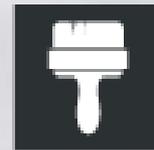




**SILKOR**  
chemistry solutions

# LOST FOAM CASTING MATERIALS



[www.silkor.com.ua](http://www.silkor.com.ua)



- **Silkor Ltd** is part of the international production corporation Korona Group. For 20 years we have been specializing in the production of silicone, epoxy materials, and other materials for construction, **foundry**, industrial and household.



- The production facilities of the Corporation are located in Ukraine, Hungary, Russia. Representative offices are located in the CIS countries, Europe, Asia, the USA.



- In cooperation with **Castchem New Material Co.**, we supply raw materials for the lost foam casting: polystyrene/methyl methacrylate copolymer resin STMMA for the foam-pattern production & refractory coatings.



- Today we set up own production of blocks from copolymer materials for full-mold casting.



# Materials for Lost-Foam Casting



## STMMA

Foundry polystyrene/methyl methacrylate copolymer is a raw material for the manufacture of foam patterns for lost foam casting (LFC) technology for casting of aluminum, copper alloys, gray cast iron, nodular cast iron, alloy steel, low carbon (mild) steel and stainless steel .

## STMMA-FD

Casting polystyrene/methyl methacrylate copolymer is the raw material for the manufacture of foam model for the production of lost foam casting technology (LFC) for casting aluminum, aluminum alloys, gray cast iron, etc.



## SM Block

Blocks made of STMMA for full-mold casting of large-sized parts.

Chemical composition: 70% MMA + 30% Styrene

Dimensions: 3000x1200x1000 mm.

Density: 18 – 28 kg/m<sup>3</sup>, according to customer's requirement.

## SM-FD Block

Blocks made of STMMA-FD for full-mold casting of large-sized parts.

Chemical composition: 10% MMA + 90% Styrene

Dimensions: 3000x1200x1000 mm,

Density: 18 – 28 kg/m<sup>3</sup>, according to customer's requirement.



## REFRACTORY COATING FOR CAST IRON

Highly permeable refractory coating for foam-patterns in lost foam casting for cast iron castings.  
Special mix for co-polymeric foam-patterns.

## REFRACTORY COATING FOR STEEL

Refractory coating for foam-patterns in lost foam casting for steel castings.  
Special mix for co-polymeric foam-patterns.



# Lost-foam casting



Lost foam casting (LFC) is one of the newest casting technology, where EPS (expandable polystyrene) is used for pattern molding. STMMMA is called to replace EPS, because it solves all problems in LFC casting and its benefits:

- defect liquidation (from standard 20% to 0-3%)
- improves casting quality
- saves energy consumption
- raw material savings
- costs savings in total
- less harmful emissions





# STMMA expandable copolymer resin



STMMA - raw materials for the foam molds manufacturing in the production of lost foam casting technology (LFC) – is a copolymer of polystyrene (30%) and methyl methacrylate (70%) with functional additives that quickly reduce the molecular weight of polystyrene at elevated temperatures.



Parameter	Standard
Content of volatile substances (by weight), %, min.	7,0
Chemical formula	$-(C_5O_4H_8)_m-$
Carbon content, %	63
Foaming temperature, °C	95-105
Decomposition temperature, °C	700
Gas evolution of 900°C, ml/g	900
Casting temperature(for gray iron), °C	1400-1450
Percent of residues, %	4,45
Shrinking percentage of foamed molds, %	0,1-0,3
Rate of finished casting products(for boxes and motor housings), %	≥98

Bead type	Bead size, μ
STMMA-1	600-900
STMMA-2	450-600
STMMA-3A	400-550
STMMA-3	350-500
STMMA-4	250-350

## Application

STMMA copolymer resin is designed specifically for the of foam-pattern manufacturing using LFC technology for casting products from aluminum, copper alloy, grey iron, nodular iron, alloy steel, mild steel and stainless steel.



STMMA-FD - raw materials for the foam molds manufacturing in the production of lost foam casting technology (LFC) – is a copolymer of polystyrene (90%) and methyl methacrylate (10%) with functional additives that quickly reduce the molecular weight of polystyrene at elevated temperatures.



Bead type	Bead size, $\mu$
STMMA-FD special	900 – 1250
STMMA-FD1B	800 – 900
STMMA-FD1	600 – 800
STMMA-FD2	450 – 600
STMMA-FD3	350 – 450
STMMA-FD4	250 - 350

Parameter	Standard
Content of volatile substances (by weight), %, min.	7,0
Carbon content, %	82
Foaming temperature, °C	85 – 95
Decomposition temperature, °C	900
Gas evolution of 900°C, ml/g	700
Casting temperature(for gray iron), °C	1450-1480
Percent of residues, %	30,6
Shrinking percentage of foamed molds, %	0,2-0,4
Rate of finished casting products(for boxes and motor housings), %	$\geq 93$

## Application

STMMA-FD copolymer resin beads are designed specifically for the foam-pattern manufacturing using LFC technology for casting products from aluminum, aluminum alloys, gray cast iron, etc.



## Advantages

- SM Blocks allow the production of complex models with a high level quality of castings.
- The absence of flame retardants in the composition provides a low flash point.
- The production of large-sized foam-patterns simplifies the assembly of the product molding, reduces the number of gluing operations.
- SM Block has a low volumetric weight, no dust emission, not afraid of moisture.
- It is easy to cut with hand tools and 3D milling machines.
- Balanced granulation eliminates the need for additional post-milling processing, creating the effect of pleasant surface graininess of the casted parts.
- Excellent edge stability.
- Processing of SM block does not require any changing the LFC technology of using conventional polystyrene materials.
- SM block has a very low solids content of only 1.8-2%, resulting in almost complete gasification without residue in the casting process.

Blocks made of STMMA are specially designed for the manufacture of foam models using LFC technology for casting large-sized parts and products from aluminum, copper alloys, gray cast iron, nodular cast iron, alloy steel, mild steel and stainless steel.

**Chemical composition:** 70% MMA + 30% Styrene

**Dimensions:** 3000x1200x1000 mm.

**Density:** 18 – 28 kg/m<sup>3</sup>, according to customer's requirement.

- The carbon content in STMMA is 62%, while EPS - up to 93%. STMMA will significantly reduce cementation defects when casting steel / ductile iron, and reduce carbon emissions.
- STMMA has a lower temperature during casting, the gasification temperature is usually 50°C lower than EPS (STMMA - 1400°C - 1450°C, EPS - 1460°C - 1500°C). It helps the foundry to save energy consumption about \$50 - \$100 per tonne of castings
- Molecular bonds break down orderly during STMMA burning, so liquid low molecular weight residues are formed in the process of destruction.
- EPS molecules are destroyed randomly, and the process is accompanied by the formation of tarry residues.
- STMMA high molecular weight reduces model shrinkage. The molecular weight of STMMA is 220,000, EPS - 50,000 - 60,000.



# SM-FD Block



## Advantages

- SM-FD Blocks allow the production of complex models with a high level quality of castings.
- The absence of flame retardants in the composition provides a low flash point.
- The production of large-sized foam-patterns simplifies the assembly of the product molding, reduces the number of gluing operations.
- SM-FD Block has a low volumetric weight, no dust emission, not afraid of moisture.
- It is easy to cut with hand tools and 3D milling machines.
- Balanced granulation eliminates the need for additional post-milling processing, creating the effect of pleasant surface graininess of the casted parts.
- Excellent edge stability.
- Processing of SM block does not require any changing the LFC technology of using conventional polystyrene materials.
- SM block has a very low solids content of only 1.8-2%, resulting in almost complete gasification without residue in the casting process.



Blocks made of STMMA-FD are specially designed for the manufacture of foam models using LFC technology for casting large-sized parts and products from aluminum, aluminum alloys, gray cast iron, etc.

**Chemical composition:** 10% MMA + 90% Styrene

**Dimensions:** 3000x1200x1000 mm.

**Density:** 18 – 28 kg/m<sup>3</sup>, according to customer's requirement.

- The carbon content in STMMA-FD is 82%, while EPS - up to 93%. STMMA-FD will significantly reduce cementation defects when casting steel / ductile iron, and reduce carbon emissions.
- STMMAFD has a lower temperature during casting, the gasification temperature is usually 50°C lower than EPS (STMMA-FD - 1450°C - 1480°C, EPS - 1460°C - 1500°C). It helps the foundry to save energy consumption about \$50 - \$100 per tonne of castings
- Molecular bonds break down orderly during STMMA burning, so liquid low molecular weight residues are formed in the process of destruction.
- EPS molecules are destroyed randomly, and the process is accompanied by the formation of tarry residues.
- STMMA-FD high molecular weight reduces model shrinkage.



Refractory coatings are highly permeable refractory materials for foam-patterns during lost foam casting; represent a powder mixture of corundum (aluminum oxide) and silica (silicon dioxide) as the main chemical components. Fire resistance > 1800°C.

### Applications

Refractory coating is used for coating foam-patterns made of polystyrene and methyl methacrylate copolymers (STMMA), polystyrenes (EPS) and their mixtures in the production of cast iron castings.

### Advantages

The coating has a high viscosity.

It has special characteristics that prevent spreading, so that the coating is smooth and durable.

The coating, after the immersion of the foam, does not drain, does not form cracks and folds.

Composition	Content, %
Al <sub>2</sub> O <sub>3</sub>	71.11
SiO <sub>2</sub>	22.91
TiO <sub>2</sub>	2.95
Fe <sub>2</sub> O <sub>3</sub>	1.79
K <sub>2</sub> O	0.40
CaO	0.22
Na <sub>2</sub> O	0.06
MgO	0.05
Ash content	0.19



Refractory coatings are highly permeable refractory materials for foam-patterns during lost foam casting; represent a powder mixture of aluminosilicate and andalusite as the main chemical components.



### Applications

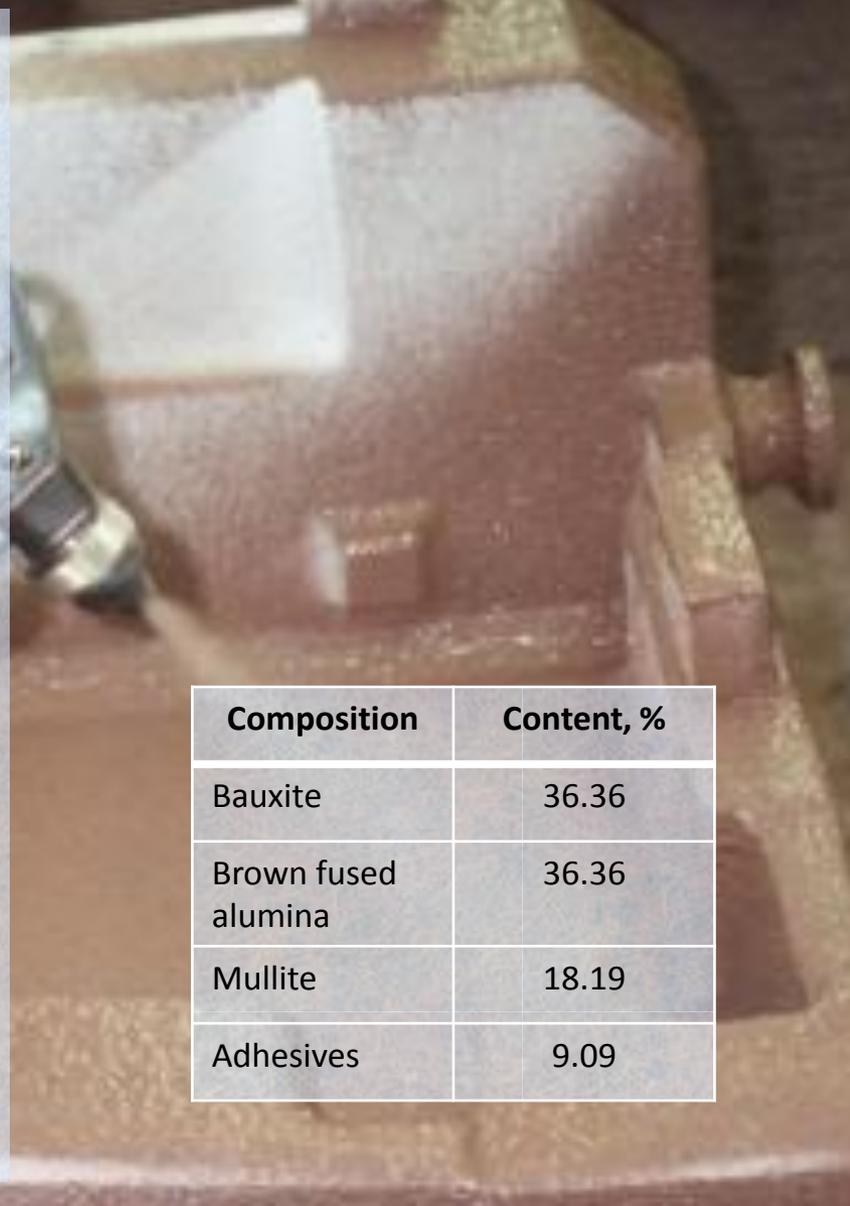
Refractory coating is used for coating foam-patterns made of polystyrene and methyl methacrylate copolymers (STMMA), polystyrenes (EPS) and their mixtures in the production of steel.



### Advantages

The coating has a high viscosity. It has special characteristics that prevent spreading, so that the coating is smooth and durable.

The coating, after the immersion of the foam, does not drain, does not form cracks and folds.



Composition	Content, %
Bauxite	36.36
Brown fused alumina	36.36
Mullite	18.19
Adhesives	9.09



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**Thank you!**

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