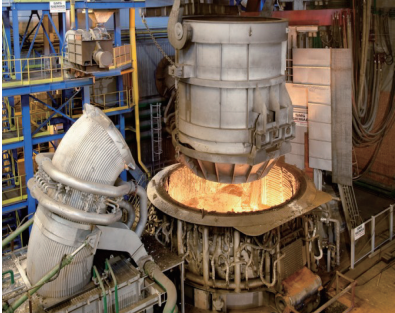




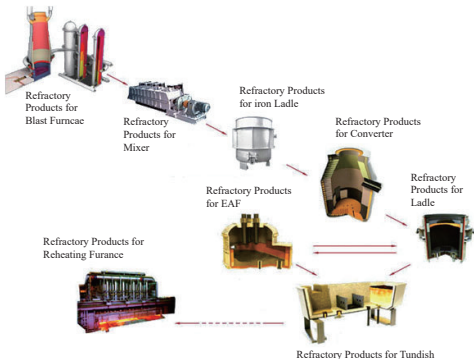
HOTION REFRACTORY

HOTION



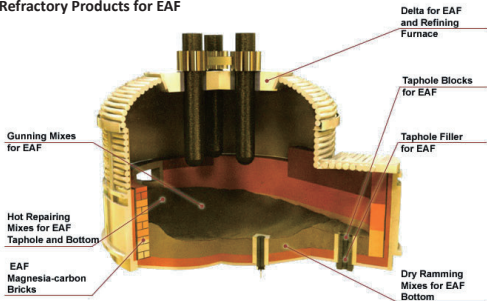


Refractory Products



Since HOTION engineers know each single refractory part is playing an important role in the whole production process. We always take accurate information of our customers' production and furnaces conditions to select most adapted refractory for different application types.

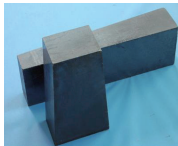
Refractory Products for EAF



Magnesia Carbon Brick

On the basis of different application parts and conditions, using high-purity, high-density, large crystal magnesite and high-purity flake graphite as raw materials, adopting high-pressure shaping technique, and under the help of antioxidant.

MgO % Min	97.5	97	95	97.5	96	97
Al ₂ O ₃ % Max	0.1	0.2	0.2	0.1	0.2	0.2
CaO % Max	1.0	1.0	1.6	1.0	1.0	1.0
FeO % Max	0.3	0.4	0.6	0.3	0.4	0.4
SiO ₂ % Max	0.4	0.6	1.2	0.4	0.8	0.6
C % Min	10	10	10	14	14	12
Bulk Density g/cm Min	2.95	2.90	2.85	2.96	2.95	2.95
Apparent Porosity % Min	4.0	5.0	5.0	4.0	5.0	5.0
Cold Crushing Strength MPa Min	35	35	30	40	35	40



Delta Sections EAF

Modern EAF usually have a cast core piece in the cover. We provide monolithic delta pieces for different kinds of furnace. The delta sections are made by castables to increase the work life. We also supply the castables and make it in accordance with customer's requirement.

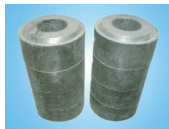
Al ₂ O ₃ + MgO % Min	80	80	90	
Al ₂ O ₃ + Cr ₂ O ₃ % Min				88
Bulk Density g/cm ³ Min	2.80	2.85	3.10	3.00
Modulus of Rupture MPa Min	5	10	12	6
Cold Crushing Strength MPa Min	25	60	60	40
Application	EAF, LF	EAF, LF	EAF, LF	EAF VD



Taphole Blocks for EAF

Taphole block is molded at isostatic pressure with fused magnesia and graphite as raw material. It is characterized by strong oxidation resistance, high strength and high corrosion resistance.

MgO % Min	97.5	97.5	97.5	97.5
Al ₂ O ₃ %	0.1	0.1	0.1	0.1
Fe ₂ O ₃ %	0.3	0.3	0.3	0.3
CaO %	1.0	1.0	1.0	1.0
SiO ₂ %	0.4	0.4	0.4	0.4
C %	10	14	10	14
Apparent Porosity % Max	4	4	5	5
Bulk Density g/cm ³ Min	2.95	2.92	2.95	2.92
Cold Crushing Strength MPa Min	40	40	35	35
Hot Modulus of Rupture MPa Min	1400°Cx0.5h	12	10	12





EAF Ramming Mass

HOTION Ramming Mass for EAF is characterized by:
High corrosion and erosion resistance against molten steel and slag
Good sintered Layer
Good service life



Items	Drying Ramming Mass
Al ₂ O ₃ % ≥	84
MgO %	12
Bulk Density ≥ g/cm ³ (110°Cx24h)	3.0
Crushing Strength ≥ Mpa(110°Cx3h)	25
Modulus of Rupture ≥ Mpa(1400°Cx3h)	7
Critical Grain Size mm	5
Linear Change on Heating % 1400°Cx3h	0~+1.5
Application	Used in 5-20tons medium frequency furnace. With campaign life of 80-100 heats

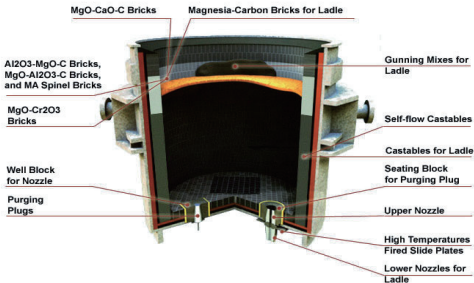
EAF Gunning Mix

HOTION EAF gunning mix is made by magnesia/ magnesia-calcium material. It is characterized by high bonding strength, good corrosion resistance and non-spalling. When the work temperature is higher than 1000 °C, it works well and the adhesion rate is higher than 85%.





Refractory Products for Ladle



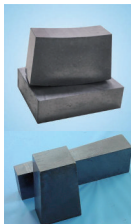
Magnesia Alumina Carbon Brick

Name	Magnesia Alumina Carbon Brick			Alumina Magnesia Carbon Brick		Magnesia Calcium Brick	
MgO % $\geq$	72	74	76	6	8		
Al ₂ O ₃ % $\geq$	6	6	6	78	78		
CaO % $\geq$						18 - 20	28 - 32
C % $\geq$	8	8	8	8	8		
$\sum (A + F + S) \% \leq$						3	3
Apparent Porosity % $\leq$	5	5	5	5	5	8	8
Bulk Density (g/cm ³) $\geq$	3.0	3.0	3.0	3.1	3.1		
Crushing Strength (MPa) $\geq$	40	40	40	45	45	55	55



Magnesia Carbon Brick for Ladle

Chemical Composition % $\geq$	MgO %	82	82	78	80	78	76
	C %	8	8	8	10	10	10
Apparent Porosity % $\leq$		5	6	7	4	5	6
Bulk Density (g/cm ³) $\geq$		3.0	2.95	2.95	3.0	2.95	2.95
Crushing Strength (MPa) $\geq$		45	40	35	40	40	35
Hot Modulus of Rupture (MPa) $\geq$		6	5	4	8	7	6
Chemical Composition % $\geq$	MgO %	78	76	74	76	74	72
	C %	12	12	12	14	14	14
Apparent Porosity % $\leq$		4	5	6	4	5	6
Bulk Density (g/cm ³) $\geq$		2.98	2.96	2.95	2.98	2.96	2.95
Crushing Strength (MPa) $\geq$		40	40	35	40	40	35
Hot Modulus of Rupture (MPa) $\geq$		8	7	6	12	10	8



Magnesia Chrome Bricks

Direct-Bonded Magnesite-Chrome Bricks										
MgO % Min	80	75	74	74	66	66	60	60	58	58
Cr ₂ O ₃ % Min	4	6	8	8	12	12	16	16	18	18
SiO ₂ % Max	2.0	2.0	1.5	2.0	1.5	2.0	1.5	2.0	1.5	2.0
Apparent Porosity % Max	18	18	18	18	18	18	18	18	18	18
Cold Crushing Strength MPa Min	40	40	40	35	40	35	40	35	40	35
Refractoriness under Load °C Min	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Semi-Rebonded MgO-Cr ₂ O ₃ Brick					Rebonded MgO-Cr ₂ O ₃ Brick					
MgO % Min	60	60	55	55	65	60	60	60	52	50
Cr ₂ O ₃ % Min	16	16	20	20	16	16	20	20	22	24
SiO ₂ % Max	1.5	1.8	1.5	1.8	1.2	1.6	1.2	1.2	1.2	1.2
Apparent Porosity % Max	17	17	17	17	16	16	16	16	16	16
Cold Crushing Strength MPa Min	40	35	40	35	45	40	45	40	45	45
Refractoriness under Load °C Min	1750	1700	1750	1700	1750	1700	1750	1700	1750	1750



Ladle Castables

Ladle castables are produced from corundum aluminum magnesia spinel and fused magnesite. The ladle castables have the characteristic as below:

Good construction function

High Strength

Volume stability

Erosion and washout resistance

Solid thermal shock resistance

Al ₂ O ₃ + MgO (%)≥		90	88	85
Bulk Density (g/cm ³) ≥		2.90	2.85	2.80
Crushing strength (MPa)≥	110 °C x 24h	30	30	25
	1550 °C x 3h	70	60	60
Firing linear change (%)	1550 °C x 3h	-0.2/+1.0	-0.2/+1.0	-0.2/+1.0



Ladle Gunning Mix

Chemical Composition(%)≥	MgO	78	10
	Al ₂ O ₃	7	70
Bulk Density g/cm ³ ≥	110 °C x 24h	2.5	2.5
	1500 °C x 3h	2.4	2.4
Modulus of Rupture (MPa)≥	110 °C x 24h	5	5
	1500 °C x 3h	6	7
Crushing Strength (MPa)≥	110 °C x 24h	15	15
	1500 °C x 3h	18	25
Firing Linear Change %	1500 °C x 3h	-2.5/0	-1.5/+1.5





Lower Nozzle

HOTION series of lower nozzles for ladle are made from corundum, bauxite, flake graphite, antioxidant and phenolic resin. They are characterized by excellent thermal shock resistance, stable performance, good excellent corrosion and erosion resistance, strong cracking resistance etc.

Al ₂ O ₃ % Min	75	70	72	68
C % Max	4	4	8	8
Bulk Density g/cm ³ Min	2.85	2.75	2.80	2.75
Apparent Porosity % Max	14	14	14	14
Cold Crushing Strength MPa Min	65	55	40	40
Hot Modulus of Rupture MPa Min	12	10	10	10
Application	All kinds of ladles		ladles bigger than 80T	ladles smaller than 80T
Service life (heats)	4Min	1/2	3 Min	2/4



Upper Nozzle

HOTION develops series of corundum based ladle upper nozzles with newest technology. They are characterized by superior resistance to thermal shock, erosion, oxidation and long service life.

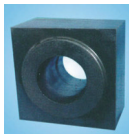
Al ₂ O ₃ % Min	85	75	-	72	68
MgO % Min			70		
C % Max	3	4	4	8	8
Bulk Density g/cm ³ Min	2.90	2.85	2.75	2.80	2.75
Apparent Porosity % Max	14	14	14	14	14
Cold Crushing Strength MPa Min	75	65	45	40	40
Hot Modulus of Rupture Mpa Min	12	12	10	10	10
Application Area	≥60MT	≥40MT	High erosion steel	40-80 MT	≤50MT



Ladle Nozzle Well Block

HOTION series of well blocks for nozzles are made from high-purity, high-density, high-strength materials. They show the features of stable structure, excellent thermal shock resistance, good corrosion/erosion resistance and long service life.

Al ₂ O ₃ % Min	84	83	84
MgO % Min	5	4	4
Cr ₂ O ₃ % Min	—	3	3
Bulk Density g/cm 1500 C x 3h Min	3.00	3.05	3.05
Cold Crushing Strength MPa 1500 C x 3h	12	12	15
Modulus of Rupture MPa 1500°C x3h Min	80	80	60



Ladle Slide Plates

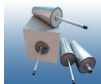
Chemical Composition % ≥	Al ₂ O ₃	75	80	88
	C	6	8	2
Apparent Porosity g/cm ≥		9	7	7
Bulk Density MPa ≥		2.7	2.9	2.95
Crushing Strength(1500 C) %		50	95	100
Hot Modulus of Rupture MPa≥		8	10	12
Application		20-30 Tons for steel once	30-80 Tons for steel twice	30-100 Tons for steel triple



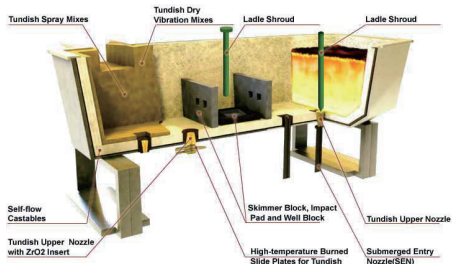


Ladle Purging Plugs

Al ₂ O ₃ + Cr ₂ O ₃ % Min	94	93	92	
Al ₂ O ₃ + Cr ₂ O ₃ % Min				92
Bulk Density g/cm 1500 °C x 3h Min	3.00	3.10	3.20	3.10
Cold Crushing Strength MPa 1500 °C x 3h Min	80	80	100	80
Modulus of rupture MPa 1500 °C x 3h Min	12	15	20	18
Al ₂ O ₃ + MgO + ZrO ₂ % Min	99	98		98
Bulk Density g/cm 1750 °C x 3h Min	3.30	3.00		3.40
Apparent Porosity % 1750 °C x 3h Max	10	15		10



Refractory Products for Tundish





Mono Block Stopper (stopper rod)

HOTION develops multiples kinds of stoppers by selecting different raw material properties: Aluminum carbon based, Aluminum-Zirconium carbon based, Aluminum-magnesia carbon based



Item	Body	Head	Body	Head
Al ₂ O ₃ % ≥	55	65	55	—
C+SiC % ≥	25	20	25	15
MgO % ≥	—	—	—	75
ZrO ₂ % ≥	—	—	—	70
Apparent Porosity ≤	19	18	19	19
Crushing Strength MPa ≥	20	22	20	20
Modulus of Rupture ≥	5	7	5	5
Bulk Density MPa ≥	2.46	2.65	2.46	2.85
Resistance ≥	5	5	5	5

Ladle Shroud

HOTION supplies different categories ladle shroud such as: reheating type, non-preheating type, argon blowing type and not argon blowing type. Different kinds of material: aluminum carbon, aluminum-magnesia carbon.

Item	Body	Head	Body	Head
Al ₂ O ₃ % ≥	55	65	55	—
C+SiC % ≥	25	20	25	15
MgO % ≥	—	—	—	75
ZrO ₂ % ≥	—	—	—	70
Apparent Porosity ≤	19	18	19	19
Crushing Strength MPa ≥	20	22	20	20
Modulus of Rupture ≥	5	7	5	5
Bulk Density MPa ≥	2.46	2.65	2.46	2.85
Resistance ≥	5	5	5	5





Submerged Entry Nozzle

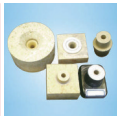
HOTION supplies different categories submerged entry nozzles such as plug-in type, hanging type, fast changing type. Different materials: aluminum carbon, zirconium carbon, magnesia carbon.



Item	Body	Slag Line	Body	Slag Line
Al ₂ O ₃ % ≥	52	—	60	—
C+SiC % ≥	23	17	20	15
MgO % ≥	—	75	—	78
ZrO ₂ % ≥	—	70	—	77
Apparent Porosity ≤	20	17	20	15
Crushing Strength MPa ≥	20		22	
Modulus of Rupture ≥	5		6	
Bulk Density g/cm ³ ≥	2.46	2.9	2.6	3.1
Resistance ≥	5	5	5	5

Zirconia Metering Nozzle

Item	Zirconia insert		Coat
ZrO ₂ % ≥	94	95	—
Al ₂ O ₃ +C % ≥	0	0	65
Apparent Porosity ≤	8	7	12
Bulk Density g/cm ³ ≥	4.5	5.4	2.8



Tundish Castable

Al ₂ O ₃ %	≥55	≥65
CaO %	≥2.2	≥2.0
Bulk Density g/cm ³	≥2.4	≥2.6
Crushing Strength Mpa	≥40	≥50
Linear change rate %	±0.5	±0.5



Dry Vibration Mix

Initial sintering temp °C	1000
Max. service temp °C	1700
MgO % ≥	79
SiO % ≥	—
CaO % ≥	17
BD g/cm ≥	2.59
LCR %	±0.13
MOR MPa ≥	3.9

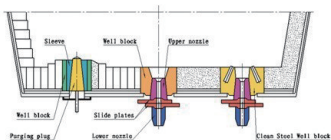


Tundish Spray Mixes

MgO %		≥80
Bulk Density g/cm		2.0-2.2
Modulus of Rupture (Mpa)	110℃x24h	>1
	1500℃x3h	>2
Compression Strength (MPa)	110℃x24h	>2
	1500℃x3h	>5
Linear Expansion Rate(%) (1500℃x3h)		

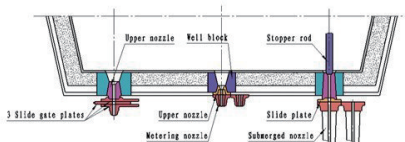


Plates-Plugs-Nozzles



For Ladle

Description	Material
Burned slide plates	Aluminum-Carbon Aluminum-Zirconium -Carbon Magnesia
Unburned slide plates	
Slide plates installed metal bossor metal canned	
Preinstall slide plates with lower nozzles	
Purging plug	Corundum corundum-spinel
Lower nozzles Upper nozzles	Corundum Aluminum-Zirconium- Carbon Aluminum-Carbon
Well blocks	Corundum Corundum-spinel



For Tundish

Applications	Description of quick changer	Main Parts
Slab caster	Submerged nozzle changer	Stopper rod
		Submerged nozzle
		Quick changer mechanism
	3 plates flow control	Upper nozzle
		3 slide gate plates
Billet caster	Metering nozzle quick changer	Well blocks
		Upper nozzle
		Metering nozzle
		Quick changer mechanism