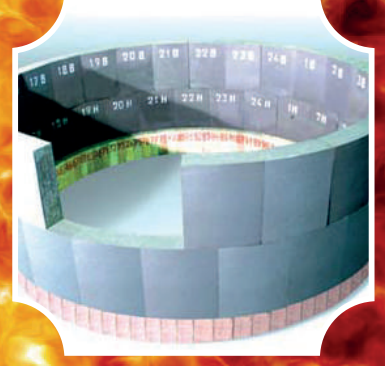




bakor

BAKOR
RESEARCH AND DEVELOPMENT CENTER

SPECIAL REFRACTORIES REFRACTORY MATERIALS



EXPERIENCE • INNOVATIONS • RELIABILITY

Bakor Research and Development Center is a national leader in development and manufacturing of new materials and technologies in the area of technical ceramics and composites used for manufacturing of commercial products.

With current market requirements taken into account together with the state policy for promotion of innovations, the most important area of our business is development and manufacturing of import substituting and export oriented products. Our products are designed to meet energy saving, environmental and process efficiency challenges of steelworks, petrochemical and glass manufacturing plants, nuclear, mining and smelting and other industries.

Our creative and highly professional teams, state-of-the-art research, testing and manufacturing facilities have been used for 25 years for development of a series of new efficient products and technologies for high temperature processes and machinery.

Development of refractories for specific operating environments that require special properties and performance enables using our refractories in a wide range of applications.

For many industrial companies our innovations have no alternatives for implementation of their own front edge technologies.

Bakor Research and Development Center has been working for many years in industrial supplies and analysis of developed refractories performance in heating units. We develop profound recommendations on the efficient arrangement of refractories, provide process support for furnace warm-ups by personnel of the center, monitor furnace performance and provide prompt response to challenges and tasks of the customer.

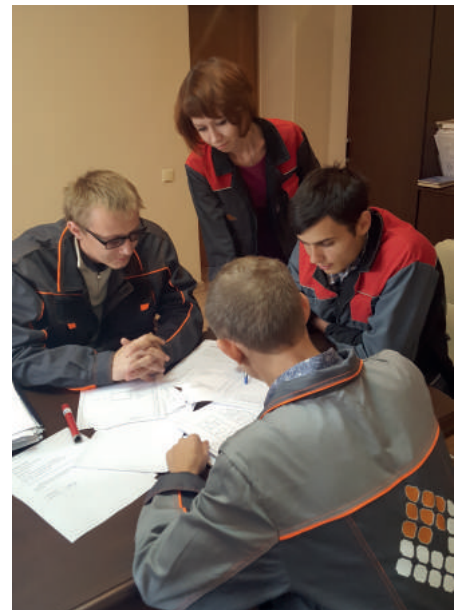
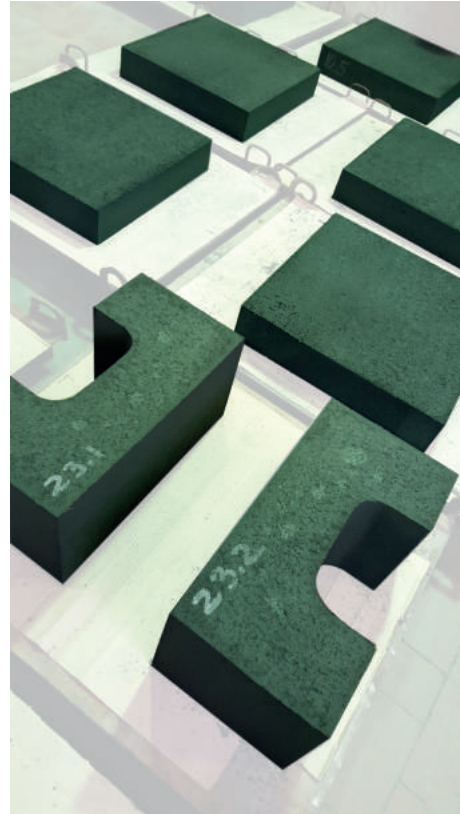
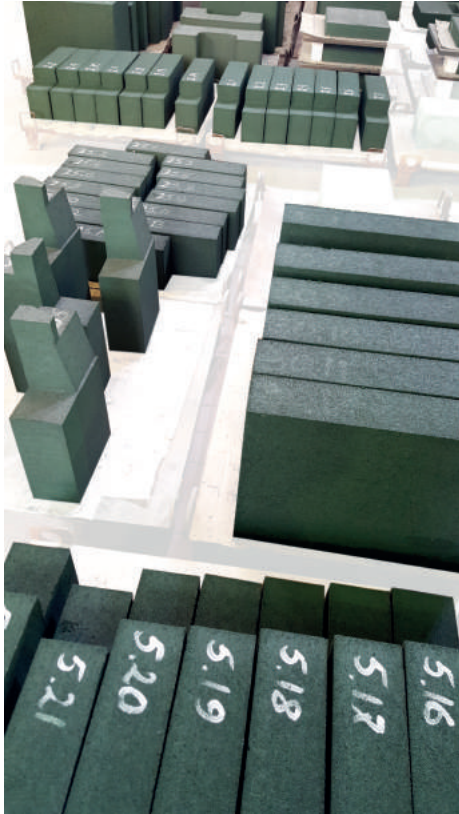


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CHROMIUM OXIDE REFRACTORIES



INDUSTRIES

- Heat insulation production
- Glass production
- Metallurgy

HEATING UNIT TYPES

- Smelters for glass, staple fibre and basalt fibre production
- Smelters for radioactive waste disposal

BENEFITS

- High corrosion resistance to corrosive flux, advanced glass-attack resistance
- High performance
- Extended service life of furnace

SHAPE AND DIMENSIONS

- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Slatted blocks, complex shaped products
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES

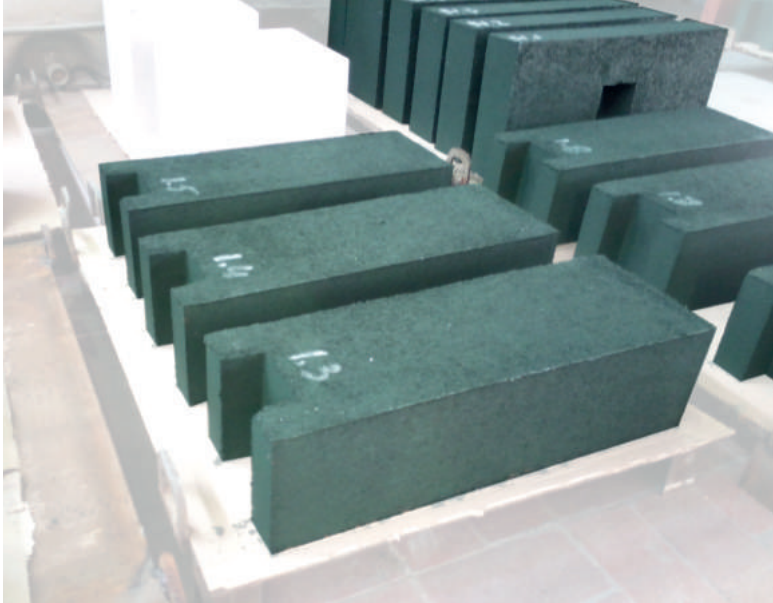
Cr₂O₃, %, MINIMUM

92,5

INITIAL SOFTENING TEMPERATURE, °C, MINIMUM

1720

CHROMIUM CORUNDUM REFRACTORIES



INDUSTRIES

- Glass production
- Heat insulation production
- Ceramics production
- Metallurgy

BENEFITS

- Advanced corrosion resistance in case of contact with high temperature corrosive molten metals, slag and minerals
- Significant increase of furnace service life as compared to conventional refractories

HEATING UNIT TYPES

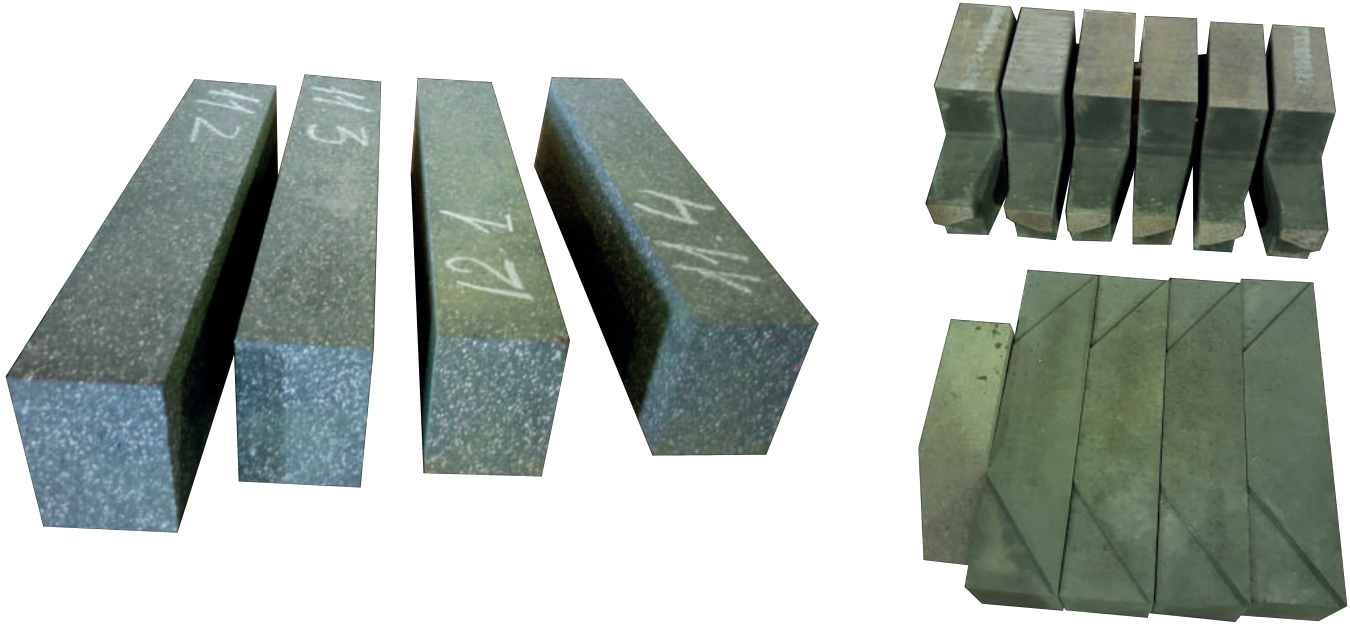
- Glass melting furnaces
- Smelters for nonferrous metallurgy
- Smelters for heat insulating materials production
- Baths and arc furnaces for basalt melting

SHAPE AND DIMENSIONS

- Wall blocks, complex shaped products
- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Bricks (straight, skew, circle)
- Wedge bricks (neck, end) up to and including 380mm
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES	XKT-15	XKT-30	XKT-45	XKT-60
Al ₂ O ₃ , %, MINIMUM	80	67	50	33
Cr ₂ O ₃ , %, MINIMUM	15	27	45	60
INITIAL SOFTENING TEMPERATURE, °C, MINIMUM	1700	1700	1700	1700

CHROMIUM ALUMINUM AND ZIRCONIUM REFRACTORIES



INDUSTRIES

- Heat insulation production
- Glass production
- Metallurgy

BENEFITS

- Advanced glass-attack resistance, advanced resistance to corrosive flux
- Advanced performance, increased service life of furnace

HEATING UNIT TYPES

- Smelters for fiberglass
- Smelters for basalt
- Smelters for mineral fibre
- Smelters for nonferrous metallurgy

SHAPE AND DIMENSIONS

- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Complex shaped products
- Bricks (straight, skew, circle)
- Wedge bricks (neck, end) up to and including 380 mm
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES	XAL-30	XAL-45	XAL-60
Cr ₂ O ₃ , %, MINIMUM	30	45	60
Al ₂ O ₃ , %, MINIMUM	31	25	17
ZrO ₂ , %, MINIMUM	20	15	12
INITIAL SOFTENING TEMPERATURE, °C, MINIMUM	1600	1650	1700

CORUNDUM, MULLITE AND ZIRCONIUM REFRACTORIES



INDUSTRIES

- Metallurgy
- Glass production
- Heat insulation production
- Ceramics production

BENEFITS

- High resistance to corrosive gases, flux and condensate
- No chemical reaction between refractory and coupling medium
- No volumetric and linear deformation of refractories during operation
- High resistance to shocks, thermal and dynamic loads

HEATING UNIT TYPES

- Smelters for "E" type corrosive glass for fiberglass production
- Smelters for mineral rock for basalt and mineral fibre production
- Heating furnaces
- Smelters for soluble potassium and borosilicate glass production
- Fritting furnaces
- Smelters and heating units for ferrous and non-ferrous metallurgy

SHAPE AND DIMENSION

- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Brick, blocks, complex shaped products
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES

Al₂O₃, %, MINIMUM

82,5

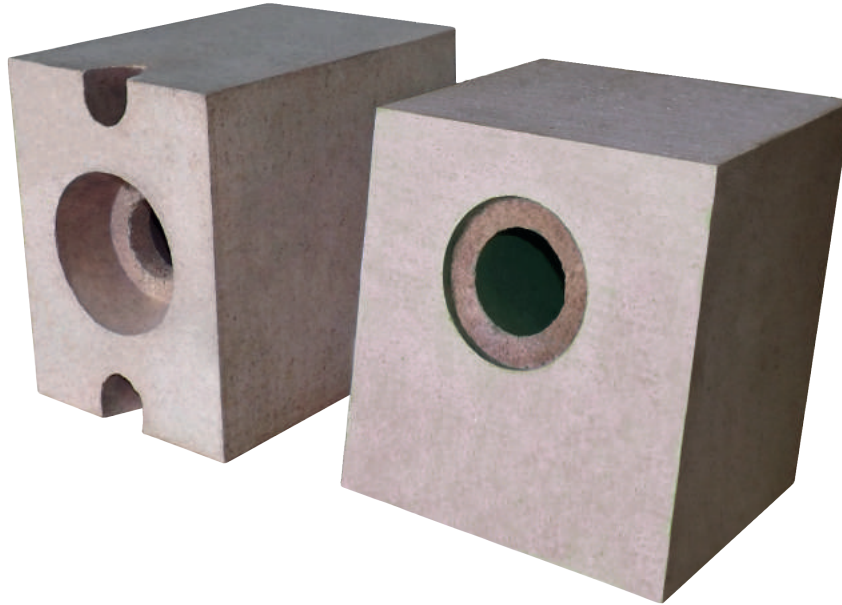
ZrO₂, %, MINIMUM

10,0

INITIAL SOFTENING TEMPERATURE, °C, MINIMUM

1800

BADDELEYITE AND CORUNDUM REFRACTORIES



INDUSTRIES

- Chemical and petrochemical industry
- Glass production
- Ceramics production

HEATING UNIT TYPES

- Baths and rotating kilns for frit melting
- Glass melting furnaces
- Incinerators
- Cladding of smelters for non-ferrous industry
- High temperature units for chemical and petrochemical industries including those working with vapors of acids and alkali

BENEFITS

- Chemical resistance
- Advanced heat resistance
- Corrosion resistance to frit flux, corrosive acidic and alkaline environment at high temperatures up to 1200°C

SHAPE AND DIMENSIONS

- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Bricks (straight, skew, circle)
- Wedge bricks (neck, end) up to and including 380mm
- Complex shaped products • Customized products

PHYSICAL AND CHEMICAL PROPERTIES

Al₂O₃, %, MINIMUM

45

ZrO₂, %, MINIMUM

25

INITIAL SOFTENING TEMPERATURE, °C, MINIMUM

1500

HIGH TEMPERATURE CONDUCTING METAL SYSTEM



INDUSTRIES

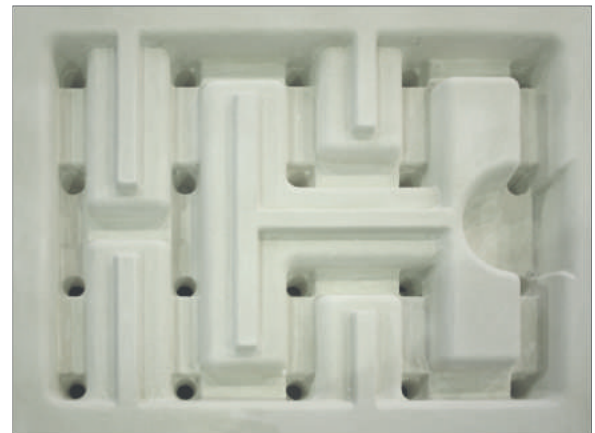
- Metallurgy

BENEFITS

- High heat resistance
- High corrosion resistance
- No reaction with molten metal
- No molten metal contamination in case of contact with ceramic foundry accessories

SHAPE AND DIMENSIONS

- Complex shaped products
- Customized products



PHYSICAL AND CHEMICAL PROPERTIES	МПС-70	МПС-90	МПС-95
Al ₂ O ₃ , %, MINIMUM	70	90	95
INITIAL SOFTENING TEMPERATURE, °C, MINIMUM	1650	1750	1800

CRUCIBLES FOR METAL AND ALLOY MELTING



INDUSTRIES

- Aircraft engines manufacturing
- Machine building
- Ferrous and non-ferrous metallurgy

HEATING UNIT TYPES

- Vacuum induction furnace
- Induction furnace
- Resistance furnace

BENEFITS

- Advanced thermal and erosion resistance
- Increased (up to 98%) casting yield with reduced spoiled casting with oxide and slag inclusions

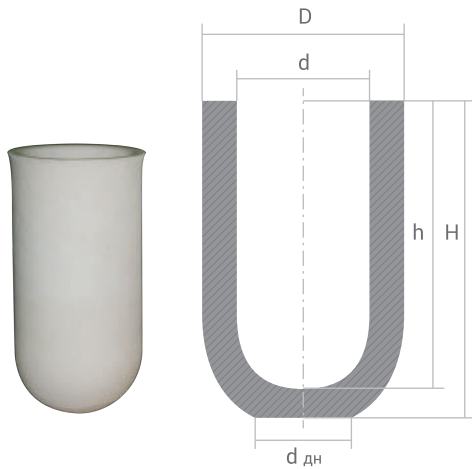
SHAPE AND DIMENSIONS

- Crucible capacities from 1.3 to 100L.
- Optional customized crucibles

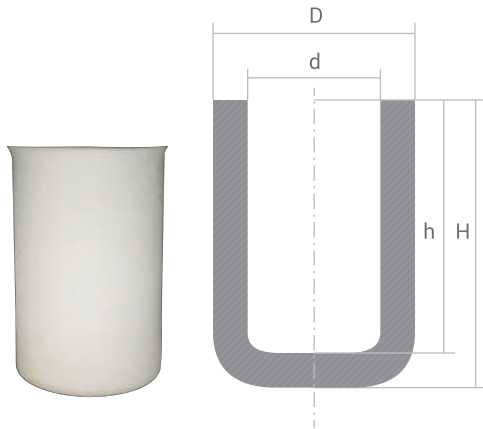


PHYSICAL AND CHEMICAL PROPERTIES

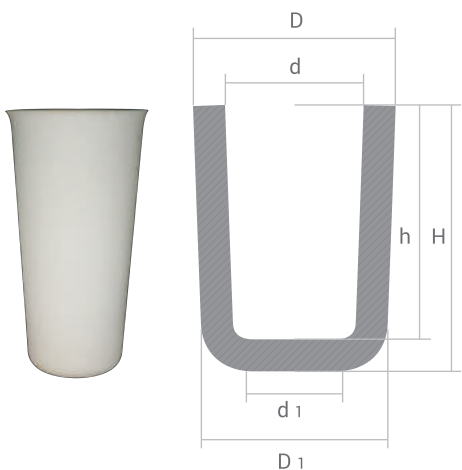
PROPERTY / GRADE	TK	ТП	ТМК	ТКМЦ
Al ₂ O ₃ , %, MINIMUM	97	–	90	80
MgO, %, MINIMUM	–	96	–	–
APPLICATION TEMPERATURE, °C, MAX	1750	1800	1700	1700



DESCRIPTION AND PRODUCT CODE	CRUCIBLE WEIGHT, KG (APPROX.)	CRUCIBLE VOLUME, L	SIZE				
			D	H	d	h	d ДН
№0	1,7	1,36	124	200	110	193	50
№1	3,7	2,6	140	286	120	265	60
№2	8,4	4,5	168	330	148	307	60
№3	8,9	6,1	177	405	152	380	60



DESCRIPTION AND PRODUCT CODE	CRUCIBLE WEIGHT, KG (APPROX.)	CRUCIBLE VOLUME, L	SIZE			
			D	H	d	h
№4	8,2	5,3	165	370	140	350
№5	8,8	5,4	195	260	170	240
№6	19,5	12,1	242	390	206	365
№7	34,0	19,0	285	465	235	445
№11	187,0	93,0	560	600	480	560



DESCRIPTION AND PRODUCT CODE	CRUCIBLE WEIGHT, KG (APPROX.)	CRUCIBLE VOLUME, L	SIZE					
			D	H	d	h	D 1	d 1
№8	5,6	3,4	165	290	138	265	140	100
№9	7,5	2,8	230	135	190	115	230	180
№10	32,8	20,0	330	380	280	350	330	250
№12	3,7	3,3	148	260	128	245	138	98
№13	14,2	7,8	197	390	165	368	197	127
№14	10,2	7,4	210	320	186	296	210	80
№15	20,6	10,4	230	420	185	395	230	140

HIGH TEMPERATURE CERAMIC INSULATION WITH PURE OXIDES



INDUSTRIES

- Oil, gas and oil processing industries
- Chemical industry
- Metallurgy

BENEFITS

- Advanced chemical purity
- Advanced resistance to corrosive gases and flux
- No volumetric and linear deformation

HEATING UNIT TYPES

- High temperature heating furnaces and smelters

SHAPE AND DIMENSIONS

- Complex shaped products
- Bricks (straight, skew, circle)
- Wedge bricks (neck, end) up to and including 380mm
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES / GRADE	ИCHK-30	ИCHK-20	ИCHK-21	ИCHK-31
Al ₂ O ₃ , %, MINIMUM	99,5	99,5	99,5	99,5
APPLICATION TEMPERATURE, °C, MAX	1850	1800	1850	1850
COMPRESSION STRENGTH, MPA, N*M.	80	12	25	11

CERAMIC LINERS



INDUSTRIES

- Oil, gas and oil processing industries

BENEFITS

- Operation in deoxidizing atmosphere
- Corrosion and thermal resistance
- High operating temperature

HEATING UNIT TYPES

- Claus unit

SHAPE AND DIMENSIONS

- Customized products

PHYSICAL AND CHEMICAL PROPERTIES

Al₂O₃, %, MINIMUM

90

APPLICATION TEMPERATURE, °C, MAX

1550

COMPLEX SHAPED REFRACTORY PRODUCTS FOR VARIOUS APPLICATIONS



INDUSTRIES

- Metallurgy
- Chemical industry
- Oil, gas and oil processing industries
- Machine building

BENEFITS

- High chemical purity
- High resistance to corrosive gases and flux
- No volumetric and linear deformation
- High strength and refractory properties

HEATING UNIT TYPES

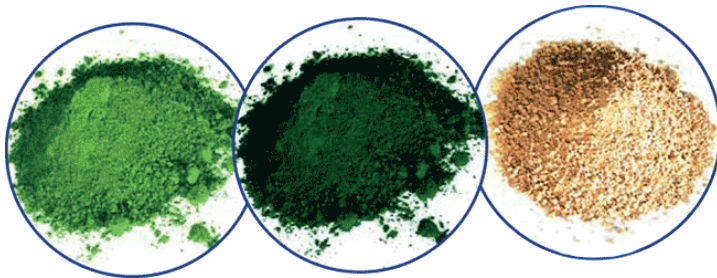
- Smelting and casting units for steel casting
- Incinerators and reactors for various waste disposal
- Ammonia production furnaces

SHAPE AND DIMENSIONS

- Complex shaped products
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES	ИКТ-90	ИКТ-94	ИКТ-96	ИКТ-99
Al ₂ O ₃ , %, MINIMUM	97	94	96	99,5
INITIAL SOFTENING TEMPERATURE, °C, MINIMUM	1700	1800	1800	1850
HEAT RESISTANCE (1300°C-WATER) THERMAL CYCLES, MINIMUM	10	10	10	2

REFRACTORY MORTAR AND CONCRETE



INDUSTRIES

- Metallurgy
- Oil, gas and oil processing industries
- Glass production
- Heat insulation production

BENEFITS

- Homogeneous mixture structure
- High binding properties
- Extended shelf life
- High thermal resistance
- High resistance to corrosive gases and flux

HEATING UNIT TYPES

- Cladding and joint sealing during refractory cladding and heating unit manufacturing
- Cementing of solid furnace masonry

PHYSICAL AND CHEMICAL PROPERTIES OF MORTAR	МБК-30М	МКМЦ	МХ-85	МХ-30
Al ₂ O ₃ , %, WT	50	80	3	60
ZrO ₂ , %, WT	30	9	–	–
Cr ₂ O ₃ , %, WT	–	–	85	30

PHYSICAL AND CHEMICAL PROPERTIES OF CONCRETE	БККАР-80	БКМ-70	БКК-25	БК-95
Al ₂ O ₃ , %, WT	80	70	50	95
ZrO ₂ , %, WT	–	–	23	–
APPLICATION TEMPERATURE, °C, MINIMUM	1600	1550	1500	1700

CASTING ACCESSORIES FOR SMELTING AND CASTING UNITS



INDUSTRIES

- Non-ferrous metallurgy

BENEFITS

- High mechanical strength
- No deformation or linear dimensions variations
- Reliable performance of the working surface
- Thermal and chemical resistance to molten aluminum and copper

HEATING UNIT TYPES

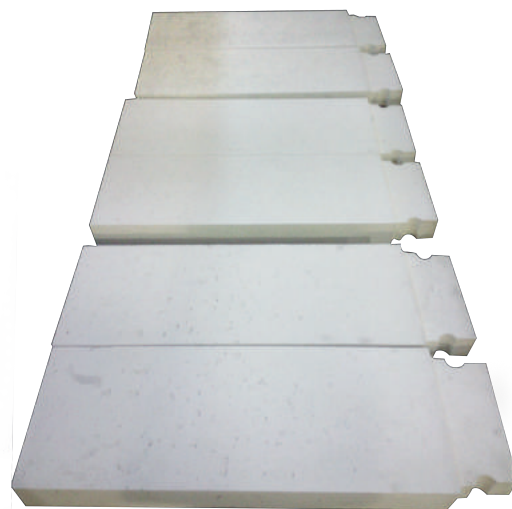
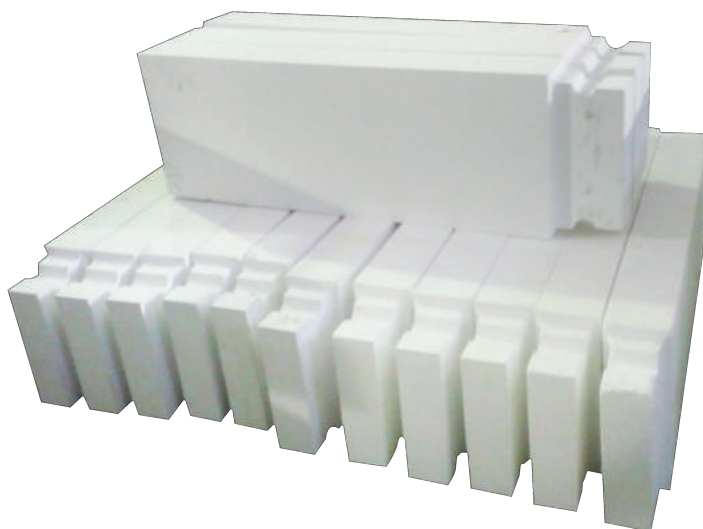
- Smelting and casting units for aluminum casting
- Smelting and casting units for copper casting

SHAPE AND DIMENSIONS

- Complex shaped products (rings, liners, chutes and funnels)
- Customized products

PHYSICAL AND CHEMICAL PROPERTIES	МПС-70	ГВЛК-10
Al ₂ O ₃ , %, MINIMUM	70	–
SiO ₂ , %, MINIMUM	–	67
CaO, %, MINIMUM	–	12
APPLICATION TEMPERATURE, °C, MAX	1650	900

HEAT RESISTANT CORUNDUM AND ZIRCONIUM PRODUCTS



INDUSTRIES

- Glass production
- Ceramics production
- Aircraft engines manufacturing
- Machine building



BENEFITS

- Chemical resistance
- High heat resistance
- Corrosion resistance to molten metals, glass, frits at high temperatures



HEATING UNIT TYPES

- Glass melting furnaces
- Cladding of smelters for non-ferrous industry
- High temperature units for chemical and petrochemical industries including those working with vapors of acids and alkali

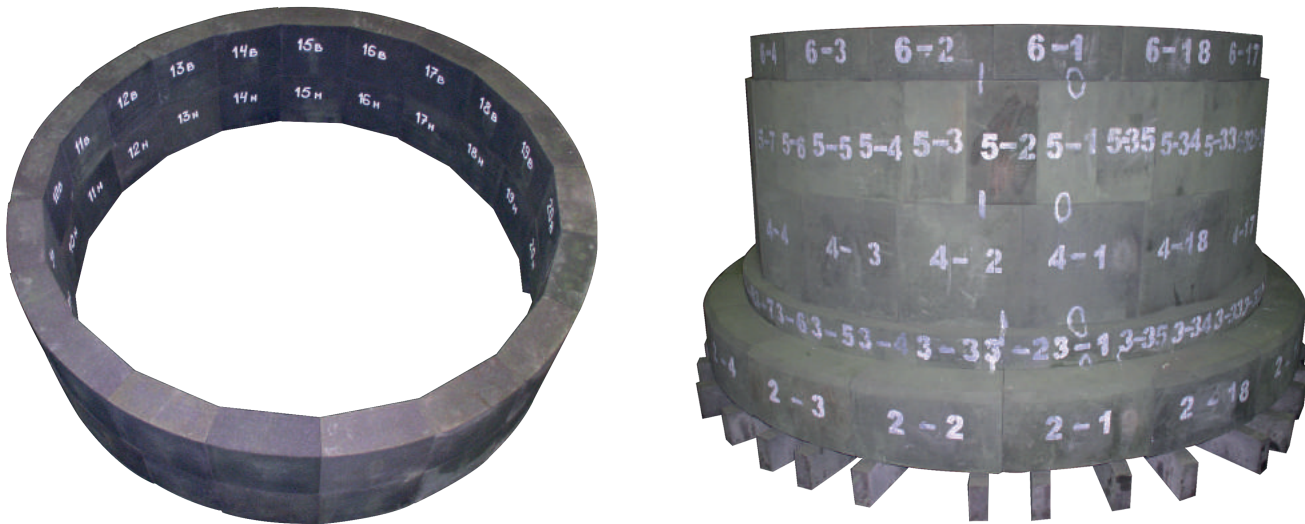


SHAPE AND DIMENSIONS

- Plates (600x300x75, 600x150x75, 400x300x50, 400x150x50, etc.)
- Blocks (600x300x250, 600x400x250, 500x300x250, 500x400x250, etc.)
- Complex shaped products • Customized products

PHYSICAL AND CHEMICAL PROPERTIES OF MORTAR	KLQT-20	KLQT-5B	KLQT-5
Al ₂ O ₃ , %, MINIMUM	70	90	90
ZrO ₂ , %, MINIMUM	17	2,5	2,5
APPLICATION TEMPERATURE, °C, MAX	1600	1650	1650
HEAT RESISTANCE (1300°C-WATER) THERMAL CYCLES, MINIMUM	10	25	25

REFRACTORY CLADDING ASSEMBLIES FOR FURNACES

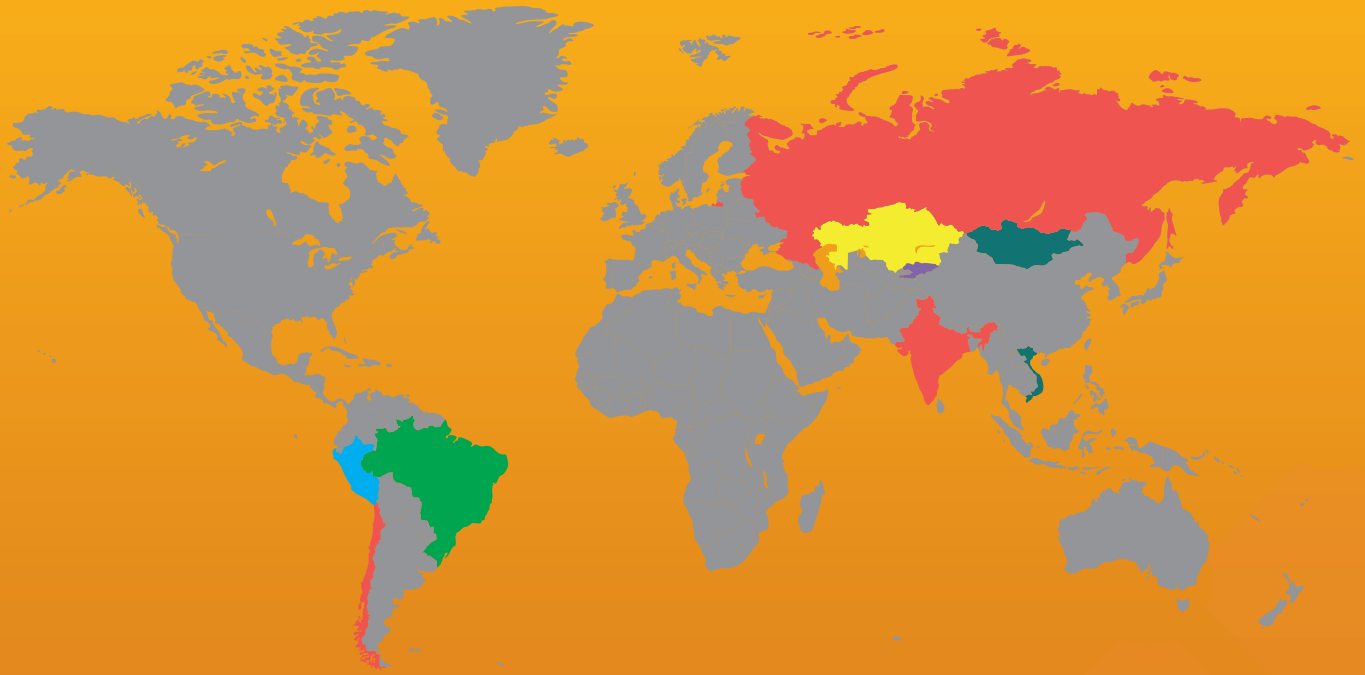


INDUSTRIES

- Metallurgy
- Glass production
- Heat insulation production
- Chemical and petrochemical industry
- Ceramics production

For the maximum extension of service life of refractory cladding in heating units, Bakor Research and Development Center offers the following comprehensive solutions, including, but not limited to:

- Development, validation and submission of recommendations for efficient arrangement of refractories in various zones of the furnace for uniform and predictable wear of cladding during its operation
- Complete mechanical treatment of refractories
- Test assembly and marking of various elements and the whole cladding of the furnace
- Designer supervision and cladding installation by personnel of Bakor Research and Development Center
- Submission of recommendations for furnace warm up
- Process support of furnace operation by personnel of the center
- Furnace cladding inspection after the cycle is completed, analysis of refractories performance and submission of recommendations for furnace provision with refractories for the next cycle.



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