

Fireproof systems "TIZOL" increase the fire resistance of the structures of many top objects, including the tallest building in Europe and Russia — "Lakhta Center", St. Petersburg

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Fireproof materials
Building insulation
Technical insulation
Marketing and advertising

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ISO 9001 : 2015
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Full range of services with the involvement of qualified professionals who have the appropriate permits:
— technical and commercial advice
— development of projects and STR
— performance of fireproof works
— architectural supervision in any region of the Russian Federation

 **TIZOL**[®]

**SYSTEMS
OF CONSTRUCTIVE
FIRE PROTECTION**

 **TIZOL**[®]

CONTENT



OBJECTS WITH THE USE OF FIRE-PROOF MATERIALS "TIZOL"

Olympic facilities in Sochi

- Olympic flame bowl (1)
- Olympic stadium "Fisht" (2)
- Sledge-Bobsleigh track "Sankey"
- Ski-biathlon complex "Laura"
- Grand Ice Palace (3)
- Ice Arena "Shayba"

Administrative and public buildings

- Skolkovo Innovation Center, Moscow (4)
- State residence "Palace of Congresses", St. Petersburg (5)
- Central Stadium "Yekaterinburg Arena", Yekaterinburg (6)
- Stadium "Arena CSKA", Moscow
- Stadium "Zenit-Arena", St. Petersburg (7)
- International Terminal of Koltsovo Airport, Yekaterinburg (8)
- International terminal of Kazan airport, Kazan (9)
- Tolmachevo Airport, Novosibirsk
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Industrial facilities

- Production buildings "AvtoVAZ", Togliatti
- Beloyarsk NPP, Zarechny
- Yaivinskaya SDPP, Yaiva Village, Perm Krai
- Kashirskaya SDPP, Moscow region
- Kurskaya NPP, Kursk
- Leningradskaya NPP, Sosnovy Bor, Leningrad Region
- North-West TPP, St. Petersburg
- Nizhnevartovsk SDPP, Nizhnevartovsk
- Sochi TPP, Sochi
- Mutnovskaya Geo PP, Kamchatka



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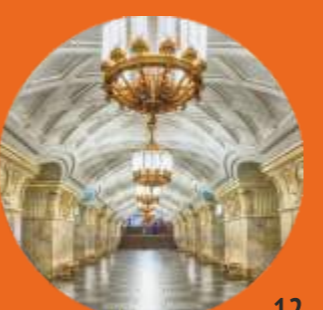
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JSC "TIZOL" is one of the recognized leaders among Russian manufacturers of non-combustible heat and sound insulation materials and systems of constructive fire protection based on basalt.

For 70 years, our company has accumulated a unique experience for the entire industry, has created a technical and scientific base for training and the work of highly qualified specialists. Continuous improvement of technology, modernization of production facilities, own source of raw materials, accredited laboratory guarantee the compliance of manufactured products with international quality standards.

The technologies and materials developed at the enterprise are patented and their characteristics are superior to those of the competitors. For example, our fire protection systems are the most effective in Russia and, today, are unique even for Europe. This is confirmed by numerous awards of international and domestic exhibitions.

Every year we produce 25 million square meters or 100 thousand tons of non-combustible heat-sound-proof and fire-proof materials. A developed retail chain stores of dealers ensures timely delivery of our products anywhere in the world. Specialists of the company respectfully treat each partner and create comfortable conditions for cooperation.

The TIZOL brand is a development, stability, decency and, the most important thing is quality.



BASIC TERMS AND PROPERTIES OF FIREPROOF INSULATION

THE FIRE RESISTANCE OF BUILDING STRUCTURES

The ability of the building structure to maintain the load-bearing and (or) enclosing functions in a fire.

FIRE RESISTANCE LIMITS OF THE STRUCTURE

The time interval from the beginning of the fire impact under the conditions of standard tests to the occurrence of one of the limit states normalized for this structure:

— **R** — loss of bearing capacity — for columns, beams, trusses, arches, frames, for bearing external and internal walls, partitions and fire barriers;

— **E** — loss of structural integrity as a result of the formation of through cracks and holes under the influence of fire through which the combustion products or flames penetrate non-heated surface — for external and internal walls, partitions and ceilings, as well as fire barriers and air ducts;

— **I** — loss of thermal insulation capacity under the influence of fire, that is, the temperature on the non-heated surface of the structure increases by more than 140°C, for internal walls, partitions and ceilings, fire barriers and air ducts.

FIREPROTECTION

Technical measures aimed at improving the fire resistance and (or) reducing the fire hazard of buildings, structures, building structures.

CONSTRUCTIVE FIRE PROTECTION

Method of fire protection of building structures, based on the creation of a heat-insulating layer on the heated surface of the structure by means of fire protection. Constructive fire protection includes thick-layer spraying compositions, fireproof coatings, plasters, cladding with plate, sheet and other fireproof materials.

MEANS OF FIRE PROTECTION

Fireproof composition or material with fireproof efficiency and specially designed for fire protection of various objects.

FIREPROOF EFFICIENCY

Comparative indicator of fire protection means, which is characterized by time in minutes from the beginning of fire testing until reaching the critical temperature (500°C) of a standard steel structure with a fire-retardant coating and is determined by the method described in GOST R53295-2009.

Fireproof efficiency groups	
Group	Minutes
1	≥150
2	120
3	90
4	60
5	45
6	30
7	15

CRITICAL TEMPERATURE

The temperature at which the steel structure loses its structural strength. Conventionally, the value of the critical temperature for steel structures is 500°C.

THE SPECIFIED METAL THICKNESS (SMT)

A conventional value defined as the ratio of the cross-sectional area of a metal structure to its heated perimeter. It serves as one of the criteria for determining the thickness of the fireproof coating.



UNIQUE FIRE PROTECTION DEVELOPMENTS "TIZOL"

Fire safety is one of the basic requirements for the design and construction of any building and structure. In case of fire, the temperature inside the building can reach 1200°C. At this temperature, wood and plastic structures burn, metal structures lose their strength, and structures from monolithic and precast concrete are destroyed. With the collapse of the supporting structures of the building fire damage reaches the maximum value.

One of the effective ways to reduce the damage from fire is fire protection of the building structures, which increases the fire resistance of the structures to regulated limits. The use of fire protection means allows:

- increase the time limit for evacuation of people and rescue of material assets in case of fire;
- reduce the risk of fire;
- exclude the possibility of fire spreading on structures;
- to expand the possibilities of applying various architectural and design solutions for buildings.

FIRE PROTECTION OBJECTS:

- building structures;
- air ducts;
- utility lines;
- electric cables;
- construction and textile materials.

The recent years practice has shown the advantages of constructive methods of fire protection. For example, cladding with fireproof materials better meets the increased fire safety requirements of buildings and provides a high fire resistance rating of building structures and utility networks.

TIZOL SYSTEMS

JSC "TIZOL" is one of the leading Russian enterprises for the production of fire protection systems of building structures. The fireproof systems are based on plate and rolled basalt fiber materials.

Systems for increasing fire resistance of metal structures: "ET METAL", "ET PROFIL", fireproof coating "GeoMix", the unique system "ET LSTK" is the first in Russia for the fire protection of steel thin-walled structures made of cold-formed galvanized profiles. The system "ET BETON" is designed to protect reinforced concrete structures. The system "ET VENT" is intended for fire protection of air ducts.

The high quality of the produced fiber provides small coefficient of heat conductivity that is important for fireproof efficiency of materials. The sintering temperature of the fiber is 1100°C, so basalt insulation prevents the spread of flame.

Due to the chaotic structure of the fiber arrangement, fireproof products made of basalt cloth retain their structure for a long time even under the influence of high temperatures.

The system of three-stage control: input control for raw materials and materials, operational and final control guarantee the quality of products.

The company "TIZOL" regularly cooperates with specialists of the Ural Institute of State Fire Service EMERCOM of Russia. Specialists of the Institute have developed instructions for determining the thickness of the fireproof coating for systems "ET METAL" and "ET PROFIL", which can be found on our web-site. All fireproof materials and TIZOL systems are certified on the basis of fire tests carried out in accredited laboratories, and awarded with medals and diplomas at national and international exhibitions.

Every year, TIZOL materials protect more than three million square meters of various types of structures at the facilities of the Russian Federation, near and far abroad. The retail chain stores of dealers of the plant includes more than 30 companies whose scope of activity covers vast territories from Kaliningrad to Vladivostok, from Salekhard to Sochi.

COUNTERFEIT

A lot of counterfeit products appeared on the market of fireproof materials, the declared characteristics of which do not correspond to real indicators. These products are sold at a bargain price. According to various estimates, the share of counterfeit fire protection products on the Russian market is about 80%.

Specialists of JSC "TIZOL" actively prevent the spread of counterfeit. Public tests are regularly carried out on the unique equipment of the enterprise laboratory, to determine the fireproof efficiency of materials and systems of questionable fireproof products. Representatives of the manufacturer, supervisory authorities and all interested persons are invited to the tests. The results show that many of the characteristics stated in the certificates differ significantly from the real ones.

Specialists of JSC "TIZOL" conduct on-site workshops on the installation of fireproof coatings, cover the topic of counterfeit fireproof products at conferences and seminars on fire protection subject.



Observers and interested parties after testing fireproof products

UNIQUE FIRE PROTECTION DEVELOPMENTS "TIZOL"

Since 2015, the universal test installation (furnace) has been successfully operating at the TIZOL company for conducting fire tests of fireproof products. Fire protection means for steel and enclosing structures, fire doors, gates are tested.



Universal furnace for fire tests of building structures

The fire chamber confidently enters the temperature regimes of standard and hydrocarbon fires. The automatic burner control system eliminates the human factor and supports fire regimes that comply with regulatory documents. Features of the furnace design allow testing the fire resistance of vertical load-bearing structures.

It is planned to use the furnace extensively to monitor the quality of fire prevention products which present in the market of Sverdlovsk region and the Ural region as a whole. But the main thing is that all own products of the TIZOL brand undergo regular inspections to maintain the best quality.



The testing process



Fireproof materials and TIZOL systems are awarded with numerous awards at national and international exhibitions

CONSTRUCTIVE FIRE PROTECTION SYSTEMS

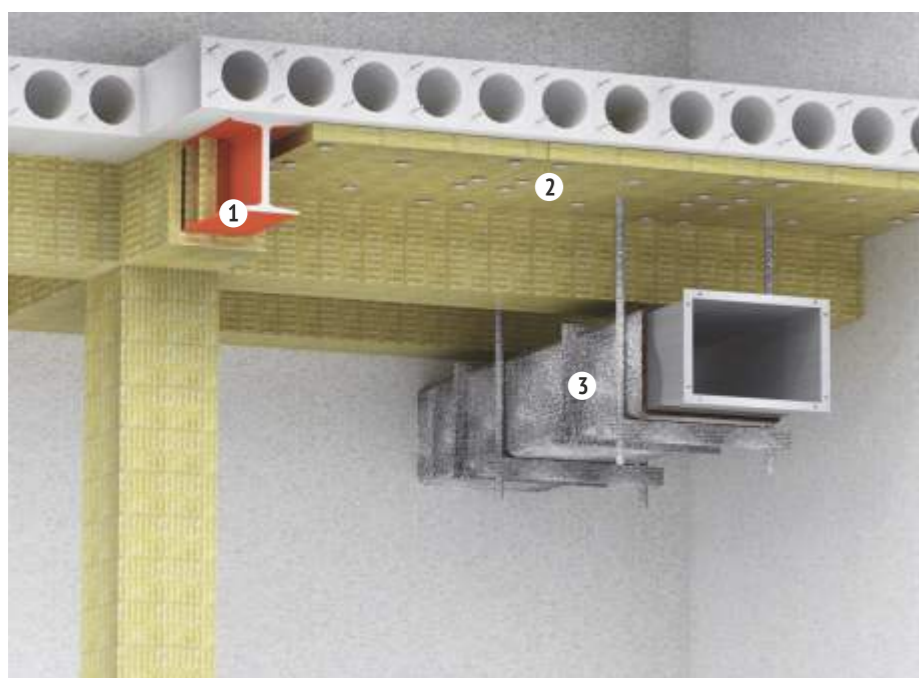
Fire safety is one of the most important aspects of design and operation of any facility. JSC "TIZOL", a leader in the development and production of fireproof materials, offers a wide range of fireproof systems to ensure the required limits of fire resistance of building structures and utilities systems.

In 2005, the first system of constructive fire protection "ET VENT" for air ducts was certified. To date, JSC TIZOL offers more than 20 systems of constructive fire protection for air ducts, metal and reinforced concrete structures to achieve fire resistance from 30 to 240 minutes in the market.

Every year, our materials protect more than three million square meters of various types structures at the sites in Russia, Kazakhstan, Kyrgyzstan, Ukraine, Azerbaijan, and China.

Most of the sports facilities of the Olympic Sochi are insulated with TIZOL fireproof materials. Our constructive fire protection systems are certified and meet the modern requirements of the Technical Regulations on Fire Safety Requirements No. 123-FZ dated July 22, 2008.

The declared fireproof efficiency of the systems of JSC "TIZOL" is not estimated, but actual. Behind figures of the certificate there are valid minutes and hours during which the structure constrains fire, saving, finally, human lives.



1. Protection of metal structures
2. Protection of reinforced concrete structures
3. Protection of air ducts



Protection of light steel thin-walled structures

MAIN COMPONENTS OF SYSTEMS



THE BASALT FIREPROOF ROLLED MATERIAL (MBOR)

TY 5769-003-48588528-00. Non-combustible, environmentally friendly basalt "batting" without coating or coated with foil, fiberglass cloth or fiber-glass mesh on one side. Thickness options: 5, 8, 10, 13, 16, 20, 23, 26 mm. It is used for fire protection of metal structures and air ducts.



HEAT-INSULATING FIRE-PROOF PLATE "EURO-LIT"

TY 5762-011-08621635-2009. The non-combustible plate with a density of 50-80, 100, 150 kg/m³ is unique in terms of fireproof efficiency. Fireproof efficiency of the plate is 1.5 times higher than that of similar products of domestic and international manufacturers. It is used for fire protection of metal and reinforced concrete structures.



FIREPROOF COMPOSITION "PLAZAS"

TY 5765-013-70794668-2006. It is used as an adhesive mixture in "TIZOL" systems, has excellent adhesion to basalt fiber materials and protected surfaces, and gives additional fire resistance to structures. It is able to retain its properties after repeated freezing and thawing, it is delivered ready-made, it does not expand when heated.



METAL ANCHOR FASTENING ELEMENT

It consists of a pin $\varnothing 8 \times 170$ mm (packing of 50 pieces) and a disk $\varnothing 10,5 \times 70$ mm (packing of 100/250 pieces). Length of pins can vary up to 180 mm. It is used to fix fireproof plates to reinforced concrete structures



ALUMINIUM ADHESIVE TAPE "LAMS"

TY 2245-074-04696843-2001. Roller 70x50000 mm. Consumption 1.5-2.5 m per 1 m² of the surface to be protected. It is intended for sealing the joints of foiled coatings.



DRY FIREPROOF MORTAR MIXTURE "GeoMix"

TY 5745-021-08621635-2016. It is designed to improve the fire resistance of metal structures.

DRY FIRE-PROTECTIVE PRIMING DISPERSABLE MIXTURE

GeoMix (PRIMER) TY 236410-023-08621635-2017.

PROTECTION OF METAL STRUCTURES

Introduction

As it is known, steel does not burn, but, like all materials used in construction, it cannot withstand the effects of high temperatures that occur inside the building during fire for a long time. The actual fire resistance limit of unprotected steel structures is on average 15 minutes. This is due to a fairly rapid decrease in the strength and stress-related characteristics of the metal at elevated temperatures during the fire.

The actual limit of fire resistance of steel structures depends on thickness of elements and size of the operating tension. The greater the thickness of steel and less stress, the higher the fire resistance limit.

To compare various metal structures, the concept of reduced metal thickness δ_{pr} is used, which is determined by the formula $STM = F/P (1)$, where F is the cross-sectional area, P is the heated part of the perimeter of the cross-section.



Fire protection of steel structures should be carried out by means that slow down the heating of the metal to a critical temperature, for a time corresponding to the required limit of fire resistance on the basis of R (bearing capacity). When determining the group of fireproof effectiveness of fire protection products, test results with indicators less than 15 minutes are not considered.

Fireproof efficiency of means of fire protection depending on approach of a limit state							
Groups	the 1 st	the 2 nd	the 3 rd	the 4 th	the 5 th	the 6 th	the 7 th
Not less (min)	150	120	90	60	45	30	15

The thickness of the fireproof coating is calculated depending on the required fire resistance limit, the critical temperature and the specified thickness of the metal (STM) of the protected structure.

STM data for the most common profiles of steel structures are presented in Tables No. 1-8

Table 1. I-Beam GOST 26020-83	
Profile number	STM (mm)
18B2	3,43
20B1	3,71
23B1	3,79
26B1	3,70
26B2	4,10
30B1	3,76
30B2	4,17
35B1	3,90
35B2	4,33
40B1	4,39
40B2	4,98
45B1	4,91
45B2	5,51
50B1	5,37
50B2	5,92
55B1	5,95
55B2	6,52
60B1	6,62
60B2	7,18
70B1	6,99
70B2	7,75
80B1	7,73
80B2	8,57
90B1	8,51
90B2	9,34
100B2	9,25
100B3	10,31
100B3	11,36

Table 2. H-beams GOST 57837-2017	
Profile number	STM (mm)
20SCH1	4,09
23SCH1	4,45
26SCH1	4,61
26SCH2	5,28
30SCH1	5,12
30SCH2	5,79
35SCH1	5,89
35SCH2	6,43
35SCH3	7,11
40SCH1	6,38
40SCH2	7,36
40SCH3	8,15
50SCH1	6,93
50SCH2	8,39
50SCH3	9,42
50SCH4	10,44
60SCH1	7,65
60SCH2	9,49
60SCH3	10,97
70SCH1	8,41
70SCH2	9,76
70SCH3	11,57

Own fire resistance limit of metal structures provided that the critical temperature is 500°C, depending on the specified metal thickness								
STM (mm)	3	5	10	15	20	30	40	60
Fire resistance limit (min)	7	9	15	18	21	27	34	43

Since the own (actual) fire resistance limit of steel building structures, as a rule, does not exceed 15 minutes, it is necessary to ensure their fire protection to achieve the required fire resistance limit.

Table 3. UC GOST 57837-2017	
Profile number	STM (mm)
20K1	4,57
20K2	5,15
23K1	4,83
23K2	5,49
26K1	5,52
26K2	6,17
26K3	6,99
30K1	6,20
30K2	7,02
30K3	7,91
35K1	6,88
35K2	7,86
35K3	9,00
40K1	7,56
40K2	9,03
40K3	10,98

Table 4. I-shaped beams GOST 8239-89	
Profile number	STM (mm)
18	3,45
18a	3,55
20	3,55
20a	3,65
22	3,68
22a	3,78
24	3,92
24a	4,04
27	4,08
27a	4,22
30	4,30
30a	4,47
33	4,65
36	5,01
40	5,38
45	5,78
50	6,26
55	6,81
60	7,36

Table 5. I-Beams of the additional series (D) GOST 57837-2017	
Profile number	STM (mm)
24DB1	3,93
27DB1	4,07
36DB1	4,99
35DB1	3,66
40DB1	3,84
45DB1	4,57
45DB2	5,26
30DSCH1	6,81
40DSCH1	8,19
50DSCH1	9,28

Table 6. Channels GOST 8240-97		
H (mm)	B (mm)	STM (mm)
160	68	3,49
180	70	3,42
180	74	3,57
200	76	3,50
200	80	3,68
220	82	3,66
220	87	3,84
240	90	3,82
240	95	4,01
270	95	4,01
300	100	4,24
330	105	4,51
360	110	4,82
400	115	5,11

Table 7. Equal angle bars GOST 8509-93		
H (mm)	t (mm)	STM (mm)
70	8	3,81
75	7	3,39
75	8	3,84
75	9	4,28
80	7	3,39
80	8	3,85
80	9	4,30
90	7	3,42
90	8	3,87
100	7	3,44
100	8	3,91
100	10	4,82
100	12	5,71
100	14	6,58
100	16	7,43
110	7	3,45
110	8	3,91
125	8	3,94
125	9	4,41
125	10	4,87
125	12	5,79
125	14	6,68
125	16	7,57
140	9	4,42
140	10	4,89
140	12	5,81
160	10	4,92
160	11	5,39
160	12	5,85
160	14	6,77

Table 8. Unequal angle bars GOST 8510-86			
H (mm)	B (mm)	t (mm)	STM (mm)
63	40	8	3,69
75	50	8	3,74
90	56	8	3,78
100	63	8	3,80
100	63	10	4,69
110	70	6,5	3,20
110	70	8	3,90
125	80	8	3,84
125	80	10	4,75
125	80	12	5,65
140	90	8	3,86
140	90	10	4,78
160	100	9	4,34
160	100	10	4,80
160	100	12	5,72
160	100	14	6,62
180	110	10	4,82
180	110	12	5,75
200	125	11	5,31
200	125	12	5,77
200	125	14	6,70
200	125	16	7,60
250	160	12	5,82
250	160	16	7,68
250	160	18	8,60
250	160	20	9,51

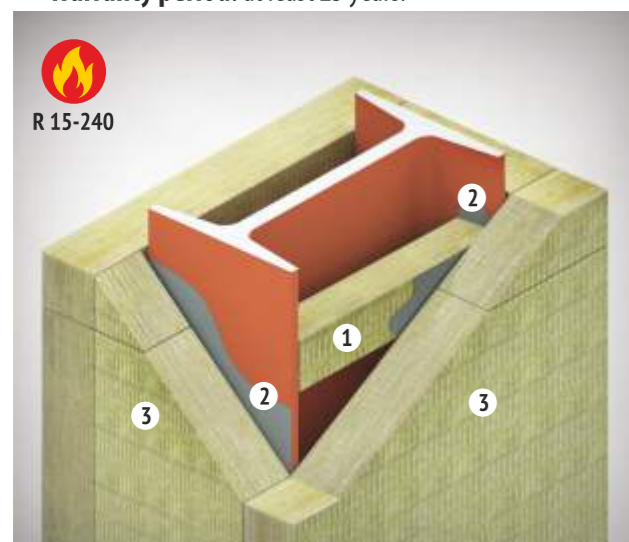
PROTECTION OF STEEL STRUCTURES (R 15-240) System "ET METAL"

Purpose: increasing the fire resistance limits of structures from 15 to 240 minutes.

Scope: in buildings and constructions of any type and appointment, including in medical and preschool institutions, catering establishments and food production.

Operating conditions: temperature from -60 to + 100°C, humidity up to 90%.

Warranty period: at least 25 years.



1. Insert from the plate "EURO-LIT"
2. Fireproof composition "PLAZAS"
3. Plate "EURO-LIT"

ADVANTAGES OF THE SYSTEM

- reliability and durability
- environmental cleanliness, radiation safety
- the adaptability of the installation, "clean" process
- availability of control during installation and operation
- maintainability
- the minimum thickness of the coating and the load on the structure
- additional heat and sound insulation, noise absorption
- moisture resistance, vibrostability
- aesthetic appearance, the possibility of subsequent plastering or cladding with non-combustible materials.

SYSTEM COMPONENTS

Fireproof composition "PLAZAS". It is made on the basis of silicate binders, mineral fillers and chemical additives. It is supplied ready-made (thick wet mass).

Packaging: tightly closed plastic packaging with a capacity of 15, 45 kg or other as further agreed with the customer.

Main technical specifications:

- gray-brown color
- volume density 1300÷1500 kg/m³
- relative viscosity 90÷115 mm (GOST 8420-74)
- adhesion to galvanized surface 30 kPa
- group of combustibility NG
- fire hazard class of building materials KM0.

Mineral wool fireproof heat-insulating plates "EURO-LIT".

Overall dimensions: 1000x600 mm, 1200x1000 mm or others as agreed with the customer. They are made without facing, with facing by aluminum foil, fiberglass cloth or fiberglass mesh on one side.

Thickness: 25-250 mm.

Main technical specifications:

- volume density 150 kg/m³
- thermal conductivity coefficient at 100°C 0.034-0.037 W/mK
- group of combustibility NG
- fire hazard class of building materials KM0.

The consumption of materials for I-Beam № 20 per 1 m² of the surface to be protected (excluding losses)

Thickness of a plate "EURO-LIT" (mm)	The consumption of plates "EURO-LIT" (m ²)	Consumption of composition "PLAZAS" (kg)
25	1,10	1,50
30	1,15	1,55
40	1,20	1,60
50	1,25	1,65
60	1,30	1,70
70	1,35	1,75
80	1,40	1,80
90	1,45	1,85
100	1,50	1,90
110	1,55	1,95
120	1,60	2,00
130	1,65	2,05
140	1,70	2,10
150	1,75	2,15

Consumption may vary depending on the size and complexity of the structure



Calculation of parameter "P" depending on the way of facing of the structures

Profile	In the form of a box			Along the contour		
	4 sides	3 sides	2 sides	4 sides	3 sides	2 sides
	 $P=2H+2B+4c$	 $P=H+2B+2c$	 $P=H+B+c$	 $P=2H+4B+4c-2t$	 $P=2H+3B+2c-2t$	 $P=H+2B+c-t$
	 $P=2H+2B+4c$	 $P=2H+B+2c$	 $P=H+B+c$	 $P=2H+2B+4c$	 $P=2H+B+2c$	 $P=H+B+c$
	 $P=2H+2B+4c$	 $P=2H+B+2c$	 $P=H+B+c$	 $P=2H+4B+4c-2t$	 $P=2H+3B+2c-2t$	 $P=H+3B+c-2t$
	 $P=2H+2B+4c$	 $P=2H+B+2c$	 $P=H+B+c$	 $P=2H+2B+4c$	 $P=2H+B+2c$	 $P=H+B+c$
	 $P=4D+4c$	 $P=3D+2c$	 $P=2D+c$	 $P=\pi(D+2c)$		

Plate consumption increases and is calculated for each specific case using the formulas given in the table



SEQUENCE OF INSTALLATION

1. Preparation of protected surfaces (cleaning, degreasing).
2. Cutting of plates "EURO-LIT".
3. Preparation of the composition "PLAZAS" (mixing).
4. Gluing inserts from the plate "EURO-LIT" in the niches of the structures.
5. Pasting of structures with a plate "EURO-LIT" as a "box" or along the perimeter (for structures of large sizes).

Dependence of the thickness of the EURO-LIT plate (mm) with a density of 150 kg/m³ on the required fire resistance limit of the steel structure and the specified thickness of the metal at the critical temperature of the steel structure 500°C

Specified thickness of metal (mm)	R15	R30	R45	R60	R90	R120	R150	R180	R240
1,5	25	25	25	25	50	90	120	150	—
2,5	25	25	25	25	40	50	70	80	110
3,4	25	25	25	25	30	40	50	60	80
4,1	25	25	25	25	30	40	50	50	70
5,8	25	25	25	25	25	30	40	40	60
6,5	25	25	25	25	25	30	40	40	50
8,3	25	25	25	25	25	30	30	40	40
9,4	25	25	25	25	25	30	30	40	40

A more detailed table is available on the website tizol.com

PROTECTION OF STEEL STRUCTURES (R 15-120) “ET PROFILE” system

Purpose: increasing the fire resistance limits of metal structures, including complex profiles, from 15 to 120 minutes depending on the specified thickness of the metal.

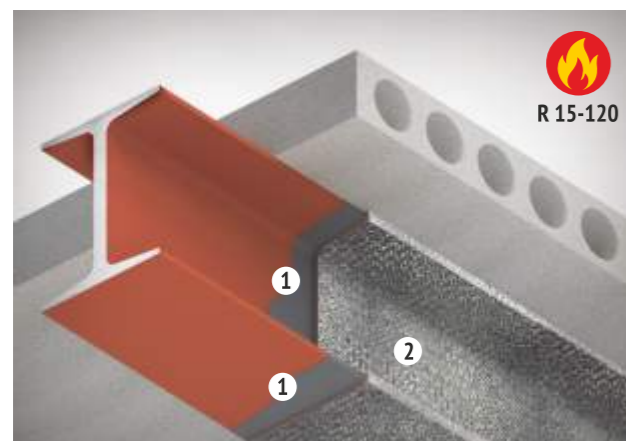
Scope: in buildings and constructions of any type and appointment, including in medical and preschool institutions, catering establishments and food production.

Operating conditions: temperature from -60 to + 100°C, humidity up to 90%.

Warranty period: at least 25 years.

ADVANTAGES OF THE SYSTEM

- reliability and durability
- environmental cleanliness, radiation safety
- the adaptability of the installation, “clean” process
- availability of control during installation and operation
- maintainability
- the minimum thickness of the coating and the load on the structure
- additional heat and sound insulation, noise absorption
- moisture resistance, vibrostability
- aesthetic appearance, the possibility of subsequent plastering or cladding with non-combustible materials.



1. Fireproof composition “PLAZAS”
2. MBOR foiled

SYSTEM COMPONENTS

Fireproof composition “PLAZAS”. It is made on the basis of silicate binders, mineral fillers and chemical additives. It is supplied ready-made (thick wet mass).

Packaging: tightly closed plastic packaging with a capacity of 15, 45 kg or other as further agreed with the customer.

Main technical specifications:

- gray-brown color
- volume density 1300÷1500 kg/m³
- relative viscosity 90÷115 mm (GOST 8420-74)
- adhesion to galvanized surface 30 kPa
- group of combustibility NG
- fire hazard class of building materials KMO.

Basalt fireproof rolled foiled material (MBOR-F). Staple cloth of super-thin basalt fibers, stitched with glass, basalt or other threads that do not impair the fireproof properties. MBOR-F laminated with aluminum foil on one side is available in 5, 8, 10, 13, 16, 18, 20, 23, 26 mm thick, 1500 mm wide, 6000-30000 mm long (depending on material thickness).

MBOR-F is supplied in rolls Ø350÷450 mm, length 1550 mm, roll weight 20÷25 kg, in a roll 12-45 m² (depending on the thickness of the material).

Main technical specifications:

- volume density 80÷110 kg/m³
- surface density 615÷2860 g/m² (depending on thickness)
- thermal conductivity coefficient at 100°C 0.032 W/mK
- mass humidity at release no more than 2%
- sound absorption index (α_w) 0,5
- group of combustibility NG
- fire hazard class of building materials KMO.



CONSUMPTION OF MATERIALS

The consumption of material MBOR per square meter of the protected surface excluding losses: with a single-layer coating of 1.1 m², with a double-layer 2.05 m². Consumption may increase depending on the size and complexity of the structure configuration. The consumption of fireproof composition “PLAZAS” from 2.0 kg/m².

SEQUENCE OF INSTALLATION

1. Preparation of protected surfaces (cleaning, degreasing).
2. Cutting of the material MBOR taking into account an allowance not less than 50 mm on positions of joints.
3. Preparation of the composition “PLAZAS” (mixing).
4. Application of the composition “PLAZA” on the protected surface with a spatula.
5. Installation of MBOR on the protected surface. Sizing the joints of the material MBOR with aluminum adhesive tape (if necessary).

Physical and technical indicators of the material MBOR

Material brand	Surface density g/m ² , no more	Mass humidity, % no more	Heat conductivity coefficient W/mK, no more, at a temperature			
			10±5°C	20±5°C	125±5°C	300±5°C
MBOR-5F	615	2,0	0,032	0,035	0,052	0,090
MBOR-8F	915					
MBOR-10F	1115					
MBOR-13F	1515					
MBOR-16F	1815					
MBOR-18F	2015					
MBOR-20F	2215					
MBOR-23F	2515					
MBOR-26F	2815					

Recommended thickness of the material MBOR for the required fire resistance limit depending on the specified thickness of the metal of the protected structure at a critical temperature of the steel structure 500°C

Specified thickness of metal (mm)	R15, R30, R45	R60	R90	R120
2,4	8	10	20	—
3,0			18	—
3,4		16	—	
4,0		15	—	
4,9		13	—	
5,9		13	20	
6,4		10	20	
7,0		—	18	
7,9		—	16	

A more detailed table is available on the website tizol.com



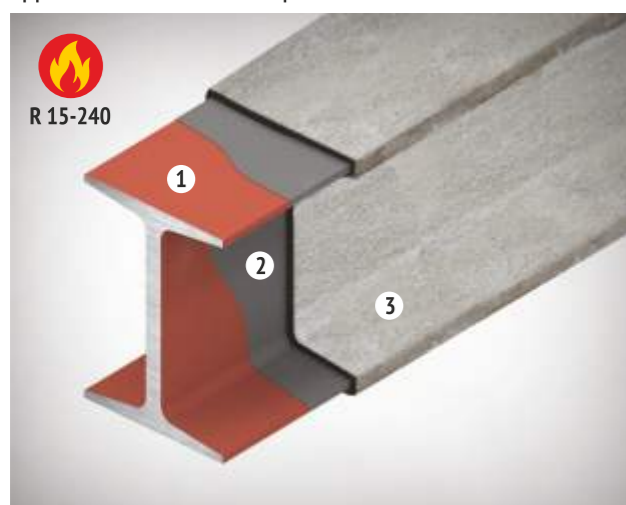
PROTECTION OF STEEL STRUCTURES (R 15-240)

Coating "GeoMix"

Purpose: to increase the fire resistance limits of metal structures to 15-240 minutes depending on the thickness of the applied coating.

Scope: in buildings and constructions of any type and appointment, including in medical and preschool institutions, catering establishments and food production.

Description: fireproof coating "GeoMix" is a lightweight plaster composition designed for protective coatings on the surface of metal building structures in order to increase their fire resistance and (or) increase fire safety. It is supplied in the form of dry mixes, it is tempered with water before being applied to the surface to be protected.



1. Protected steel structure
2. Primer "GeoMix"
3. Fireproof composition "GeoMix"

Main technical specifications:

- light grey colour
- theoretical consumption: 3.4 kg/m² (for application of layer 10 mm)
- the start time of the mortar setting: 2-6 hours at 20°C and humidity of 50%
- adhesion to the protected surface, not less: 0.25 mPa
- coefficient of thermal conductivity, not more: 0.12 W/mK
- compressive strength not less than 0.3 MPa
- minimum recommended thickness: 11 mm.



Consumption of materials of fireproof coating "GeoMix"				
Fireproof efficiency		Application thickness (mm)	Consumption per 1 m ² not less (kg)	
Group	Minutes		Fireproof mortar mixes	Disperse Primer Mixtures
1	180	33	11,22	0,35
1	150	29	9,86	
2	120	24	8,16	
3	90	20	6,8	
4	60	15,5	5,27	
5	45	13	4,42	
6	30	11	3,74	

OPERATING CONDITIONS

At temperature from -60 to + 100°C and humidity up to 90%.

Warranty period: at least 25 years.

ADVANTAGES OF THE COATING:

- low material consumption
- high adhesion to painted and galvanized metal surfaces
- ease of installation, the thickness of the coating layer applied at a time to the vertical surface is up to 50 mm
- no shrinkage during drying (hardening)
- full environmental safety of fireproof coating, no harmful emissions in a cold state and when heated
- it is applied both manually and mechanized with the help of plastering units.



Dependence of fireproof efficiency of OZP "GeoMix" on the thickness of the applied layer and the specified thickness of metal structures

Fireproof efficiency	Groups	1	1	1	2	3	4	5	6	7
	Minutes	240	180	150	120	90	60	45	30	15
Recommended application thickness										
Specified thickness of metal (mm)	2,0	—	38,9	33,6	28,2	22,8	17,5	14,8	12,1	11,0
	3,0	—	34,5	29,9	25,2	20,6	15,9	13,6	11,2	
	3,4	—	33,1	28,7	24,2	19,8	15,4	13,2	11,0	
	4,1	39,0	30,9	26,8	22,7	18,6	14,6	12,5		
	5,8	33,5	26,7	23,3	19,9	16,5	13,1	11,4		
	6,5	31,8	25,4	22,2	19,0	15,8	12,6	11,0		
	8,3	28,1	22,6	19,8	17,1	14,3	11,6			
	9,4	26,3	21,2	17,0	16,2	13,6	11,1			

A more detailed table is available on the website tizol.com



SEQUENCE OF INSTALLATION

1. Preparation of protected surfaces (cleaning, degreasing).
2. Preparation of the primer "GeoMix" (tempering with water in the proportion of 0.6-0.8 l per kg of dry mixture).
3. Application of the primer "GeoMix" (with the help of aggregates of the putty type CO-150 or their analogues, the approximate drying time is 24 hours).
4. Preparation of the primer "GeoMix" (tempering with water in the proportion of 0.8-1.3 l per kg of dry mixture).
5. Application of fireproof composition "GeoMix" (with the help of aggregates of putty type CO-150 or their analogues) is made after complete drying of the primer layer. Leveling of the fireproof composition "GeoMix" (with a spatula, trowel).

Components of fireproof coating "GeoMix"

Name	Density (kg/m ³)	Packaging	Quantity per package (kg)
Fireproof mortar mixtures	340	Polypropylene bag with liner	15
Disperse Primer Mixtures	420		20

PROTECTION OF METAL STRUCTURES (R 15-90)

System "ET LSTK"

Purpose: to increase the fire resistance of light steel thin-walled structures (LSTK) up to 15-90 minutes.

Scope: residential (up to 50 meters high), warehouse, economic, commercial, industrial premises (including the use of long-span structures). Buildings and facilities of any type and purpose.

Operating conditions: temperature from -60 to + 100°C, humidity up to 90%.

Warranty period: at least 25 years.

ADVANTAGES OF THE SYSTEM:

- reliability and durability (warranty period of operation not less than 25 years)
- absolute ecological purity
- technological effectiveness and "purity" of process
- high efficiency of installation
- availability of control during installation and operation
- aesthetically finished look
- maintainability
- the minimum thickness and the load on the structure
- moisture resistance, vibrostability
- attractive pricing.

SYSTEM COMPONENTS

Fireproof composition "PLAZAS": It is produced based on silicate binders, mineral fillers and chemical additives. It is supplied ready-made (thick wet mass).

Packaging: tightly closed plastic containers with a capacity of 15, 45 kg or other in agreement with the customer.

Main technical specifications:

- gray-brown color
- volume density 1300÷1500 kg/m³
- relative viscosity 90÷115 mm (GOST 8420-74)
- adhesion to galvanized surface 30 kPa
- group of combustibility NG

— fire hazard class of building materials KM0.

Basalt fireproof rolled foiled material (MBOR-F).

Staple cloth of super-thin basalt fibers, stitched with glass, basalt or other threads that do not impair the fireproof properties. MBOR-F laminated with aluminum foil on one side is available in 5, 8, 10, 13, 16, 18, 20, 23, 26 mm thick, 1500 mm wide, 6000-30000 mm long (depending on material thickness).

MBOR-F is supplied in rolls Ø350÷450 mm, length 1550 mm, roll weight 20÷25 kg, in a roll 12-45 m² (depending on the thickness of the material).

Main technical specifications:

- volume density 80÷110 kg/m³
- surface density 615÷2860 g/m² (depending on thickness)
- thermal conductivity coefficient at 100°C 0.032 W/mK
- mass humidity at release no more than 2%
- sound absorption index (aw) 0,5
- group of combustibility NG
- fire hazard class of building materials Km0.

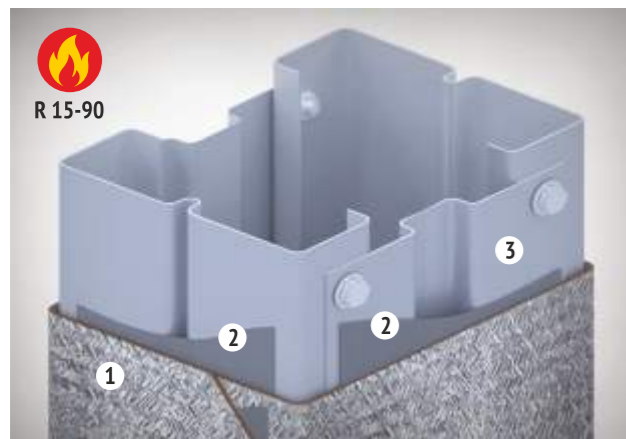
Mineral wool fireproof heat-insulating plates "EURO-LIT".

Overall dimensions: 1000x600 mm, 1200x1000 mm or others as agreed with the customer. They are made without facing, with facing by aluminum foil, fiberglass cloth or fiberglass mesh on one side.

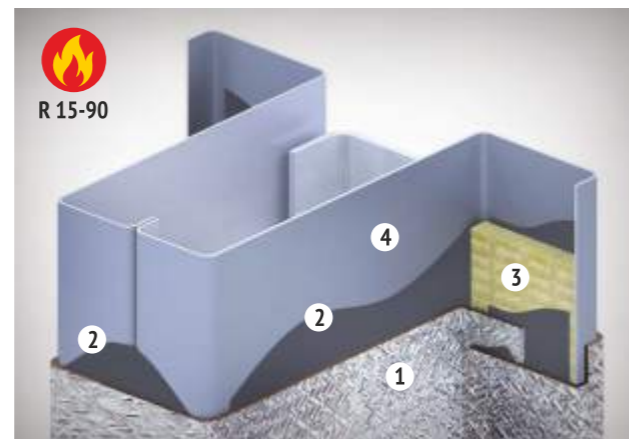
Thickness: 25-250 mm.

Main technical specifications:

- volume density 50-80 kg/m³
- thermal conductivity coefficient at 100°C 0.034-0.037 W/mK
- group of combustibility NG
- fire hazard class of building materials KM0.



Fire protection of columns from profiles assembled in a box
1. Rolled material MBOR-F
2. Fireproof composition "PLAZAS"
3. Cold formed galvanized profile LSTK



Fire protection of columns from Z profiles
1. Rolled material MBOR-F
2. Fireproof composition "PLAZAS"
3. Fireproof plate "EURO-LIT"
4. Cold formed galvanized profile LSTK

The dependence of the thickness of the material MBOR on the specified thickness of the metal (STM) to ensure the required fire resistance of the structure LSTK at a critical metal temperature of 500°C

STM (mm)	Fire Resistance R15		STM (mm)	Fire Resistance R30		STM (mm)	Fire Resistance R45		STM (mm)	Fire Resistance R60		Fire Resist. R90
	Box-type structure	I-shaped structure		Box-type structure	Box-type structure		Box-type structure	Box-type structure		Box-type structure		
0,75	MBOR-5F	MBOR-5F	0,75	MBOR-10F	MBOR-10F	0,75	MBOR-18F	MBOR-16F	0,75	MBOR-26F	MBOR-20F	MBOR-26F
0,78			0,78			0,78			0,78			
0,81			0,81			0,81			0,81			
0,80			0,80			0,80			0,80			
0,88			0,88			0,88			0,88			
0,95			0,95			0,95			0,95			
0,97			0,97			0,97			0,97			
1,05			1,05			1,05			1,05			
1,11			1,11			1,11			1,11			
1,13			1,13			1,13			1,13			
1,17			1,17			1,17			1,17			
1,19			1,19			1,19			1,19			
1,33			1,33			1,33			1,33			
1,41			1,41			1,41			1,41			
1,55			1,55			1,55			1,55			
1,61	1,61	1,61	1,61									
1,65	1,65	1,65	1,65									
1,73	1,73	1,73	1,73									
1,86	1,86	1,86	1,86									
1,98	1,98	1,98	1,98									
2,00	2,00	2,00	2,00									

CONSUMPTION OF MATERIALS

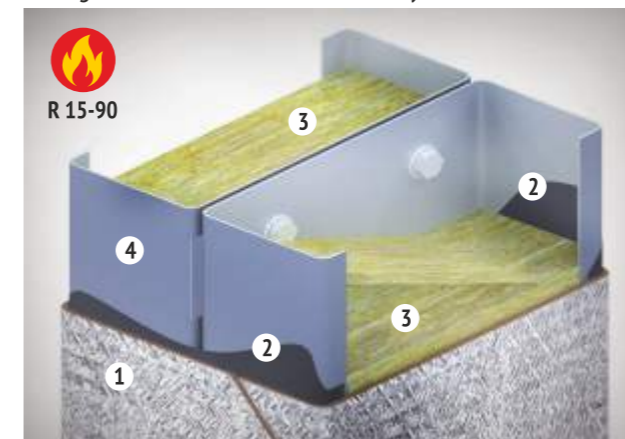
Consumption of the composition "PLAZAS" for continuous application is 1.9-2.5 kg per square meter of the protected surface.

The consumption of MBOR material in the installation in one layer is 1.2 m², in the case of a two-layer application it is 2.1 m² per square meter of the surface to be protected. Consumption may increase depending on the size and complexity of the configuration of the structure.

The consumption of the Euro-LIT plate depends on the geometric dimensions of the filled space of the protected structure. At the same time, the size of the cut out plates should be larger than the size of this distance by 2-5%.

SEQUENCE OF INSTALLATION

1. Preparation of protected surfaces (cleaning, degreasing).
2. Cutting of the material MBOR-F, if necessary plates "EURO-LIT" also.
3. Preparation of the composition "PLAZAS" (mixing).
4. Application of the composition "PLAZA" on the protected surface with a spatula.
5. Installation of plates "EURO-LIT" in the filled space of the structure (if necessary)
6. Pasting of the protected surfaces in a box with the material MBOR-F.
7. Sizing the joints of the material MBOR-F with aluminum adhesive tape (if necessary).



Fire protection of columns from I-shaped profiles
1. Rolled material MBOR-F
2. Fireproof composition "PLAZAS"
3. Fireproof plate "EURO-LIT"
4. Cold formed galvanized profile LSTK



PROTECTION OF REINFORCED CONCRETE STRUCTURES (REI 90-240)

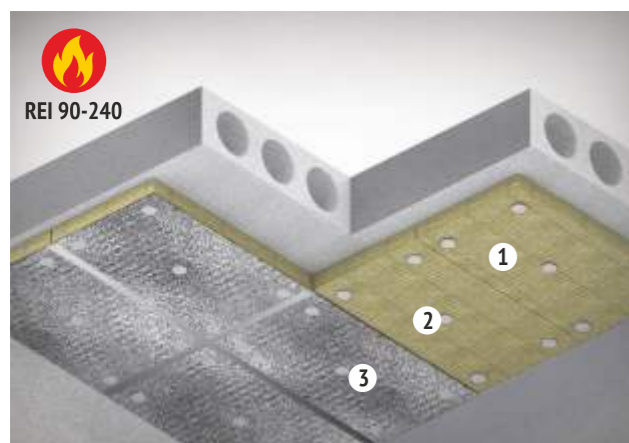
System "ET BETON"

Building structures of buildings and constructions under normal conditions of operation maintain the required quality of work for decades. In case of fire, the structures quickly lose their operational properties, lose the load-bearing and heat-insulating ability, as well as integrity.

The collapse of reinforced concrete overlappings during the fire often leads to loss of life. Concrete does not burn, but when

heated, its rigidity and strength decreases. In addition, there is its dehydration, i.e. intense steam emission and, as a result, explosive destruction by fire.

It is possible to increase the fire resistance of reinforced concrete structures to the required limit in two ways: to increase the thickness of the protective layer of concrete or to re-vent with fireproof materials.



1. Plate "EURO-LIT"
2. Fastening element
3. Coating

SYSTEM ET "BETON"

Purpose: increase of fire resistance limits of monolithic and hollow reinforced concrete structures up to 90-240 minutes with additional heat and sound insulation.

Scope: in buildings and constructions of any type and appointment, including in medical and preschool institutions, catering establishments and food production. The ideal decision for protection of overlappings between rooms with various temperature conditions: parkings in residential, public and office buildings.

Description: a universal seismically resistant system of constructive fire protection and heat and sound insulation provides fire resistance limits up to 240 minutes.

Operating conditions: temperature from -60 to + 100°C, humidity up to 90%.

Warranty period: at least 25 years.

ADVANTAGES OF THE SYSTEM:

- seismic resistance up to 9 points
- reduction of the specific load on the structure due to the use of the "EURO-LIT" plate of lower density with differentiation in thickness depending on the required fire resistance limit
- reliability and durability
- ecological purity, radiation safety
- possibility of installation at low temperatures
- technological effectiveness and "purity" of process
- availability of control during installation and operation
- maintainability
- the minimum thickness and the load on the structure



- additional heat and sound insulation and sound absorption
- moisture resistance (when using a foiled plate), vibro-stability
- aesthetic appearance, the possibility of subsequent plastering or cladding with non-combustible materials

SYSTEM COMPONENTS

Mineral wool fireproof heat-insulating plates "EURO-LIT":

Overall dimensions: 1000x600 mm, 1200x1000 mm or others as agreed with the customer.

Thickness of plates: is 25-250 mm. They are made without facing, with facing by aluminum foil, fiberglass cloth or fiberglass mesh on one side.

Main technical specifications:

- volume density 80 kg/m³
- thermal conductivity coefficient at 100°C 0.034-0.037 W/mK
- group of combustibility NG
- fire hazard class of building materials KM0.

FASTENING ELEMENTS

The plates are attached to the concrete surface of the fastening metal anchors consisting of a drive element with Ø8 mm and the mounting disc with a diameter not less than 70 mm, of brands "Mungo", "Termoclip", "Hilti".

The length of the driving element is selected in accordance with the actual thickness of the plate, taking into account the amount of blockage in the structure of at least 30 mm.

One plate "EURO-LIT" 1200x1000 mm requires 9 sets of fastening elements, the plate 1000x600 mm — 5 sets.

The dependence of the thickness of the plate "EURO-LIT" on the required fire-resistance limit

	The fire resistance limit REI (min.)	Plate thickness (mm)	The load on the protected structure (kg/m ²)
"EURO-LIT" 80	90	30	2,4
	120	40	3,2
	150	50	4,0
	180	60	4,8
	240	80	6,4

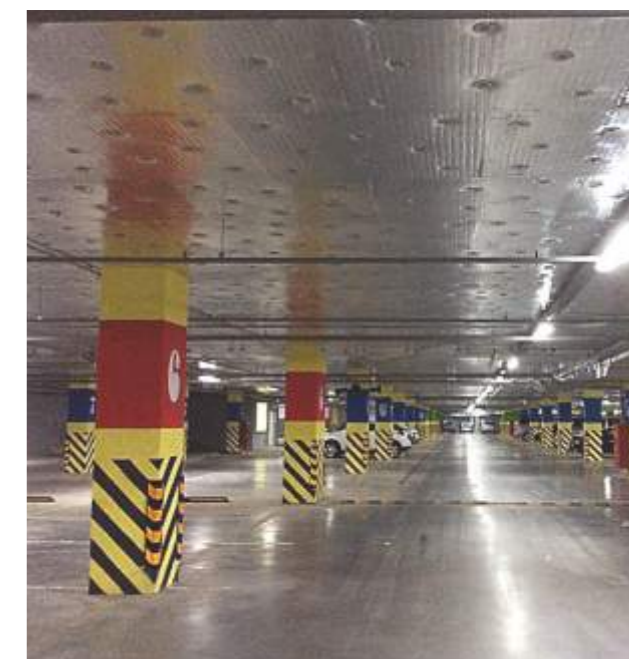
Parameters of elements of fixing anchors depending on the thickness of the plate

Plate thickness (mm)	Dowel metal	Metal disk	Metal anchor (pin)	Metal disk
30-40	8x80	14,5x80	8x70	10,5x70
50			8x90	
60			—	
70-80			8x110	
With additional insulation				
90-100	8x140	14,5x80	8x130	10,5x70
110			8x150	
120			8x180	
130-140			—	
150			—	
160-170	8x200	—	—	—
180-220	8x250	—	—	—



SEQUENCE OF INSTALLATION

1. Cleaning of the concrete surface.
2. Marking and cutting of plates "EURO-LIT".
3. Drilling holes in concrete with a perforator through the "EURO-LIT" plate.
4. Hammering the anchor fastener into the hole until the disk stops against the outer surface of the "EURO-LIT" plate.
5. The mounting of the plates "EURO-LIT" should ensure their tight fit to each other.



PROTECTION OF AIR DUCTS (EI 30-240)

System "ET VENT"

In case of fire, the flame quickly spreads through the ventilation ducts and complicates the process of extinguishing the fire. To exclude this situation, in projects, depending on the category of the room, installation of fire-prevention valves and fire protection of ventilation systems and smoke removal with limits of fire resistance of 30-180 minutes is provided.

The fire resistance of the air duct is determined by the parameters of integrity (E) and thermal insulation capacity (I). Tests are conducted on a prototype in accordance with GOST R 53299-2013 "Air ducts. Fire resistance test method".

Air ducts come in round and rectangular sections. They are made of galvanized steel and ferrous metal. Depending on the shape, they are divided into: rectangular, spiral, flat, flexible, round air ducts for ventilation.

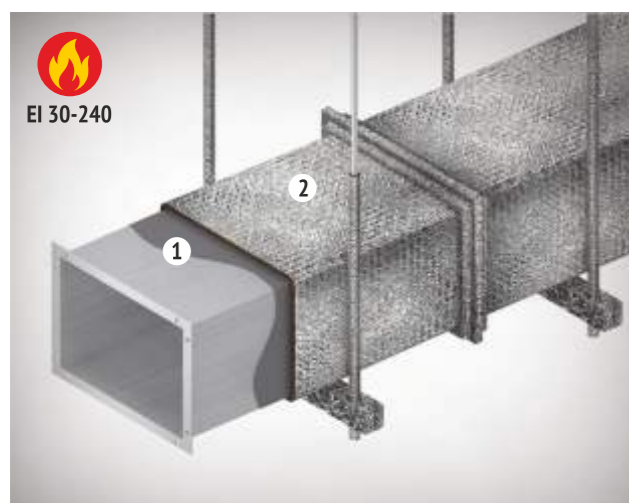
The type of connection (folded or welded) depends on the thickness of the metal. If the duct thickness is less than 1 mm, then a folded joint is used, otherwise a welded one. The

connection of metal ducts is a very important process that affects the tightness and integrity of the entire system.

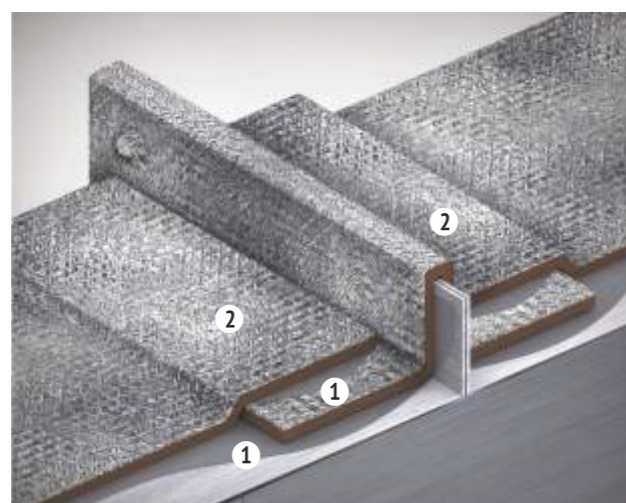
Round metal ducts are connected to the system in one of four ways:

- flange connections: the air duct is fixed by flanging;
- draw band joint: it includes the use of mastic or other chemical materials;
- couplings or nipples: they come with rubber seals, that provide a more secure fit, and without seals;
- socket: connection of two air ducts by the method of entering one air duct into another.

The main requirement for fire-resistant air ducts is the thickness of the metal wall of the air duct must be at least 0.8 mm. The duct fasteners must have the same fire resistance as the duct, but on the basis of the carrying capacity (R).



1. Fireproof composition "PLAZAS"
2. MBOR foiled



Protection scheme for flange connection duct

SYSTEM "ET VENT"

Purpose: increase of fire resistance limits the ducts of ventilation and smoke removal systems up to 30-240 minutes with additional heat and sound insulation.

Scope: in buildings and constructions of any type and appointment, including in medical and preschool institutions, catering establishments and food production in areas with seismicity up to 9 points.

Operating conditions: temperature from -60 to + 100°C, humidity up to 90%.

Warranty period: at least 25 years.

ADVANTAGES OF THE SYSTEM:

- reliability and durability
- ecological purity, radiation safety
- technological effectiveness and "purity" of process
- availability of control during installation and operation
- maintainability

- the minimum thickness and the load on the structure
- additional heat and sound insulation and sound absorption
- moisture resistance (when using a foiled plate), vibro-stability
- aseismic stability
- aesthetic appearance.

SYSTEM COMPONENTS

Basalt fireproof rolled foiled material (MBOR-F).

Staple cloth of super-thin basalt fibers, stitched with glass, basalt or other threads that do not impair the fireproof properties. MBOR-F laminated with aluminum foil on one side is available in 5, 8, 10, 13, 16, 18, 20, 23, 26 mm thick, 1500 mm wide, and 6000-30000 mm long (depending on material thickness).

MBOR-F is supplied in rolls Ø350÷450 mm, length 1550 mm, roll weight 20÷25 kg, in a roll 12-45 m² (depending on the thickness of the material).

Physical and technical indicators of the material MBOR

Material brand	Surface density g/m ² , not more than	Moisture by weight, % not more than	Heat conductivity coefficient W/mK, no more, at a temperature			
			10±5°C	20±5°C	125±5°C	300±5°C
MBOR-5F	615	2,0	0,032	0,035	0,052	0,090
MBOR-8F	915					
MBOR-10F	1115					
MBOR-13F	1515					
MBOR-16F	1815					
MBOR-18F	2015					
MBOR-20F	2215					
MBOR-23F	2515					
MBOR-26F	2815					



Fireproof composition "PLAZAS". It is produced based on silicate binders, mineral fillers and chemical additives. It is supplied ready-made (thick wet mass).

Packaging: tightly closed plastic containers with a capacity of 15, 45 kg or other in agreement with the customer.

Main technical specifications:

- gray-brown color
- volume density 1300÷1500 kg/m³
- relative viscosity 90÷115 mm (GOST 8420-74)
- adhesion to galvanized surface 30 kPa
- group of combustibility NG
- fire hazard class of building materials KMO.

Dependence of the thickness of the fireproof system "ET VENT" on the required fire resistance limit

The fire resistance limit EI (min)	Average coating thickness, not less than (mm)	The load on the protected structure (kg/m ²)	Materials and their consumption per m ² of the protected surface, not less						
			MBOR-5F (m ²)	MBOR-8F (m ²)	MBOR-13F (m ²)	MBOR-16F (m ²)	MBOR-20F (m ²)	"PLAZAS"	
								Layer thickness (mm)	Consumption (kg)
30	4,5	1,3	1,1	—	—	—	—	0,5	0,7
60	4,8	1,7	1,1	—	—	—	—	0,8	1,0
90	8,5	3,4	—	1,1	—	—	—	2,0	2,8
120	13,5	4,3	—	—	1,1	—	—		
150	16,5	4,6	—	—	—	1,1	—		
180	18,5	4,7	—	—	—	—	1,1	1,5 +0,5	
240	25	5,83	—	—	2,05	—	—		

We recommend fire protection of air duct fasteners (hangers, brackets) using the "ET PROFIL" system



CONSUMPTION OF MATERIALS

The consumption of MBOR material excluding losses:

in the installation in one layer is 1.1 m², in the case of a two-layer application it is 2.05 m² per square meter of the surface to be protected. Consumption may increase depending on the size and complexity of the configuration of the structure. Consumption of the fireproof composition "PLAZAS" is 0.7-2.8 kg/m².

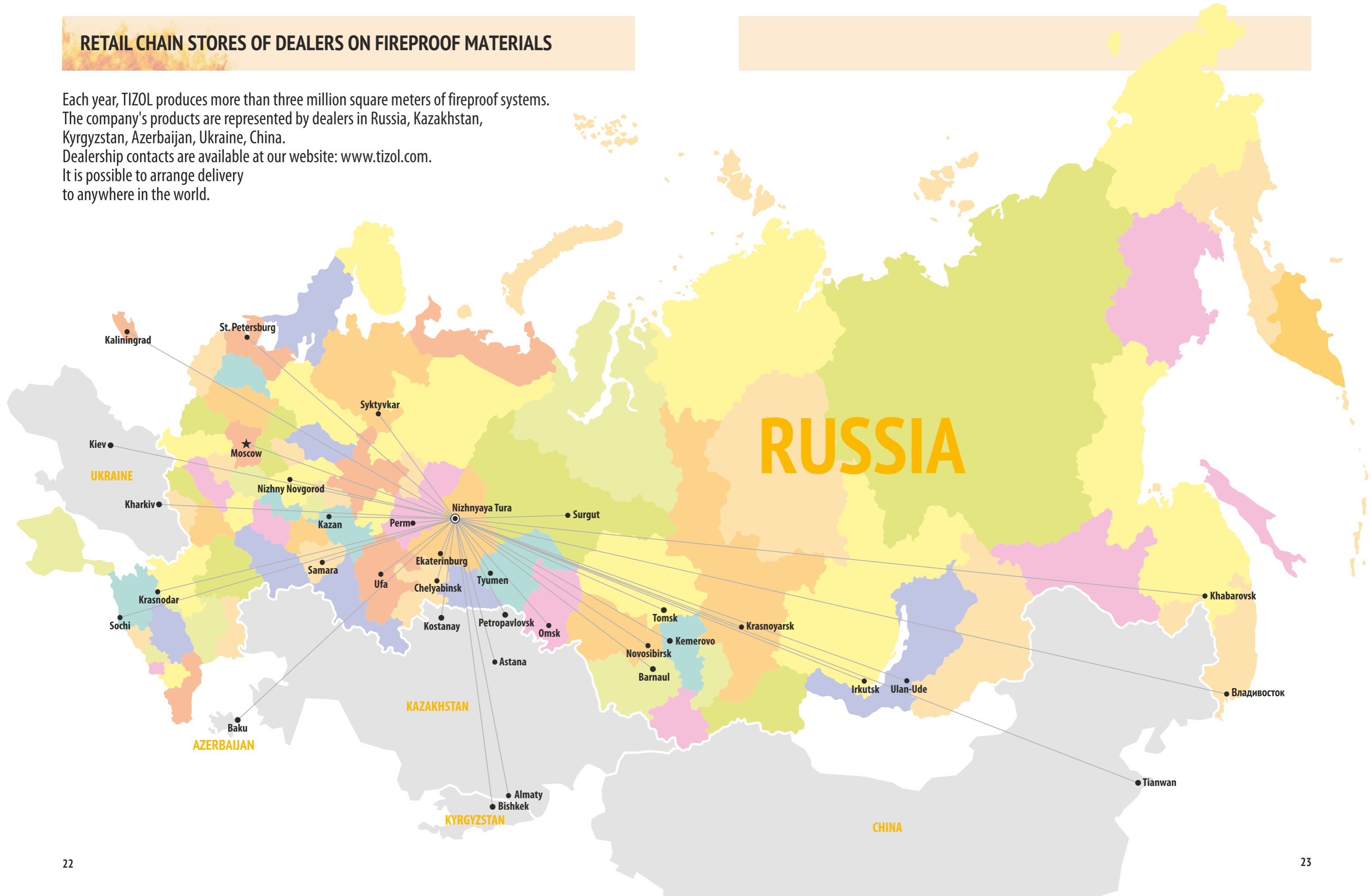
SEQUENCE OF INSTALLATION

1. Preparation of protected surfaces (cleaning, degreasing).
2. Cutting of the material MBOR-F.
3. Preparation of the composition "PLAZAS" (mixing).
4. Application of the adhesive mixture on the protected surfaces.
5. Pasting of the protected surfaces with the material MBOR-F.
6. Sizing the joints of the material MBOR-F with aluminum adhesive tape (if necessary).

RETAIL CHAIN STORES OF DEALERS ON FIREPROOF MATERIALS

Each year, TIZOL produces more than three million square meters of fireproof systems. The company's products are represented by dealers in Russia, Kazakhstan, Kyrgyzstan, Azerbaijan, Ukraine, China. Dealership contacts are available at our website: www.tizol.com. It is possible to arrange delivery to anywhere in the world.

RETAIL CHAIN STORES OF DEALERS ON FIREPROOF MATERIALS



PROPERTIES OF FIREPROOF MATERIALS AND SYSTEMS



HIGH FIRE PROTECTION EFFICIENCY

Plate and rolled fireproof materials manufactured by TIZOL have high fire retardant efficiency, providing maximum fire resistance limits of protected structures (up to 240 minutes) at low density and small coating thickness.



INCOMBUSTIBILITY FIRE SAFETY

Plate and rolled fireproof materials belong to the group of non-combustible materials. Fire hazard class KMO. They not only do not burn, but also prevent the spread of fire.



ADDITIONAL HEAT AND SOUND INSULATION

Having a low thermal conductivity, fireproof materials "TIZOL" provide additional heat and sound insulation of the protected structures, protecting them during the fire from warming up to critical temperature and collapse within a certain time, creating a temporary reserve for the evacuation of people, saving material values and extinguishing the fire.



HIGH TECHNOLOGICAL EFFECTIVENESS

Fireproof materials are easily cut by hand and mechanical tools, convenient for installation. They do not require expensive equipment for application.



BIOLOGICAL SAFETY

Fire retardant materials are made on the basis of the melt of basalt rocks, do not rot, do not grow moldy, are not suitable for food to rodents and insects.



ENVIRONMENTAL SAFETY

Sanitary-epidemiological conclusions confirm the safety of products for housing and civil construction. Materials produced by "TIZOL" can be used in the construction of objects of any functional purpose — from nuclear power plants to medical and child care facilities.



SEISMIC STABILITY

Systems "ET BETON" and "ET VENT" have been tested for seismic resistance. According to the results of dynamic tests, their high degree of reliability was established under loads simulating seismic effects. Fireproof systems "TIZOL" can be used in areas with seismicity of 7-9 points.



RELIABILITY AND DURABILITY

Mineral fireproof heat-insulating plates EURO-LIT and basalt fireproof material MBOR serve as the basis for structural fire protection systems for metal and reinforced concrete structures, as well as air ducts and ventilation and smoke removal boxes.

Systems "ET METAL", "ET PROFILE", "ET BE-TON" and "ET VENT" are certified on the basis of fire tests actually carried out in accredited laboratories and serve as reliable fire protection in case of fire.

The warranty period for TIZOL systems is 25 years. In fact, fire retardant systems retain their properties throughout the entire service life of the protected structure.



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OBJECTS WITH THE USE OF FIRE-PROOF MATERIALS "TIZOL"

Shopping and entertainment complexes, business centers, hotels

- Social and business complex "Lakhta-center", St. Petersburg
- International exhibition center "Crocus Expo", Moscow (13)
- "Moscow-City" International Business Center: Mercury City Tower", Evolution Tower, "Federation" Complex, Moscow (14)
- "Arena Uralets" cultural and entertainment complex, Yekaterinburg
- Sports and entertainment complex "Ice Palace", Yekaterinburg
- Waterpark "Limpopo", Yekaterinburg
- Hotel "Hyatt Regency", Ekaterinburg (15)
- SEC "Greenwich", 4th stage, Yekaterinburg (16)
- SEC "Alatyr", Yekaterinburg
- SEC "Rodnik", Chelyabinsk
- BC "London", Nizhny Novgorod
- "Petrovsky Fort" Shopping Center, St. Petersburg (17)
- Shopping Center "MEGA", Yekaterinburg (18)



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Housing construction

- Residential Complex "Malevich", Yekaterinburg (19)
- Residential Complex "Solnechnygorod", Perm (20)
- Residential Complex "TikhYBereg", Yekaterinburg
- Residential Complex "Sedmoe Nebo", Nizhny Novgorod
- Residential Complex "Serebryany Kwartet", Moscow



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Foreign objects

- Tianwan NPP, China (21)
- BushehrNPP, Iran (22)
- Kudankulam NPP, India
- "Ice arena", Almaty (23)
- "Expo 2017, Astana (24)
- Residential district "Sayaly", Almaty
- "State Revenue Department", Aktau
- SEC "Moscow", Almaty



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