

**SSPE «ZIRCONIUM»**  
**offers you the following production :**

- **ZIRCONIUM NITRATE SOLUTION**
- **ZIRCONIUM OXINITRATE**
- **ZIRCONIUM TETRAFLUORIDE**
- **HAFNIUM TETRAFLUORIDE**
- **ZIRCONIUM OXIDE**
- **HAFNIUM OXIDE**
- **NUCLEAR-PURE ZIRCONIUM METAL**
- **NUCLEAR-PURE HAFNIUM METAL**
- **ZIRCONIUM AND HAFNIUM CATHODES**
- **ZIRCONIUM-BASED MASTER ALLOYS**
- **HAFNIUM-BASED MASTER ALLOYS**
- **ZIRCONIUM-NIOBIUM ALLOY**

## SSPE «ZIRCONIUM»

### ZIRCONIUM NITRATE SOLUTION

Appearance	Nitrate solution	
Zirconium content	35-45 g/l	
Nitric acid content, not more than	250 g/l	
Impurities fraction of total mass, as for zirconium mass, %, not more than:	Al - 0.002	Hf - 0.05
	Ni - 0.002	Cr - 0.005
	Si - 0.04	Fe - 0.09
	Ti - 0.002	

#### Main properties, field of application.

The product is used for manufacturing pure zirconium compounds, orthosulphates, oxynitrites, hydroxides, chlorides, in synthesis of organic compounds, such as: acetate, propionate, acetylacetonate. It is also used as a catalyst in organic synthesis, and in preparing pigments, glues and binders in polymeric emulsion systems. The product is a source material in zirconium dioxide manufacturing. It is preferable to use the solution when chloride and sulphate presence is undesirable. Calcium, magnesium and sodium additives introduction into the solution makes it possible to produce compositions on zirconium oxide base suitable for structural ceramics manufacturing.

#### Packing.

The product is produced and transported in stainless containers.

#### Guarantee term of storage.

3 months from the date of shipping to the user.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### ZIRCONIUM OXINITRATE

Appearance	Crystalline powder of white colour	
Zirconium content, not less than	20 % by wt.	
Impurities fraction of total mass, %, not more than:		
	Al - 0,002	Hf - 0,008
	Ni - 0,003	Cr - 0,003
	Si - 0,005	Fe - 0,008
	Ti - 0,004	

#### **Main properties, field of application.**

The product is used in zirconium oxide, fluoride, nitrate, sulphate and other compounds manufacturing.

#### **Packing.**

The product is packed in polyethylene double bags with soldered mouth, then placed into a case of textile fabric. One piece weight meets the user's request.

#### **Guarantee term of storage.**

6 months from the date of shipping to the user.

#### **Periodicity of delivery.**

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### ZIRCONIUM TETRAFLUORIDE

Brand	Industrial	Sublimated
Appearance	Fine-dispersed white powder	1-5 mm crystals
Main substance fraction of total mass, %, not less than	99.4	99.7
Zirconium fraction of total mass, %, not less than	54.0	54.2
Impurities fraction of total mass (to zirconium mass), %, not more than:		
•Hf	0.01	0.01
•Ni	0.005	0.02
•O	0.35	0.05
•Ti	0.004	0.005
•Si	0.02	0.02
•Fe	0.01	0.1
•A	0.003	0.006
•Cr	-	0.01

#### Main properties, field of application.

The product is used in manufacturing zirconium metal, its alloys and master alloys, as well as for ultra-pure zirconium tetrafluoride preparing, being utilized when producing special optical glass and guide light fiber.

#### Packing.

The product is packed in double polyethylene bags with soldered mouth, then placed into a case of textile fabric. One piece weight is up to 30 kg.

#### Guarantee term of storage.

According to oxygen content-3 months from the date of shipping to the user, according to other impurities-1 year.

#### Periodicity of delivery.

The product can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### HAFNIUM TETRAFLUORIDE

Appearance	Crystalline powder of white colour	Crystalline powder of white colour
Modification	Fine-crystalline	Coarse-crystalline
Crystal size	10 - 100 m	1 - 5 mm
Hafnium content, not less than	65 % by wt.	65 % by wt.
Impurities fraction of total mass (in terms of hafnium), %, not more than:	Si - 0.01 Al - 0.005 Ni - 0.02 Fe - 0.01 Mn - 0.0005 Zr - 0.6 O - 0.2	Si - 0.01 Al - 0.007 Ni - 0.002 Fe - 0.04 Mn - 0.008 Zr - 0.6 O - 0.04

#### Main properties, field of application.

The product is mainly used in manufacturing hafnium metal, its alloys and master alloys. The utilization of the product in process for producing ultra-pure hafnium tetrafluoride, being used as a necessary component in fibre optics, is considered to be envisaging in its further development.

#### Packing.

The product is packed in polyethylene double bags with soldered mouth, then placed into a case of textile fabric. One piece weight is not more than 30 kg.

#### Guarantee term of storage.

1 year from the date of shipping to the user.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### ZIRCONIUM OXIDE

Brand Appearance	Industrial Fine dispersed white powder	Pure Crystalline white powder	Ultra-pure Crystalline white powder
Main substance fraction of total mass, %, not less than:	99.5	99.7	99.7
Impurities fraction of total mass, %, not more than:			
•Fe	0.04	0.005	0.004
•Al	0.0005	-	-
•Ca	0.3	-	-
•Mg	0.006	-	-
•Si	0.03	0.004	0.004
•Ti	0.006	-	-
•P	0.02	-	-
•Na	0.015	-	-
•K	0.017	-	0.02
•Cl	0.02	0.001	0.0001
•Ni	-	0.001	0.0001
•Cr	-	0.001	0.0001
•Mn	-	0.001	0.0001
•Cu	-	0.001	0.0001
•Co	-	0.001	0.00005

#### Main properties, field of application.

The product is used in manufacturing refractories, parting pastes and paints, chemical-resistant enamels and glazes, abrasives, semiprecious stones, etc. Compositions on zirconium oxide base are used as a source material in producing ceramics, including structural ones.

#### Packing.

The product is packed in polyethylene double bags with soldered mouth, then placed into a case of textile fabric. One piece weight is up to 30 kg.

#### Guarantee term of storage.

1 year from the date of shipping to the user.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### HAFNIUM OXIDE

Appearance	White powder
Main substance	HfO <sub>2</sub> +ZrO <sub>2</sub>
fraction of total mass, not less than	99.3%
Impurities fraction of total mass, %, not more than:	
•ZrO <sub>2</sub>	1.0
•SiO <sub>2</sub>	0.01
•FeO <sub>2</sub>	0.02
•AlO <sub>3</sub>	0.2
•TiO <sub>2</sub>	0.1
•MgO	0.005
•CaO	0.003
Losses by calcination, not more than	0.3%

#### Main properties, field of application.

- The product is used in manufacturing nuclear reactors' protective screens, refractories and special heat-resistant optical glass.

#### Packing.

Hafnium oxide is packed in double polyethylene bags with soldered mouth at 15 kg apiece. The bags are placed into wooden boxes or sewed up in sacks of textile fabric.

#### Guarantee term of storage.

9 months from the date of shipping.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### NUCLEAR-PURE ZIRCONIUM METAL

Appearance	Finished ingots	
Dimensions:		
-diameter	220-250 mm	
length, not more than	1200-1300 mm	
Mass, not more than	500 kg	
Zirconium fraction of total mass, not less than	99.7 %	
Impurities fraction of total mass, %, not more than		
	Hf - 0.01	Cd - 0.00003
	Si - 0.01	Al - 0.005
	Ni - 0.01	Cu - 0.005
	Ca - 0.01	Mn - 0.002
	Pb - 0.005	Ti - 0.07
	B - 0.00005	Be - 0.0005
	Fe - 0.05	Cr - 0.005
	O - 0.14	C - 0.02
	N - 0.006	F - 0.003
	Cl - 0.003	Mo - 0.005
	Li - 0.0002	K - 0.004

#### Main properties, field of application.

Zirconium unique physical and chemical properties such as neutron transparency, inertness in corrosive and biological mediums at different temperatures, high gas absorption open new prospects in different fields of application:

- \*nuclear power - as a structural material;
- \*ferrous metallurgy - as an absorber, deoxidant, denitrator in armour, gun and high-temperature steels manufacturing;
- \*non-ferrous metallurgy - in alloys on magnesium, aluminium, copper, nickel base of different purpose;
- \*chemical and oil-refining industries - in producing equipment, being operated in corrosive mediums (when acetic, phosphoric, chromatic acid manufacturing);
- \*electronic and electrical engineering - as a structural material, getter material, electrodes.

#### Packing.

Zirconium ingots are wrapped up in polyethylene film and packed into wooden boxes, one piece weight is up to 500 kg.

#### Guarantee term of storage.

Unlimited.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.



## SSPE «ZIRCONIUM»

### NUCLEAR-PURE HAFNIUM METAL

Appearance	Finished ingots	
Dimensions: diameter	240 mm	
length, not more than	1000 mm	
Mass, not more than	500 kg	
Hafnium (with zirconium) fraction of total mass, not less than	99.8 %	
Impurities fraction of total mass, %, not more than:		
	Zr - 1.0	Cr - 0.003
	Si - 0.005	O - 0.05
	Al - 0.005	C - 0.01
	Ni - 0.02	N - 0.005
	Cu - 0.005	Mo - 0.01
	Ca - 0.01	Mg - 0.004
	Mn - 0.0005	Nb - 0.01
	Fe - 0.04	Y - 0.01
	Ti - 0.005	

#### Main properties, field of application.

Hafnium metal unique physical and chemical properties have opened great prospects for application of the product in different branches of national economy:

- \*nuclear power - as an absorbing and structural material;
- \*ferrous metallurgy - as alloying additions in manufacturing high-quality steels, special purpose heat-resistant alloys, and high-quality magnets on rare-earths base ;
- \*machine building - as wear-resistant coating for tools, details, turbine blades;
- \*rocket production and aircraft industry-as an addition, improving mechanical strength and lowering oxidizability of tantalum, niobium, molybdenum and nickel alloys;
- \*space engineering - as a protective alloys against X-rays.

#### Packing.

Hafnium ingots are wrapped up in polyethylene film and packed into wooden boxes, one piece weight is up to 500 kg.

#### Guarantee term of storage.

Unlimited.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### ZIRCONIUM AND HAFNIUM CATHODES

Determined element content, %, by wt. not more than	Zirconium cathodes	Hafnium cathodes
	Nb - 3.0	
	N - 0.06	Ni - 1.0
	Fe - 0.3	Zr - 2.0
	Al - 0.1	Ca - 0.1
	O - 0.3	N - 0.005
	C - 0.2	C - 0.2
	Si - 0.1	O - 0.3
	Ca - 0.1	

#### **Main properties, field of application.**

Cathodes of zirconium, hafnium and their alloys (components are taken in different ratio) are used as a wear-resisting coating in form of nitrides, oxides, oxinitrides and other compounds. The wear-resisting coating are applied onto cutting tools, made of high-speed steels and hard alloys, onto turbine blades and friction couple elements (e.g., gear couplings, shafts, bushes), that allows to prolong 10 times as much service life of the products.

#### **Packing.**

The product is packed into wooden boxes, one piece weight meets the user's request.

#### **Guarantee term of storage.**

1 year from the date of shipping to the user.

#### **Periodicity of delivery.**

The products can be supplied evenly during the year by equal lots monthly.

## SSPE «ZIRCONIUM»

### ZIRCONIUM-BASED MASTER ALLOYS

Appearance	Irregular shape pieces	Irregular shape pieces	Irregular shape pieces
Alloying additives	Nickel	Aluminium	Copper
Mass, not more than	30 kg Zr-Ni	2 kg Zr-Al	2 kg Zr-Cu
Impurities content,%, not more than:			
Fe	-	0,2	0,8
O	-	0,2	-
N	-	0,04	-
Si	-	0,1	0,1
C	-	0,02	-
Al	-	-	0,1
Ca	1	0,02	1
F	-	-	-
P	-	-	0,1
Nb	2,5	1	1,5

#### Main properties, field of application.

Zirconium-based master alloys are used as alloying additives in special steels and alloys production. Zr-Ni master alloy is used in refractory corrosion-resistant nickel alloy manufacturing for needs of aircraft industry and space engineering, as a catalyst in organic synthesis. Nickel content in the master alloy is 20-60% by weight. Zr-Al master alloy is used for melt alloying and as a getter for noble gas deep cleaning. Aluminium content in the master alloy is 5-50 % by weight. Zr-Cu master alloy is used for special alloys manufacturing, the additives considerably improve statuary bronze. Copper content in the master alloy is 45-55 % by weight.

#### Packing.

The master alloy pieces are wrapped up in polyethylene film and packed into wooden boxes, one piece weight meets the user's request.

#### Guarantee term of storage.

Unlimited.

#### Periodicity of delivery.

The products can be supplied according to the user's request.

## SSPE «ZIRCONIUM»

### HAFNIUM-BASED MASTER ALLOYS

Appearance	Irregular shape pieces	Irregular shape pieces	Irregular shape pieces
Mass, not more than	2 kg	2 kg	2 kg
Alloying additives	Nickel(Hf-Ni)	Iron(Hf-Fe)	Aluminium(Hf-Al)
Impurities content, %, not more than:			
+Zr	1,0	0,1	1,0
+N	0,01	0,01	0,01
+Ca	0,05	-	-
+O	0,2	0,1	0,1
+C	0,2	0,01	0,01
+Si	-	0,01	0,01
+Ti	-	0,01	0,01
+Al	-	0,01	-
+Ni	-	0,01	0,04
+Fe	-	0,04	0,04

#### Main properties, field of application.

Hafnium-based master alloys are used as a component in high-temperature steels, special alloys for rocket and space technology manufacturing. Hf-Ni master alloy is used as a component in manufacturing high temperature steels, aircraft turbine blades, jet engines, special alloys for needs of rocket industry and space engineering. Nickel content in the master alloy is 9-12% by weight. Hf-Fe master alloy is used in high-temperature and corrosion-resistant alloys manufacturing. Iron content in the master alloy is 3-5 % by weight. Hf-Al master alloy is used in special alloys manufacturing. Aluminium content in the master alloy is 5-15 % by weight.

#### Packing.

The master alloy pieces are wrapped up in polyethylene film and packed into wooden boxes, one piece weight meets the user's request.

#### Guarantee term of storage.

Unlimited.

#### Periodicity of delivery.

The products can be supplied according to the user's request.

## SSPE «ZIRCONIUM»

### ZIRCONIUM-NIOBIUM ALLOY

Appearance	Finished ingots	
Dimensions:		
diameter	Up to 300 mm	
length, not more than	Up to 1300 mm	
Mass, not more than	450 kg	
Fraction of total mass of zirconium in sum with alloying additions, not less than	99 %	
Fraction of total mass of impurities and alloying additions, %, not more than:		
	Nb - 3.0	Fe - 0.3
	O - 0.3	Si - 0.1
	N - 0.05	Al - 0.1
	C - 0.2	Ca - 0.1

#### Main properties, field of application.

The zirconium-niobium alloy is used in ferrous and non-ferrous metallurgy, chemical and food industries, electronic and electric engineering. Zr-Nb, Nb-Zr-Ti alloys strengthened by zirconium nitride or carbide are applied in gas turbine blade, valve, mould manufacturing. The alloy application as magnetic materials and superconductors is being developed.

#### Packing.

The ingots are wrapped up in polyethylene film and packed into wooden boxes, one piece weight.

#### Guarantee term of storage.

Unlimited.

#### Periodicity of delivery.

The products can be supplied evenly during the year by equal lots monthly.