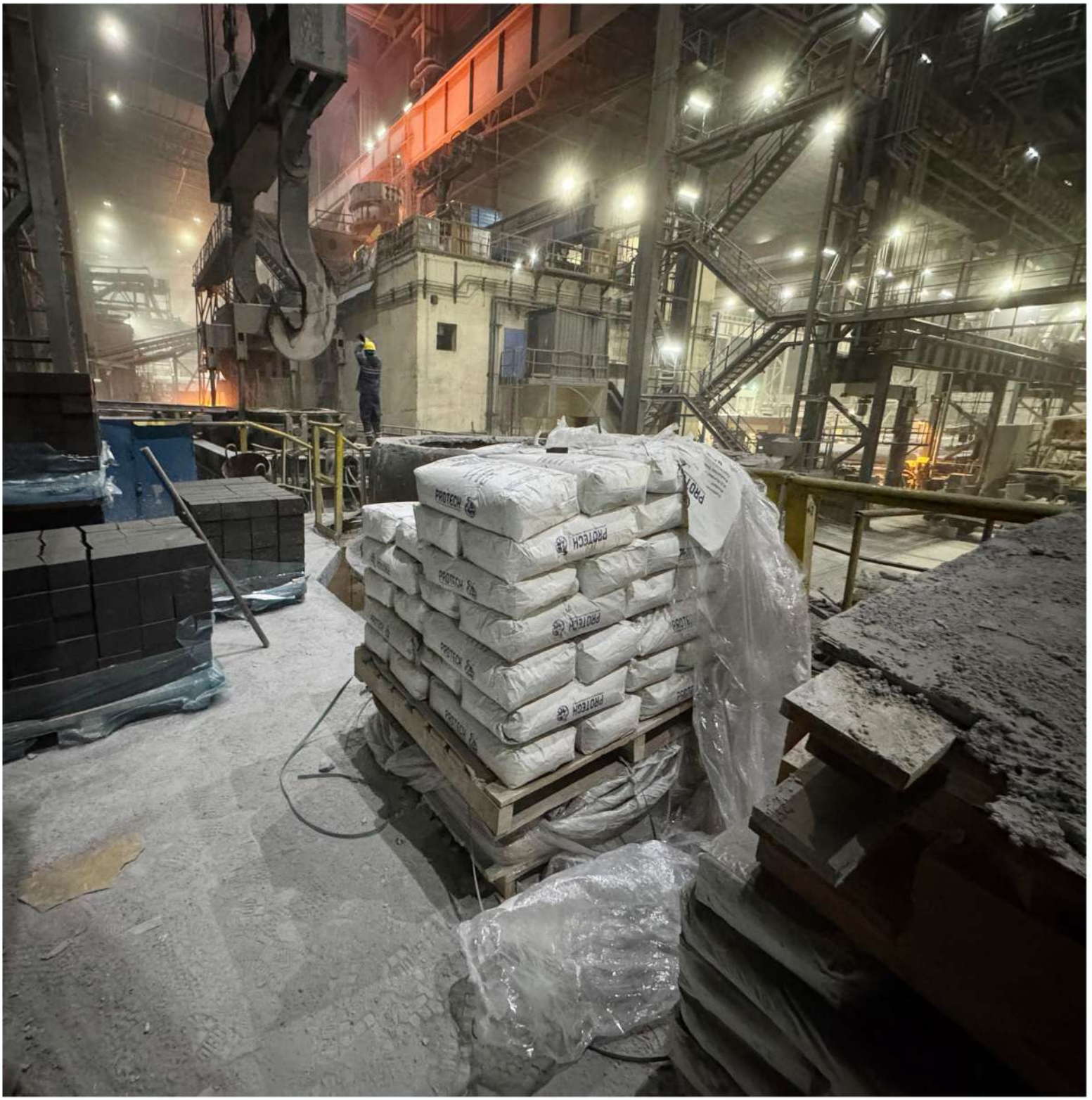
PROTECH

REFRACTORIES & BUILDING MATERIALS



PROTECH
REFRACTORIES & BUILDING MATERIALS

CALCINED KAOLIN :

Calcined kaolin is chemically knowns as de-hydrated Aluminum silicate used in many industries such as Ceramic (Glaze, Engobe, Body grade), Paper, Plastic, Rubber, Pharmaceuticals, Porcelain, Cosmetic, Ink, Dyes, Fiberglass, and Paint Industry.

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PROTECH
REFRACTORIES & BUILDING MATERIALS

PROTECH FOR REFRACTORIES

PROTECH for develops refractories

PROTECH develops and produces refractory products for the steel industry. We offer a full range of unshaped products.

PROTECH offers refractory solutions from the completely fireproof monolithic raw material mix up to the fully assembled vacuum snorkel with integrated argon gas pipes.

Our philosophy: We supply refractory concepts, tailor-made to the individual customer's demands. We recognise that every steel mill is unique. Each plant needs an individual solution – and this must be innovative and cost efficient.

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PROTECH
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Tundish Spray Mass

Tundish Spray Mass is a Magnesia-based material designed and graded less than 1 mm to be sprayed as working layer for tundish that serve many purposes during and after casting.

PT5001-HM	
Chemical Properties.	
MgO	90.0 %
CaO	3.0 %
Fe_2O_3	1.5%
SiO_2	5.0 %
Physical Properties.	
Grain size	0-0.5 mm
Bulk Density	1.4 – 1.7 g/cm^3
Expiration	12 Months

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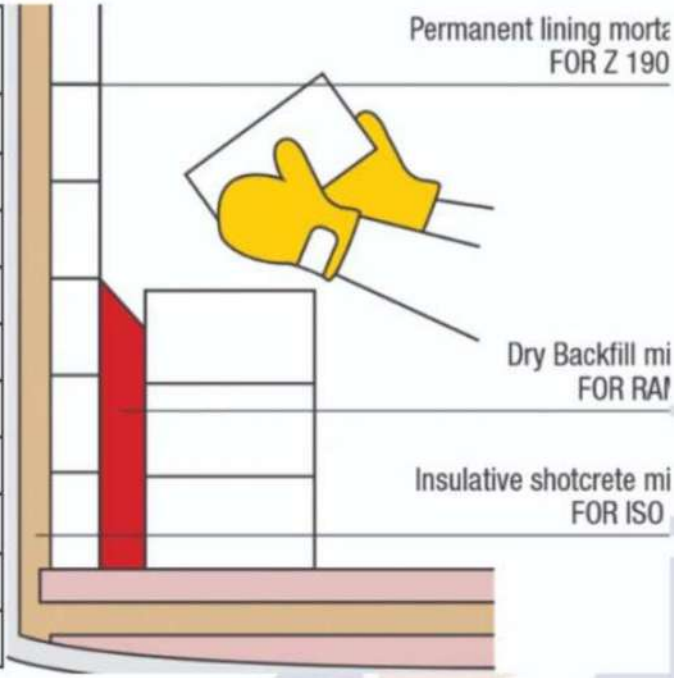
DRY BACKFILL MIXES

PROTECH has developed the FOR RAM series dry lining mixes for avoiding infiltrations and running behind the bricklaid safety lining. These are high quality alumina- or magnesite-based ceramically bonding products.

The dry lining mixes are easy to process without any further aid. They are simply poured between the brick rings and the safety lining during the bricklaying of the wall and rammed by hand.

DRY BACKFILL MIXES	
Chemical Analysis	
MgO	90%
CaO	3-5%
SiO2	5%
Fe2O3	1-3%
Type of Bonding,	Chemical
Grain Size, mm	0-3mm
Physical Properties	
Refractoriness°C	1610
Max Service Temperature, °C	1560



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PROTECH
REFRACTORIES & BUILDING MATERIALS

Silica Ramming Mass

PROTECH has developed the Silica Ramming Mass is used in the lining of induction furnaces. Quality of Acidic Ramming mass is directly related to the heating performance 17-18 heats of the furnaces. Better quality of lining results in the smooth working of furnaces, optimum output and better metallurgical control. It is manufactured under strict supervision of qualified & experienced work force. Proper check is exercised on magnetic process to assure iron free material and to assure proper composition of granules according to furnace capacity. The granulation of the mix is optimized keeping in view the furnace makes and capacity, thus giving maximum and best results. It is characterized by thermal stability, corrosion resistance and wear resistance because it contains less binders, fire clay and moisture compared to plastic refractories.

Silica Ramming Mass	
Application,	Dry Ramming
Chemical Composition.	
Moisture	≥ 0.10 %
SiO_2	98.00%
Fe_2O_3	≥ 0.01 %
H_3BO_3	≥ 1.30 %
Physical Properties.	
Method of Application,	Ramming
Max Service Temperature, ^0C	1715
GRAIN SIZE	any size

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PROTECH
REFRACTORIES & BUILDING MATERIALS

BLAST FURNACE

In the blast furnace there are more monolithic refractory products in continuous operation than at any other stage in the steel production process - excluding new linings and interim repairs. Taphole mixes, runner mixes, assembly parts or preshapes (for example skimmer, tipping trough) are heavily-used refractory products in the production of pig steel.

Pig iron is usually transported to the steel mill in special containers (torpedo ladle, pig iron ladle), which can vary considerably from plant to plant. Therefore, individual, creative refractory solutions are required - from highly adhesive mortars to insulation and maintenance mixes.

PROTECH supplies the whole range of monolithic refractory products for the blast furnace including: shaft maintenance, mux masses, light heat and erosion proof gunning mixes or tapping hole masses, offered through cooperation with world-leading technology partners.

PROTECH monolithic refractories for the blast furnace cover:

- gunning mixes
- tap hole mixes
- castables
- mortar
- preshapes

PROTECH
REFRACTORIES & BUILDING MATERIALS

Hearth Ramming Mass

Hearth Ramming Mass is a magnesia-based materials, that designed and produced to be applied by cold ramming forming strong ceramic bond through heating to serve at bottom of EAF facing impacting, wear, and abrasion at elevated temperatures 1750 °C.

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Grain Size, mm	0 – 8
Chemical Properties.	
MgO	80 – 85 %
SiO_2	1 – 2 %
Fe_2O_3	1.5 %
Al_2O_3	0.8 %
CaO	15 %
Physical Properties.	
Method of Application,	Cold Ramming
Max Service Temperature, 0C	1750
Grain Density (g/cm^3)	3.20
Type of Bonding	Ceramic
Expiration, Months	12

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REFRACTORIES & BUILDING MATERIALS

Hot Fettling Mass

Hot Fettling Mass is a magnesia-based monolithic that designed and produced to be applied by hot spraying using fettling machine to cover the arch-sided and as repairing for Hearth Ramming Mass at the bottom of EAF, it is chemically adjusted to form that ceramic bond during heating up, its GSD is designed to be easily sprayed and applied.

PT1700-85L	
Grain Size, mm	0 – 8
Chemical Properties.	
MgO	80 – 85 %
SiO_2	1 – 2 %
Fe_2O_3	1.5 %
Al_2O_3	0.8 %
CaO	5 – 10 %
Physical Properties.	
Method of Application,	Hot Repair
Max Service Temperature, 0C	1750
Grain Density (g/cm^3)	3.20
Type of Bonding	Ceramic
Expiration, Months	12

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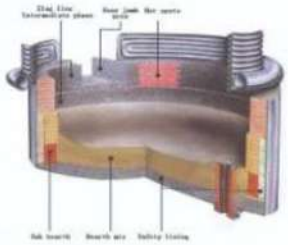
Hot Gunning Mass



Magnesia Hot Gunning Mass is a material produced and mixed with special binders that give it stickability properties to be used as a hot repairing material of the EAF wall for any leakage and/or cracks.

MgPT-90H	
Grain Size, mm	0 – 3
Chemical Properties.	
MgO	88 – 92 %
SiO_2	3.5 %
Fe_2O_3	1.5 %
Al_2O_3	0.8 %
CaO	2.5 %
Physical Properties.	
Method of Application,	Hot Repair
Max Service Temperature, ^0C	1750
Bulk Density (g/cm^3)	2.50
Type of Bonding	Ceramic
Expiration, Months	12

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PROTECH
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Pre-Shaped Castables

Pre-Shaped Castables that special shapes of refractories designed and fabricated to be served in flow system of molten steel.

It is designed chemically at first to resist highly abrasion of flow molten steel and slag reaction, then casted using highly technique and dried very carefully to give the maximum properties.

Our company has wide and very good experience in production and fabrication of such products.

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Alumina-Silicate Castables :

Alumina-Silicate Castables is unshaped refractory products designed to be used in replace of brick in some places, to be casted and shaped at the site

NOURMETEC is the only company in Middle-East who can produce a huge variety of castable types
- Traditional castables
- Low Cement Castables
- Ultra-Low Cement Castables
- No Cement Castables
- Silicon-Carbide Castable
- Spinel Castables
- Gunning castables
- Free Flow Castables
- Mortar

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PROTECH
REFRACTORIES & BUILDING MATERIALS

Steel Industry

Delta Roof (Center Piece)

	P-T 42	P-T-125LW	P-T-124LW
Chemical Composition.			
AL_2O_3	40 – 42	32 – 34	25 – 30
SiO_2	50 – 54	30 – 35	40 – 45
Fe_2O_3	1 – 3	6 – 8	6 – 8
TiO_2	2 – 4	2 – 5	2 – 5
CaO	≤ 0.3	≤ 15	≤ 12
MgO	≤ 0.2	-	-
Max Service Temperature, ^0C	1550	1300	1300
RUL, (Ta, ^0C)	1410	1140	1155
Bulk Density (g/cm^3)	≥ 2.1	0.8 – 1	0.8 – 1
C.C.S , kg/cm^2	≥ 300	20 – 30	10 – 20
PLC at 1000 ^0C, (%)	0.2	-0.85	-0.7
Thermal Conductivity, W/m.k			
At 400 ^0C	1.3	0.25	0.22
At 600 ^0C	1.23	0.25	0.26
At 800 ^0C	1.34	0.21	0.29

PROTECH
REFRACTORIES & BUILDING MATERIALS

Basic Repairing (EAF)

	SRAM-97	SRAM-97CR	SRAM-95R	SRAM-95	SRAM-91R	SGUN-91	Tundish-60L	BFILL-MDR
Chemical Analysis								
MgO	90-95 %	88-90 %	88-92 %	88-92 %	85-88 %	85-88 %	75-85 %	50-70 %
CaO	2-3 %	2-3 %	3-5 %	3-5 %	5-10 %	3-5 %	3-5 %	20-30 %
SiO2	≤1 %	≤1 %	1-2 %	1-2 %	3-5 %	5-8 %	5-10 %	3-5 %
Fe2O3	≤0.5 %	≤0.5 %	≤0.5 %	≤0.5 %	≤1 %	≤1 %	≤2 %	1-3 %
Cr2O7		2-5 %						
Type of Bonding,	Chemical	Chemical	Chemical	Chemical	Chemical	Chemical	Chemical	Chemical
Grain Size, mm	0-6	0-6	0-6	0-6	0-6	0-6	0-1	0-3
Water Required, %	5-7	5-7	5-7	5-7	5-7	5-7	20-25	
Physical Properties								
Refractoriness, °C	2250	2300	2120	2120	1860	1860	2100	1800
Max Service Temperature, °C	2150	2180	2050	2050	1730	1730	1980	1710

PROTECH
REFRACTORIES & BUILDING MATERIALS

Ladle Furnace

	SWB-RC05	SWB-SP25	SWB-99CR	SSP-25R	SC-1900	SC-1800	SG-1850R
	Slid Gate Well Block	Slid Gate Well Block	Slid Gate Well Block	Repairing/ Casting	Repairing/ Casting	Repairing/ Casting	Repairing/ Gunning
Chemical Composition.							
AL_2O_3	96-98	90-94	88-92	90-94	96-98	94-96	94-96
SiO_2	≤ 0.5	1 max.	1 max.	2 max.	2 max.	3-5	3-5
Fe_2O_3	≤ 0.2	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
CaO	≤ 1	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Cr_2O_7			4-6				
MgO		4-6		4-6			
Max Service Temperature, ^0C	1800	1850	1800	1750	1750	1750	1750
RUL, (Ta, ^0C)	≥ 1700	≥ 1700	≥ 1700	1650	1650	1650	1650
Bulk Density (g/cm^3)							
At 110 ^0C	3.20	3.15	3.20	3.20	3.20	3.20	3.20
At 815 ^0C	3.20	3.15	3.20	3.20	3.20	3.20	3.20
At 1600 ^0C	3.25	3.10	3.25	3.25	3.25	3.25	3.25
C.C.S , kg/cm^2							
At 110 ^0C	900	600	1000	900	900	1200	400
At 815 ^0C	700	400	850	750	600	1000	250
At 1600 ^0C	1500	1200	1600	1400	1200	1600	450

PROTECH
REFRACTORIES & BUILDING MATERIALS

Tunddish

	TBX-SP25	TBX-SP25	DMG-95	TRC-S5	SBS-F5	SGF-75	TPL-FL05	TPL-1750R
	Tunddish Box	IMPAD-5G	Dam Wall	Tunddish Cover(Roof)	Setting Block	Working Layer	Permanent Layer	Repairing/ Gunning
Chemical Composition.								
AL_2O_3	90-94	90-94	1-2	75-85	75-85	≤ 2	75-85	75-85
SiO_2	1 max.	2 max.	3-5	10-20	10-20	10-15	10-20	10-20
Fe_2O_3	≤ 0.5	≤ 0.5	1-3	1-2	1-2	2-4	≤ 1	1-3
CaO	≤ 2	≤ 2	5-10	≤ 2	≤ 2	3-5	≤ 2	≤ 2
Cr_2O_7								
MgO	3-6	3-6	80-85			75-85		
Max Service Temperature, ^0C	1850	1850	1930	1720	1720	1750	1790	1700
RUL, (Ta, ^0C)	≥ 1700	≥ 1700	≥ 1700	1650	1650	1650	≥ 1700	1620
Bulk Density (g/cm^3)								
At 110 ^0C	3.15	3.15	2.85	2.85	2.85	3.20	2.85	2.70
At 815 ^0C	3.15	3.15	2.85	2.80	2.80	3.20	2.85	2.70
At 1600 ^0C	3.10	3.10	2.85	2.85	2.85	3.25	2.90	2.75
C.C.S , kg/cm^2								
At 110 ^0C	600	1200	450	850	850	900	1100	350
At 815 ^0C	400	950	450	600	600	600	850	300
At 1600 ^0C	1200	1400	600	1200	1200	1200	1400	400

PROTECH
REFRACTORIES & BUILDING MATERIALS

Cement Industry

Silicon Carbide Castable:-

	SIC-2H	SIC-4A	SIC-4B	SIC-4X	SIC-70X
Chemical Composition.					
AL_2O_3	55-60	55-60	45-50	25-30	20-25
SiO_2	10-15	5-10	5-10	5-10	5-10
Fe_2O_3	1.5-2.0	≤0.5	≤0.5	≤0.5	≤0.5
SiC	25-30	30-45	45-50	50-60	65-70
Physical Properties.					
Max Service Temperature ^0C	1750	1800	1800	1800	1800
Method of application	Casting	Casting	Casting	Casting	Casting
Water required	3-5	3-5	3-5	3-5	3-5
RUL, (Ta, ^0C)	1550	1575	1650	1650	1650
Bulk Density (g/cm^3)					
At 110 ^0C	2.85	3.10	3.15	3.15	3.15
At 815 ^0C	2.75	3.10	3.1	3.1	3.1
After firing	2.80	3.10	3.10	3.10	3.10
C.C.S , kg/cm^2					
At 110 ^0C	1100	1300	1350	1350	1350
At 815 ^0C	950	1050	1100	1100	1100
After firing	1300	1450	1650	1650	1650

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

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REFRACTORIES & BUILDING MATERIALS

Gunning Castables:-

	SGUN	SGUN-70	SGUN-80L	SGUN-90X
Chemical Composition.				
AL_2O_3	55-60	68-72	80-85	90-95
SiO_2	25-30	20-25	5-10	2-4
Fe_2O_3	2-2.5	2-2.5	1-1.05	0.5-1
CaO	4-5	4-5	4-5	4-5
Physical Properties.				
Max Service Temperature ^0C	1650	1750	1800	1850
Method of application	Gunning	Gunning	Gunning	Gunning
Water required	11-13	11-13	10-12	8-10
RUL, (Ta, ^0C)	1610	1690	$\geq$1700	$\geq$1700
Bulk Density (g/cm^3)				
At 110 ^0C	2.35	2.55	2.75	2.95
At 815 ^0C	2.25	2.40	2.70	2.85
After firing	2.30	2.60	2.80	2.90
C.C.S , kg/cm^2				
At 110 ^0C	450	450	500	550
At 815 ^0C	300	350	380	400
After firing	500	550	570	650

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

PROTECH
REFRACTORIES & BUILDING MATERIALS

General Use

Special castables:-

*Special castables are produced by special technology and special additives to serve in critical areas using special methods of applications.

	STM 80U	STM 90U	STM 95U	STM 99U	STM 95NS	STM99N
Grain Size, mm	0-6	0-6	0-6	0-6	0-6	0-6
Water Required %	4-6	3-6	3-6	4-6	4-6	4-6
Chemical Composition.						
AL_2O_3	80-85	88-90	94-96	98-99	94-96	94-96
SiO_2	5-10	4-6	3-5	≤0.5	4-6	4-6
Fe_2O_3	1-1.5	≤0.5	≤0.3	≤0.3	≤0.2	≤0.2
CaO	≤0.5	≤0.5	≤0.5	≤0.5	≤0.2	≤0.2
Physical Properties.						
Method of Application,	Casting	Casting	Casting	Casting	Casting	Casting
Max Service Temperature, ^0C	1750	1850	1900	1950	1800	2000
RUL, (Ta, ^0C)	≥1700	≥1700	≥1700	≥1700	≥1700	≥1700
Bulk Density (g/cm^3)						
At 110 ^0C	2.85	3.15	3.2	3.25	3.25	3.25
At 815 ^0C	2.80	3.10	3.15	3.15	3.15	3.15
After firing	2.90	3.2	3.25	3.25	3.25	3.25
C.C.S , kg/cm^2						
At 110 ^0C	950	1300	1400	1400	850	550
At 815 ^0C	800	1000	1050	1000	750	650
After firing	1300	1600	1800	1500	1400	900

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

PROTECH
REFRACTORIES & BUILDING MATERIALS

Covenantal Castables:-

*Refractory castables are made with high cement and calcium content.

	STM 40	STM 50	STM 60	STM 70	STM 80	STM 85	STM 90	STM 94
Grain Size, mm	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-4
Water Required %	11-13	11-13	10-12	10-12	10-12	9-11	6-8	6-8
Chemical Composition.								
AL_2O_3	40-45	50-55	60-65	70-75	78-80	84-86	88-90	93-95
SiO_2	50-55	30-35	25-30	15-20	10-13	7-10	3-5	0.2 Max
Fe_2O_3	1.5-2	1.5-2.5	1.5-2.5	1.5-2.5	1.8-3	1.2-2	0.5-1	0.1-0.5
CaO	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
Physical Properties.								
Method of Application,	Casting	Casting	Casting	Casting	Casting	Casting	Casting	Casting
Max Service Temperature, ^0C	1520	1550	1575	1610	1650	1720	1750	1810
RUL, (Ta, ^0C)	1325	1375	1410	1440	1480	1520	1590	1680
Bulk Density (g/cm^3)								
At 110 ^0C	2.1	2.2	2.35	2.45	2.6	2.65	2.8	2.9
At 815 ^0C	2.05	2.15	2.3	2.4	2.6	2.6	2.75	2.8
After firing	2.15	2.2	2.35	2.45	2.6	2.65	2.75	2.85
C.C.S , kg/cm^2								
At 110 ^0C	300	300	350	450	450	500	540	600
At 815 ^0C	150	150	200	300	350	350	370	390
After firing	300	350	420	470	510	590	610	650

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

PROTECH
REFRACTORIES & BUILDING MATERIALS

Low Cement Castables:-

*Refractory castables are made by modern technology of reducing cement content to enhance the refractoriness and physical properties of the castable.

	STM 40LC	STM 50LC	STM 60LC	STM 70LC	STM 80LC	STM 90LC	STM 90LCS	STM 96LC	STM96LCS
Grain Size, mm	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Water Required %	6-8	6-8	5-7	5-7	5-7	3-5	3-5	3-5	4-6
Chemical Composition.									
AL_2O_3	40-45	50-55	60-65	70-75	78-80	88-90	88-90	94-95	94-97
SiO_2	50-55	30-35	25-30	15-20	10-13	4-7	3-5	4-5	≤0.2
Fe_2O_3	1.5-2	1.5-2.5	1.5-2.5	1.5-2.5	1.8-3	1-1.5	0.5-1	0.1-0.5	≤0.2
CaO	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0	1.5 – 2.0
Physical Properties.									
Method of Application,	Casting	Casting	Casting	Casting	Casting	Casting	Casting	Casting	Casting
Max Service Temperature, ^0C	1550	1600	1620	1680	1710	1730	1800	1750	1860
RUL, (Ta, ^0C)	1430	1490	1560	1650	1680	≥1700	≥1700	≥1700	≥1700
Bulk Density (g/cm^3)									
At 110 ^0C	2.25	2.30	2.40	2.65	2.85	3.10	3.20	3.25	3.10
At 815 ^0C	2.20	2.30	2.35	2.55	2.8	3.10	3.15	3.20	3.00
After firing	2.25	2.35	2.45	2.65	2.85	3.10	3.25	3.25	3.00
C.C.S , kg/cm^2									
At 110 ^0C	500	530	590	650	850	1000	1200	900	800
At 815 ^0C	420	450	510	550	650	850	870	700	650
After firing	650	750	850	1050	1200	1400	1600	1800	1500

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

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Light Weight Castables:-

	STM40UW	STM40LW	STM60LW	STM80LW	SPR40LW	SPR60LW
Grain Size, mm	0-6	0-6	0-6	0-6	0-6	0-6
Water Required %	30-35	20-25	20-25	15-20	30-35	20-25
Chemical Composition.						
AL_2O_3	40-45	40-45	60-65	70-75	40-45	60-65
SiO_2	50-55	50-55	25-30	15-20	50-55	25-30
Fe_2O_3	7-9	7-9	1.5-2.5	1.5-2.5	7-9	1.5-2.5
Physical Properties.						
Method of Application,	Casting	Casting	Casting	Casting	Casting	Casting
Max Service Temperature, ^0C	1230	1320	1400	1530	1230	1400
Thermal Conductivity ($Kcal/m^2.s$)						
At 300 ^0C	0.13	0.37	0.5	0.65	0.13	0.5
At 500 ^0C	0.125	0.37	0.56	0,65	0.125	0.56
At 800 ^0C	0.125	0.33	0.43	0.65	0.125	0.43
Bulk Density (g/cm^3)						
At 110 ^0C	0.6	1.1	1.3	1.55	0.6	1.3
At 815 ^0C	0.5	1.0	1.2	1.5	0.5	1.2
After firing	0.5	1.2	1.35	1.6	0.5	1.35
C.C.S , kg/cm^2						
At 110 ^0C	15	50	60	65	90	100
At 815 ^0C	10	40	45	60	80	90
After firing	12	45	65	70	110	120

- **Notice:-** Firing temperature is defined and differentiated according to the castable type.

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