание свидетельства в силе

Зарегистрирован в Государственном реестре полезных моделей Российской Федерации

г. Москва, 27 ноября 2000 г.

*Генеральный директор*

*А.Д. Корчагин*



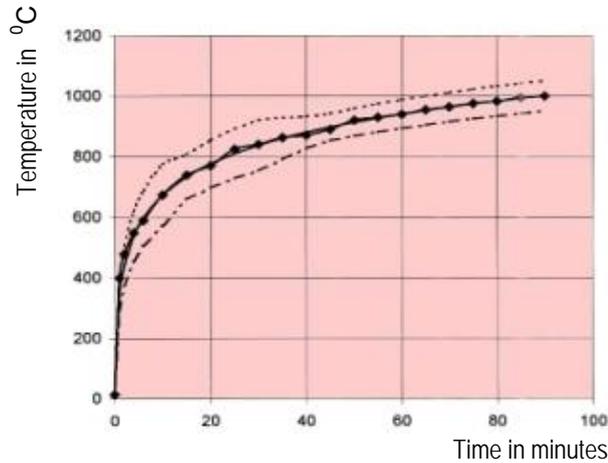
**PATENT FOR THE MODEL OF A THREE-LAYERED SIMPROLIT PANEL**



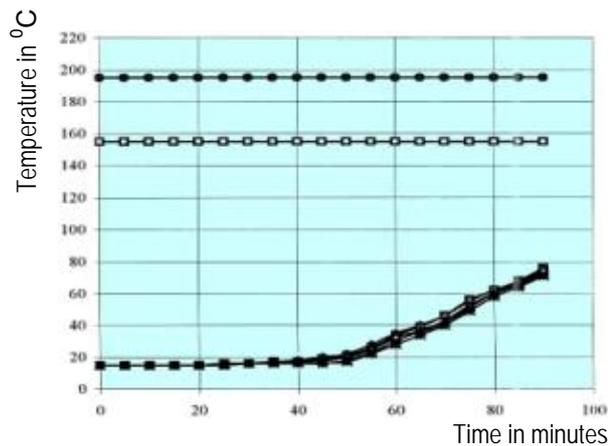
**СИМПРО РУ**



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адрес: Свердловская 26, ССЗБ.85-301419  
зарегистрирован в Госреестре 24.06.1998 г.



Graph 1: Temperature in furnace



Graph 2: Change of temperature on the exterior side of panel sample 11,0 cm thick (d=11,0 cm)

SIMPROLIT PANEL  
SUP 3  
SUP 5  
SUP 10  
SUP 12



SIMPROLIT



SIMPROLIT

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**SIMPROLIT** – structure elements proven successful in industrial, cultural, sport, agricultural, housing and other structures.

**SIMPROLIT** – a composition of styrofoam granules, which after the process of foaming and adding the corresponding quantity of Portland cement, water and special additives, turns into a plastic mass from which structure elements are formed in vibration moulds.

Str. 22

The »SIMPRO« company **SIMPROLIT** range of products include:

- **Simprolit – panels** for facade thermo-insulation
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- **Simprolit – panels** for partition walls

The production of all elements is in conformity with TU 5741-001-52775561-00-03 and in conformity with GOST R 51263-99.

The basic raw material is polystyrene concrete »Simprolit«, which has an original composition with the company's additions, and the elements are patent-protected.

The physical and mechanical properties are determined in conformity with GOST R 51263-99 (polystyrene concrete)

Volumetric weight	100-350 kg/m <sup>3</sup> (D150-D160)
Heat productivity coefficient	0,075-0,105 W (m <sup>2</sup> °C)
Vapour permeability	0,13-0,10mg/ (m h Pa)

SIMPROLIT – it is a light material

SIMPROLIT – it is ecologically clean material (summary toxicity indicator is 1,5 to 2 times lower than that determined by standard.

SIMPROLIT - it is a very good thermo-insulator (it does not depend on the moisture content it contains)

SIMPROLIT - it is a fire resistant material (it does not burn, there is no smoke, no flame)

SIMPROLIT – it is an excellent sound insulator

SIMPROLIT – does not absorb moisture (walls »breathe« normally)

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