Refractory Products

IDEAL REFRACTORIES

MATHIOS REFRACTORIES S.A.

contents

Our Company

since 1890...

MATHIOS REFRACTORIES S.A.

Group of companies established in 1890, with 120 years of tradition in the industrial and building materials, refractories and acid-proof manufacturing is today one of the biggest producing, trading and construction corporations in Greece.

MATHIOS REFRACTORIES S.A.

began its activities as a specialized company in refractories, anti-acid installations and construction, servicing the biggest companies in the Greek industry.
The highly experienced **Construction Department** is responsible for the construction -of the biggest projects concerning refractory and chemical linings in the Greek industry and abroad(**Germany, Bulgaria, Romania, Netherlands,Iran,Iraq, S.Arabia.** This is a very significant advantage because it makes **MATHIOS REFRACTORIES S.A** the unique company in the Greek market that is able to successfully provide a complete package of customer service (supply and installation of refractories).

Our Company

MATHIOS REFRACTORIES S.A.

Our Products

The wide product range of MATHIOS REFRACTORIES is produced in the integrated refractory plant in Ritsona (former Ideal Refractories S.A.). This includes all the qualities of aluminosilicate based unshaped refractories (Conventional Castables and Gunning Materials, Low and Ultra Low Cement Castables, Self-flowing Castables), prefabricated shapes, chemically bonded refractory bricks, exfoliated vermiculite as well as insulating castables. They are applied in different industrial sectors such as steel, aluminium, cement, lime industries, power plant stations, refineries, incinerators, glass and dairy's industries.

Our Activities

The takeover of IDEAL REFRACTORIES from MATHIOS REFRACTORIES and the transfer of the entire refractory production activity to these facilities empowered the company's status quo. This merge resulted in the increasing of production capacity in order to successfully cover the increased demand of refractory materials in the Greek and European market as well. Thus, the last years MATHIOS REFRACTORIES plays a significant role in the production of unshaped aluminosilicate, prefabricated shapes and insulating refractories . Today MATHIOS is exporting to 45 countries world wide and not only has strong presence abroad, but its own sales and distribution organization in Germany and France. MATHIOS has also dynamic presence in Bulgaria with one production unit and its own sales organization. This is the reason that MATHIOS REFRACTORIES is the major refractories supplier of all the power plant stations in Greece. Through its unique experience in the refractories and acid proof construction sector MATHIOS has earned the market recognition with a leading position in the Greek industry Aluminium (Primary and secondary), Cement, Power Plant stations, Lime, Steel, Glass, Refineries.

we are proud of our solutions

- Steel Industry
- Aluminium Industry
- Cement Industry
- Power Generation
- Ceramic Industry
- Foundry
- Lime Industry
- Glass Industry
- Non - Ferrous Industry
- Refineries
- Chemical Industry

Firebricks

Alumina Silicate
Acid Resistant

Monolithic Refractory

Regular Castables / Gunning
Medium Cement Castables / Gunning
Low Cement Castables
Ultra Low Cement Castables
Self flowing Castables
Insulating Castables / Gunning
Refractory Mortars
Plastic Mouldable Materials

Raw Materials

Refractory Cements
Refractory Aggregates

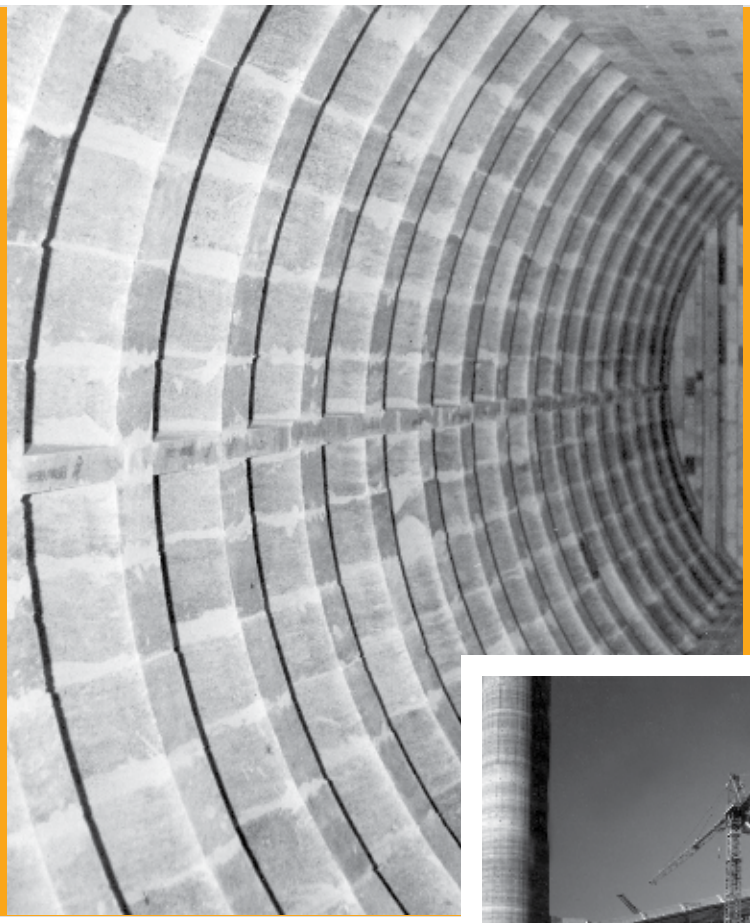
Exfoliated Vermiculite

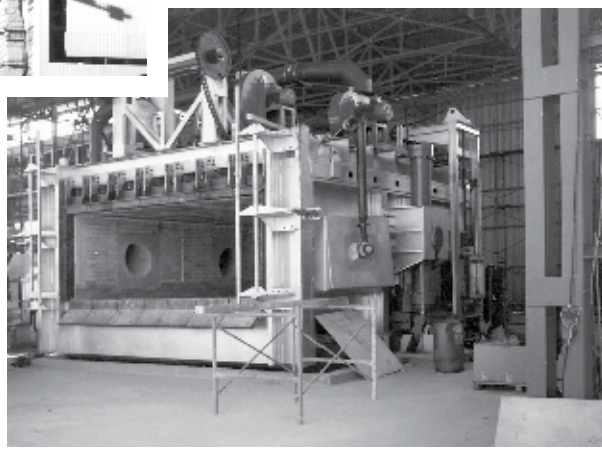
Experience & Tradition

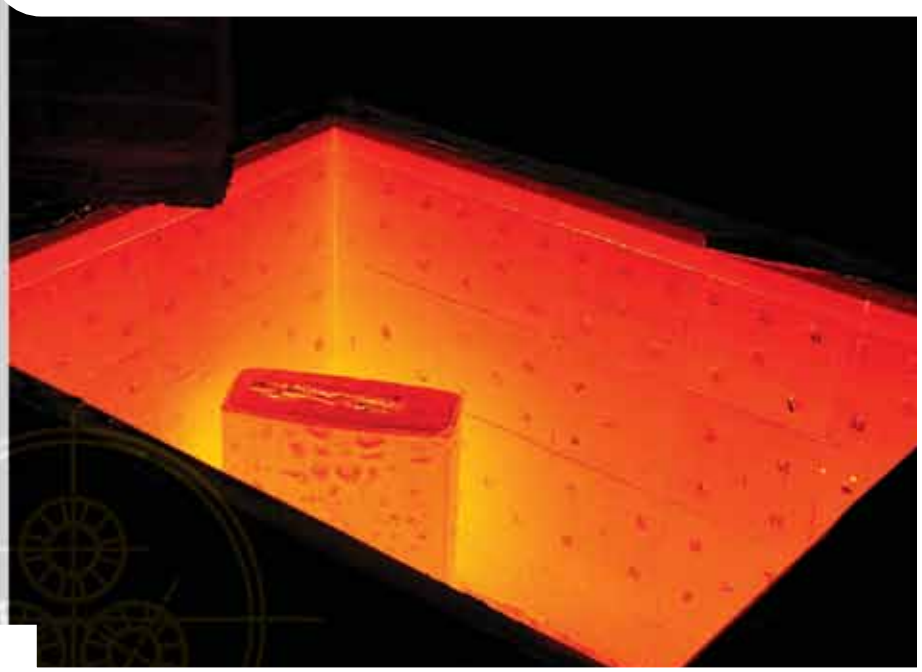
•Chemical Industry•Glass Industry•Ceramic Industry•Lime Industry•Foundry•Refineries

MATHIOS
REFRACTORIES S.A.

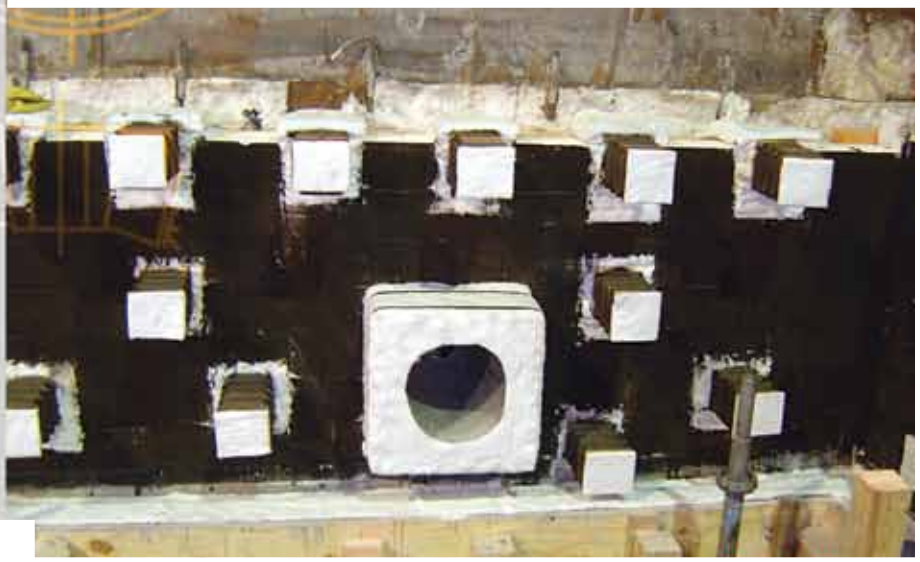
• Aluminium Industry • Steel Industry • Power Plants • Cement Industry • Non - Ferrous Industry







Reheating Furnace in Bremen

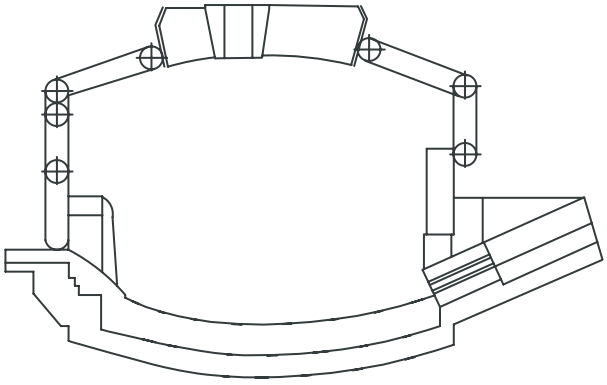


Installation of refractory mass in Settling Chamber by “pumping”

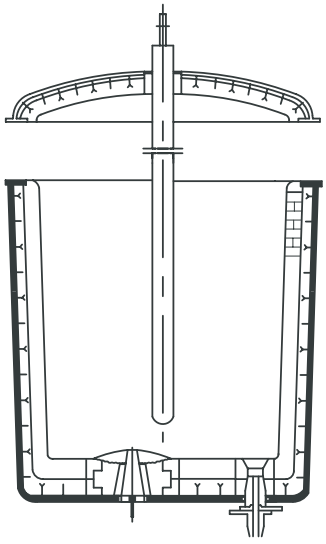
MATHIOS REFRACTORIES S.A.

Steel Industry

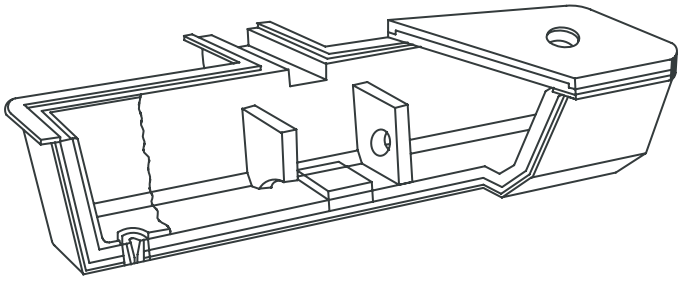
Typical Flow Chart of Steel Plants (Mini Mills)



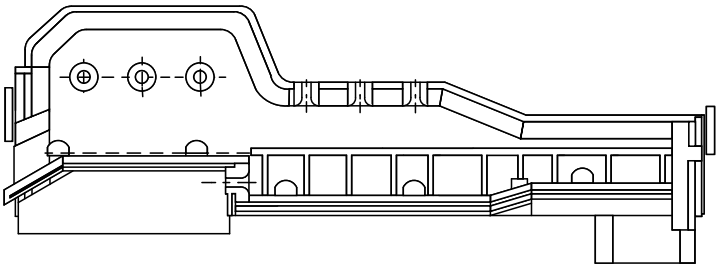
Electric Arc Furnace



Ladle for Secondary Metallurgy

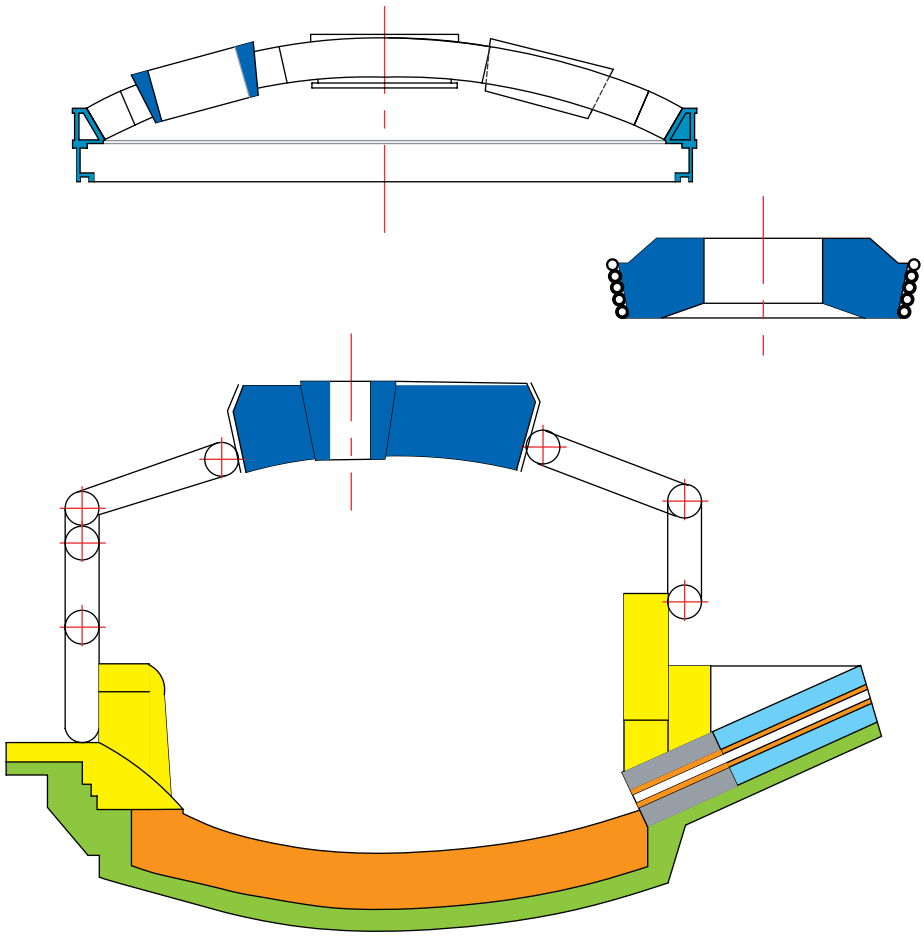


Tundish



Pusher Type Reheating Furnace

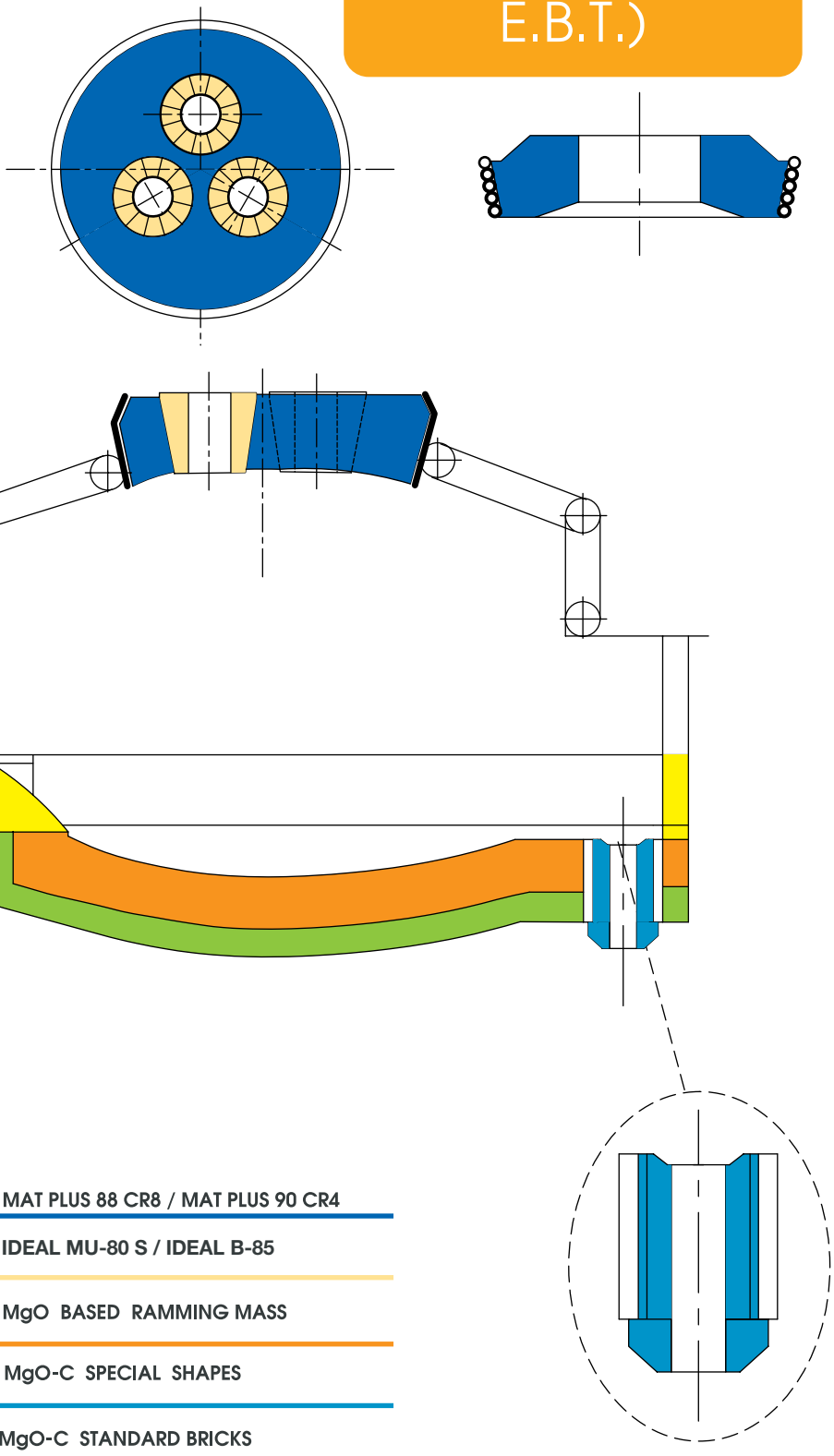
E.A.F. (Electric Arc Furnace With Tap Hole)



	(DELTA SECTION)	MAT PLUS 88 CR8 / MAT PLUS 90 CR4 / IDEAL B-85 / IDEAL MU-80 S
	(SIDE WALLS)	MgO-C BRICKS
	(BOTTOM LINING)	MgO BASED RAMMING MASS
	(TAP HOLE / RUNNER)	MAT PLUS 88 CR8 / MAT PLUS 90 CR4
	(SAFETY LINING)	MgO or MgO-Cr_2O_3BRICKS

Steel Industry

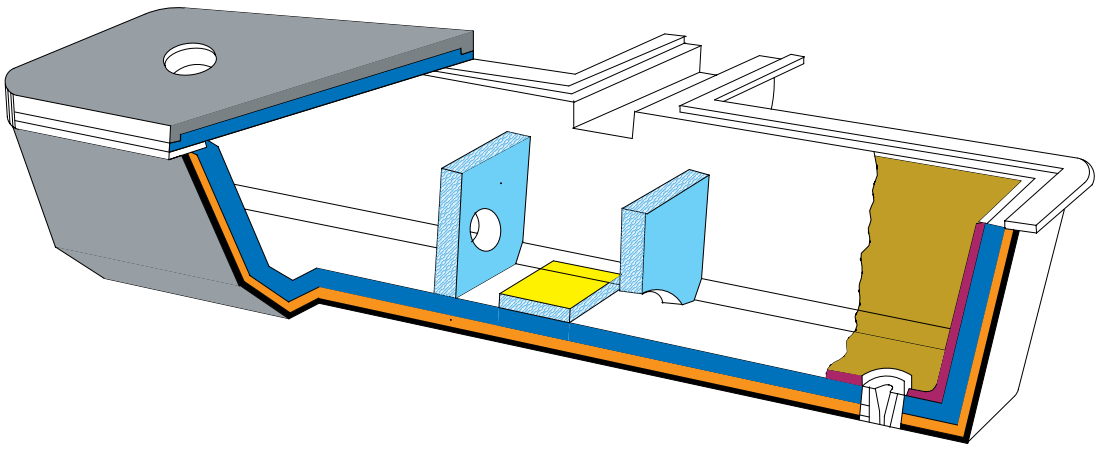
E.A.F. (Electric Arc Furnace With E.B.T.)



(DELTA SECTION)	MAT PLUS 88 CR8 / MAT PLUS 90 CR4
(ELECTRODE RINGS)	IDEAL MU-80 S / IDEAL B-85
(BOTTOM LINING)	MgO BASED RAMMING MASS
(E.B.T. LINING)	MgO-C SPECIAL SHAPES
(SIDE WALLS)	MgO-C STANDARD BRICKS
(SAFETY LINING)	MgO or MgO-Cr_2O_3 BRICKS

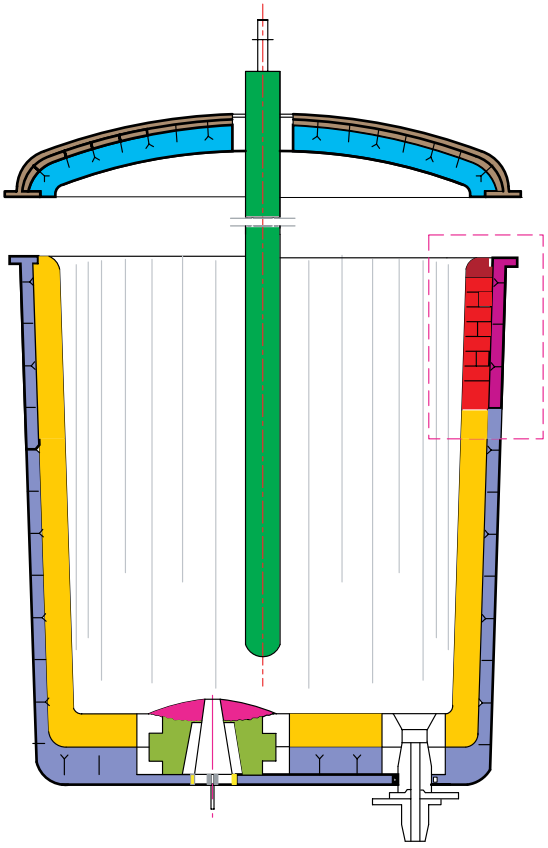
Steel Industry

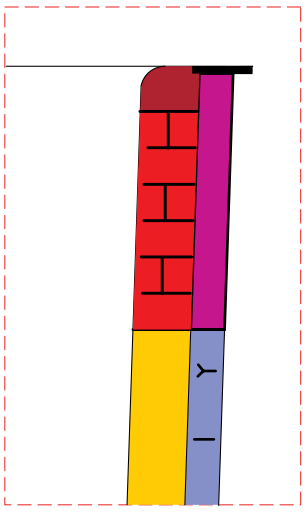
Tundish

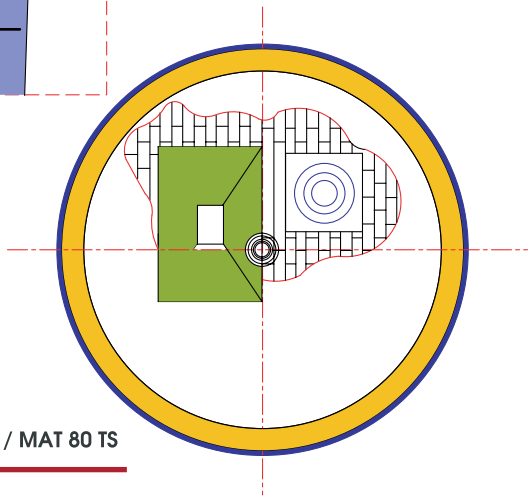


	(SAFETY LINING)	MAT PLUS 80 E / MAT PLUS 80 EA / MAT PLUS 60 M
	(WORKING LINING)	MgO BASED SPRAYABLE MASS
	(IMPACT PADS)	MAT PLUS 80 E / MAT PLUS 90 / MAT PLUS 95 T
	(INSULATING LINING)	INSULATING MATERIALS
	(SLAG WARES)	MAT PLUS 90 / MAT PLUS 95 T / MAT PLUS 93 SP

Ladle For Secondary Metallurgy



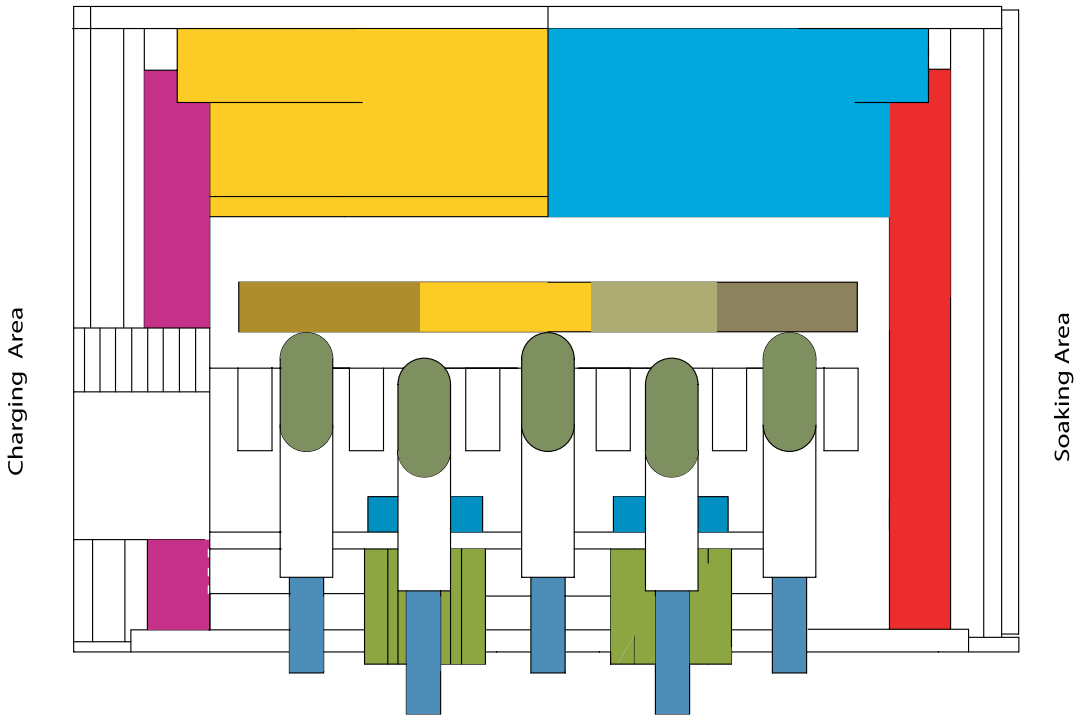




(FILLING MATERIAL)	PYROPLASTIC SUPER 80 / MAT 80 / MAT 80 TS
(SAFETY LINING)	IDEAL M 308 / IDEAL M 310
(SAFETY LINING OF SLAG ZONE)	IDEAL B 80 / IDEAL MU-80 S
(METAL ZONE)	MAT SF 93 SP
(SLAG ZONE)	MgO - C BRICKS
(WELL BLOCK)	MAT PLUS 93 SP
(COVER)	MAT PLUS 80 EA
(INSULATION OF COVER)	MAT 125 / MAT 125 G
(EMERGENCY LANCE)	MAT PLUS 93 SP / MAT PLUS 80 E
(HOT REPAIRING MATERIAL)	MAT 95F-PF

Steel Industry

Walking Beam Reheating Furnace



(ROOF)	MAT RAM 50 C / MAT PLUS MC 50 / MAT RAM 80 C / MAT PLUS 60 M
(DISCHARGING ZONE)	MAT PLUS 60 M / MAT RAM 50 C / MAT RAM 80 C
(PREHEATING ZONE)	MAT RAM 50 C / MAT PLUS MC 50 / MAT 50 G-S
(HEARTH)	MAT RAM 50 C / PYROPLASTIC SUPER / MAT PLUS 52 A MAT RAM 80 C
(BURNERS)	MAT PLUS 60 A / MAT RAM 50 C / MAT 96-S

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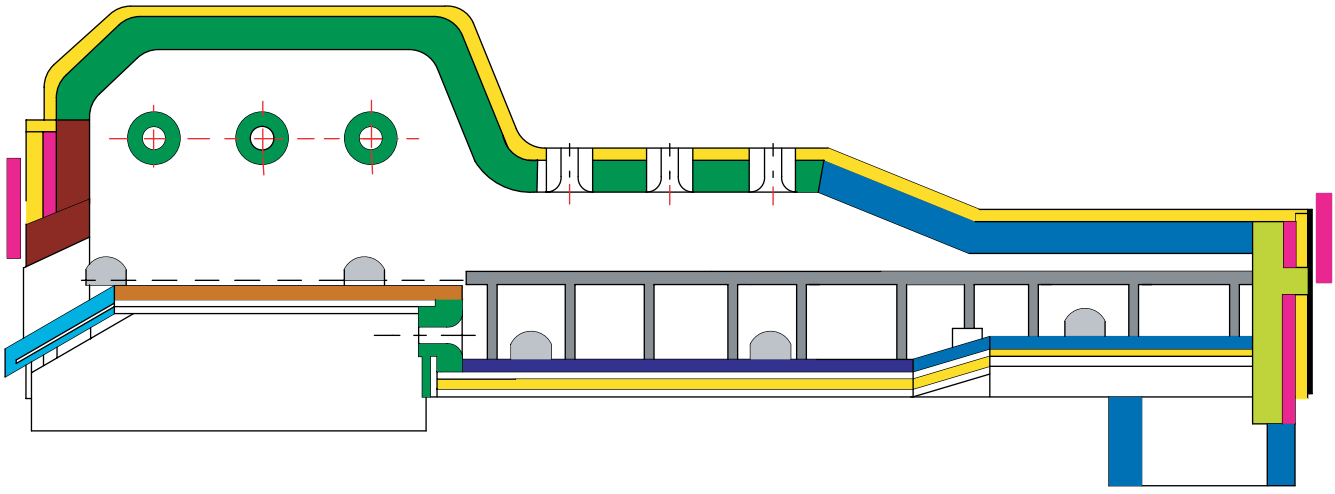
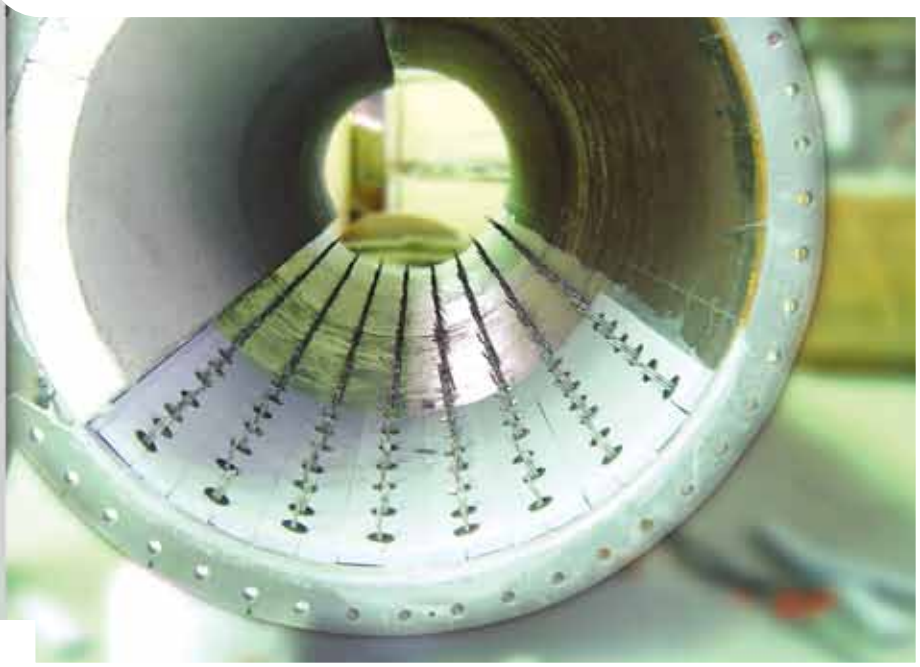
Pusher Type Reheating Furnace



(PREHEATING ZONE)	MAT PLUS MC 50 / MAT PLUS 42 / MAT RAM 50 C
(ROOF / BURNER ZONE)	MAT PLUS 60 A / MAT RAM 50 C / MAT RAM 80 C / MAT 96-S
(CHARGING ZONE)	MAT PLUS MC 50 / MAT PLUS 42
(SOAKING ZONE)	MAT PLUS MC 50 / MAT RAM 60 C
(HEARTH)	MAT PLUS 50 / MAT PLUS 60 A / MAT RAM 50 C / MAT RAM 80 C
(INSULATING LINING)	MAT 125 / MAT 125 G / MAT MW / MAT MW - G
(OUTLET ZONE)	MAT PLUS 60 M / MAT PLUS 80 E



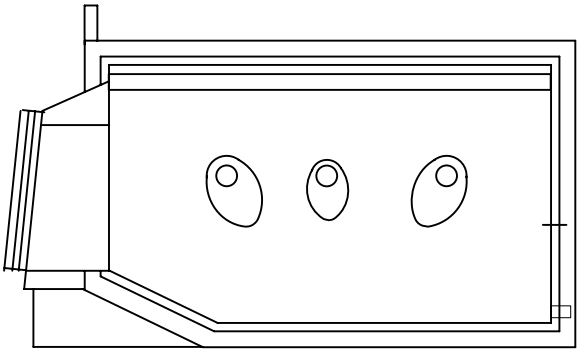
Stack of Melting Furnace

Melting Furnace

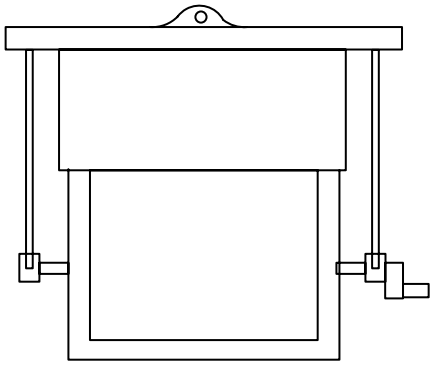
Aluminium industry

MATHIOS REFRACTORIES S.A.

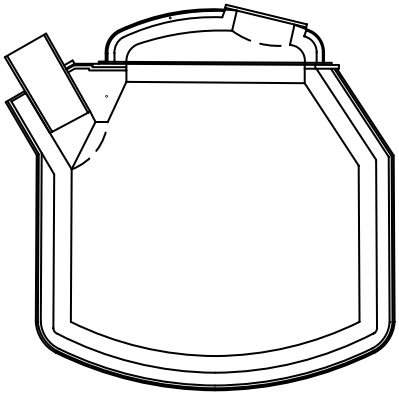
Typical Flow Chart of Secondary Aluminium Production



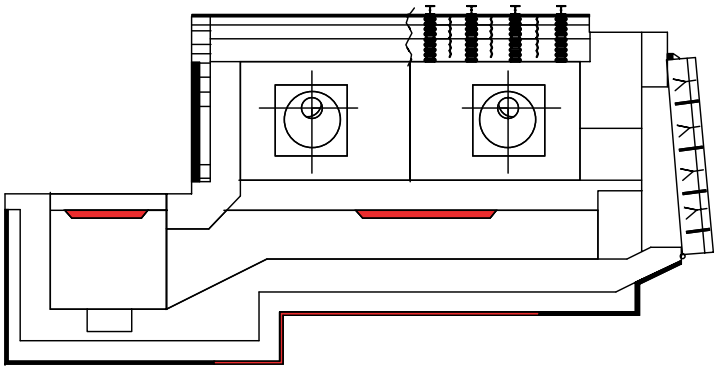
Melting Furnace



Transportation Ladle



Transportation Ladle

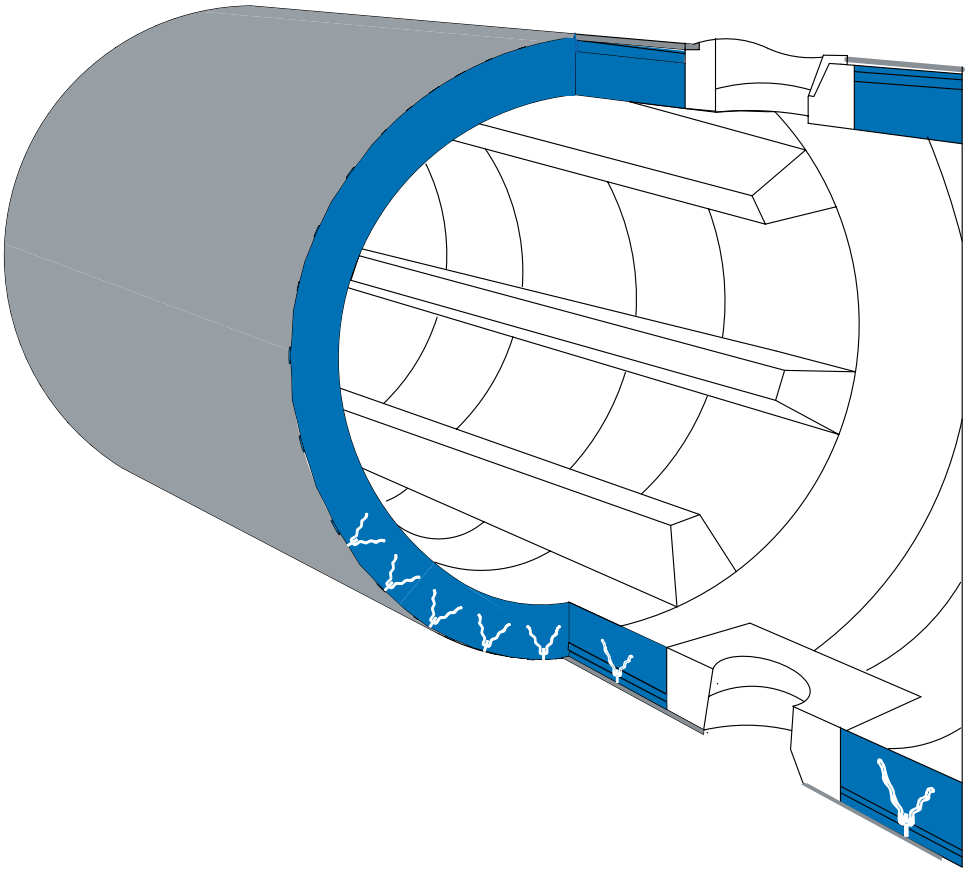


Melting & Holding Furnace

Rotary Kiln

Calcination of Alumina
Agitation Area

Aluminium industry

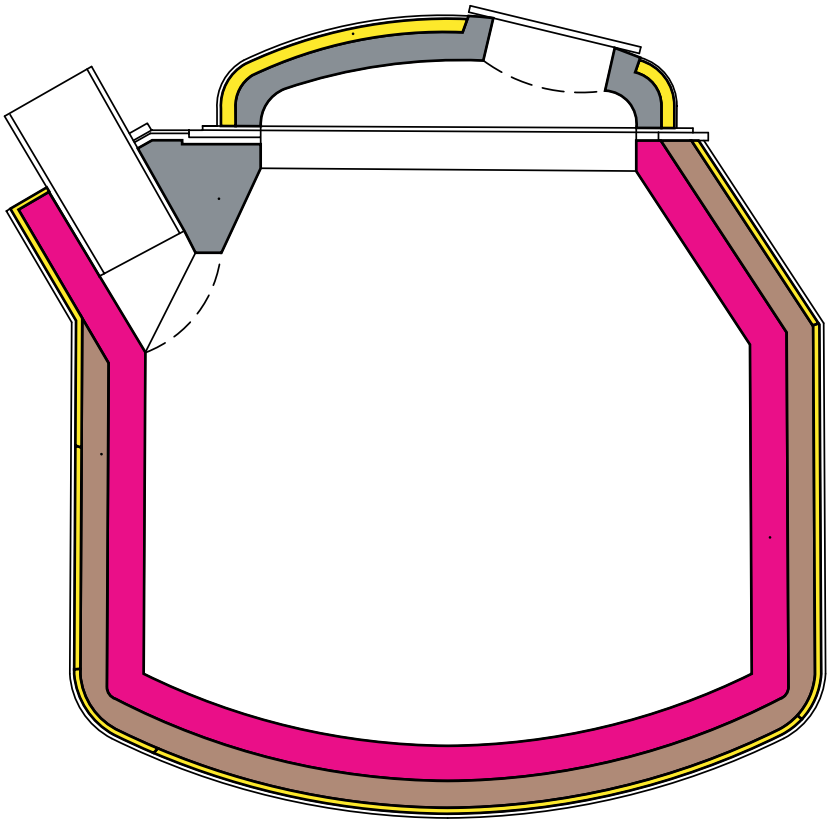


(REFRACTORY LINING) **MAT PLUS 80 / MAT PLUS 80 E**

MOVABLE METALLIC ANCHORS

MATHIOS REFRACTORIES S.A.

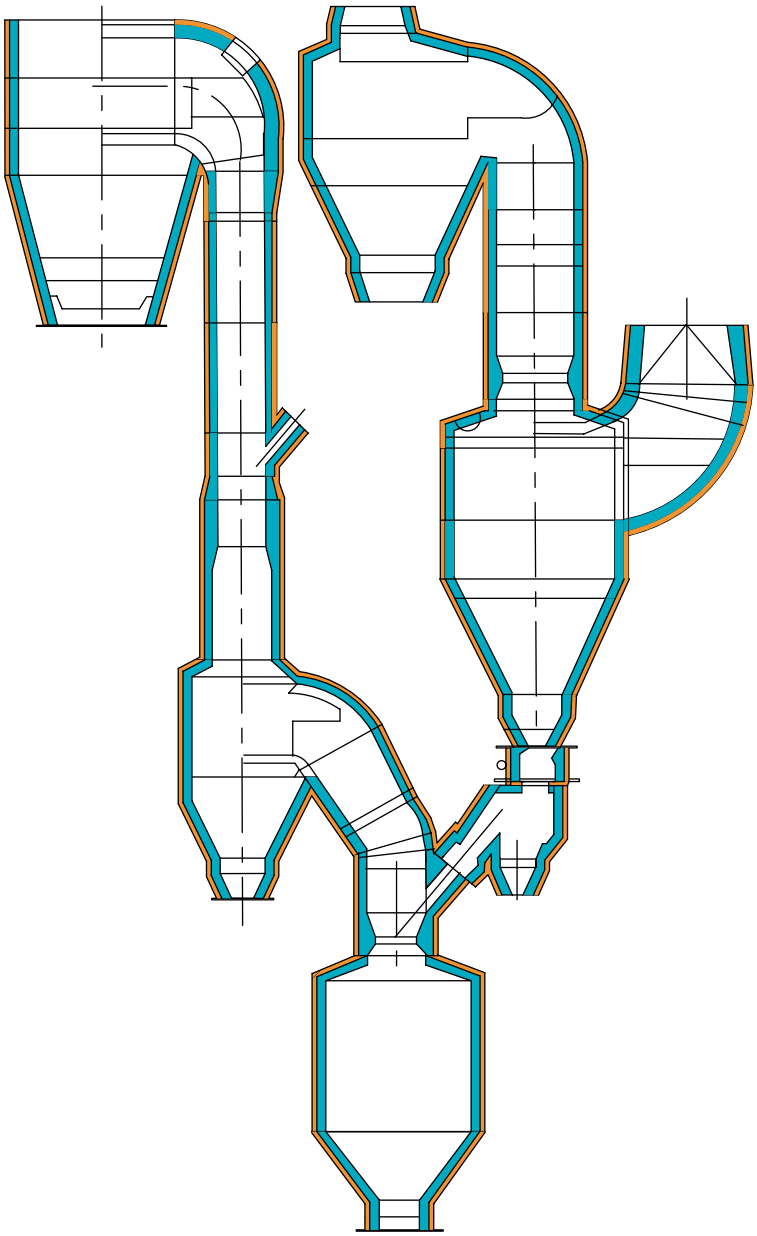
Ladle for Melted Aluminium Transportation



	(COVER)	MAT PLUS MC 50 / MAT MW
	(REFRACTORY LINING)	MAT PLUS 80H / MAT PLUS 80 E / IDEAL M-310 / IDEAL B-80
	(INSULATING LINING)	MAT MW
	(INSULATION)	INSULATING MATERIALS - FIBERS

Static Furnace

Calcination of Alumina



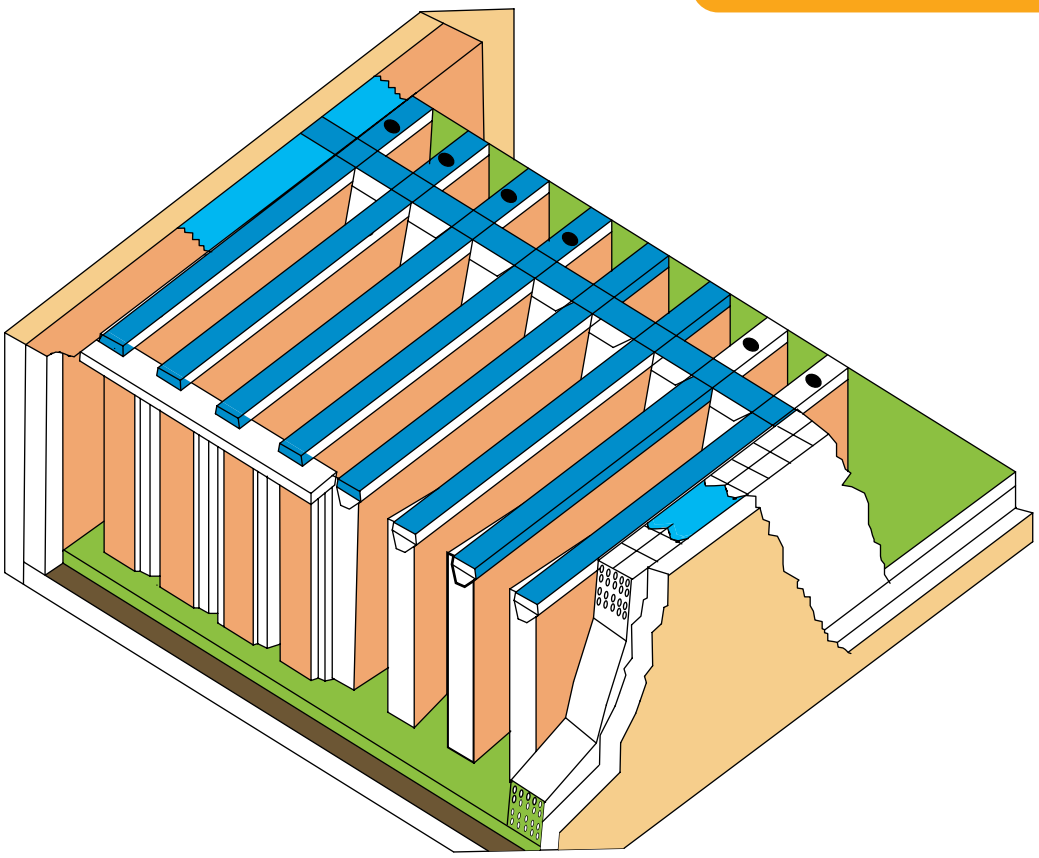
(REFRACTORY LINING) MAT PLUS 80 / MAT PLUS 80 EA / MAT PLUS 60 M

(INSULATING LINING) MAT 125 / MAT 125 - G / INSULATING MATERIALS

Aluminium industry

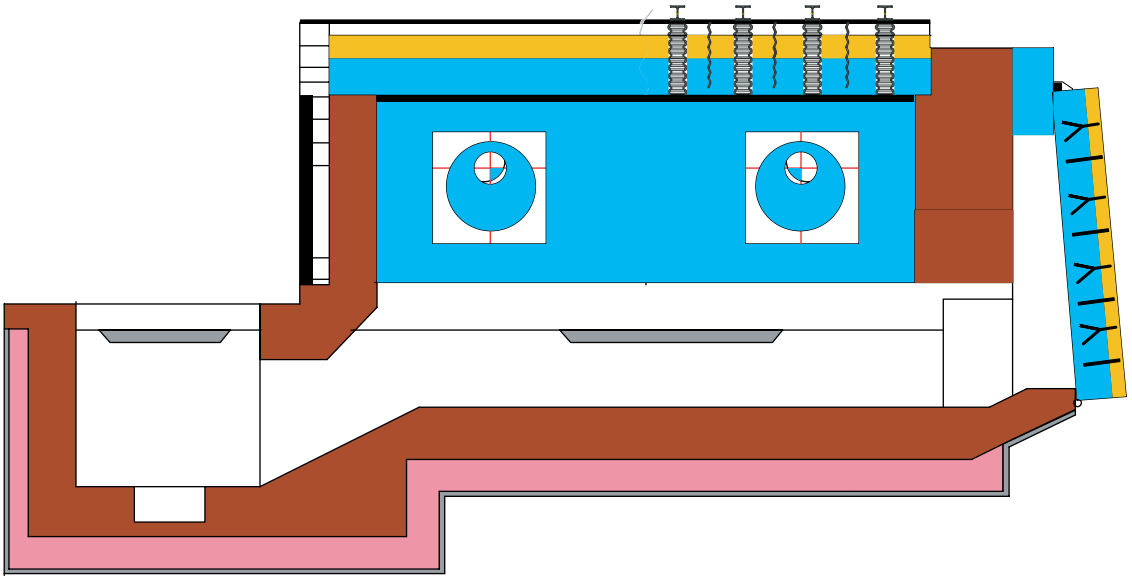
MATHIOS REFRACTORIES S.A.

Anode Baking Furnace



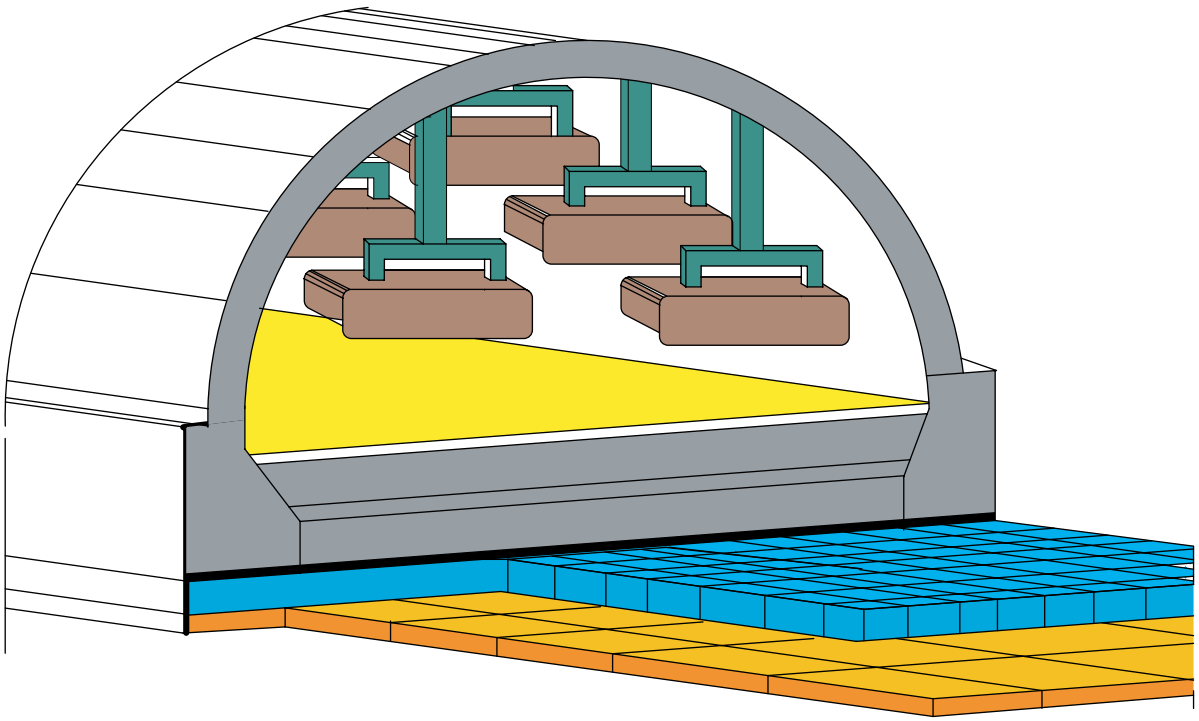
(ROOF)	**MAT 42 / MAT 42 C**
(BOTTOM LINING)	**IDEAL MU-48 / IDEAL M 310**
(INSULATING LINING)	**MAT MW**
(SIDE WALLS)	**IDEAL MU-42 / IDEAL MU-48 / IDEAL A-63**
(INSULATION)	**INSULATING BRICKS**

Melting & Holding Furnace



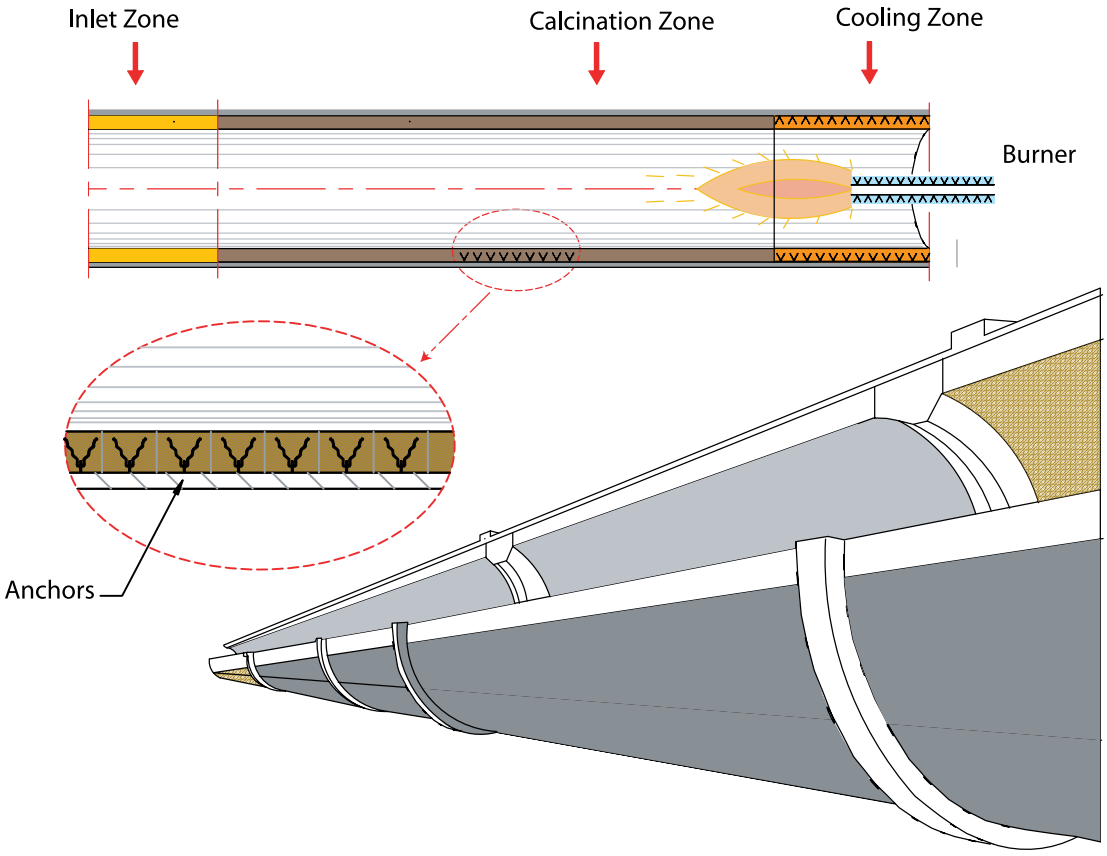
	(INSULATING LINING)	**MAT MW**
	(BATH ZONE)	**MAT PLUS 80-AL / MAT PLUS 80 E-AL**
	(ROOF & DOOR & SIDE WALLS)	**MAT PLUS 80 / MAT PLUS 80 EA** **MAT PLUS 60-M**
	(ROOF & DOOR INSULATION)	**MAT MW-G / MAT MW**
	(CERAMIC ANCHOR)	**IDEAL A-63 / IDEAL MU-60**
	MOVABLE METALLIC ANCHORS	

Electrolytic Cell



(INSULATING LINING)	**INSULATING BRICKS / MAT MW**
(BOTTOM REFRACTORY LINING)	**MAT PLUS MC 45 / IDEAL M334-AL**

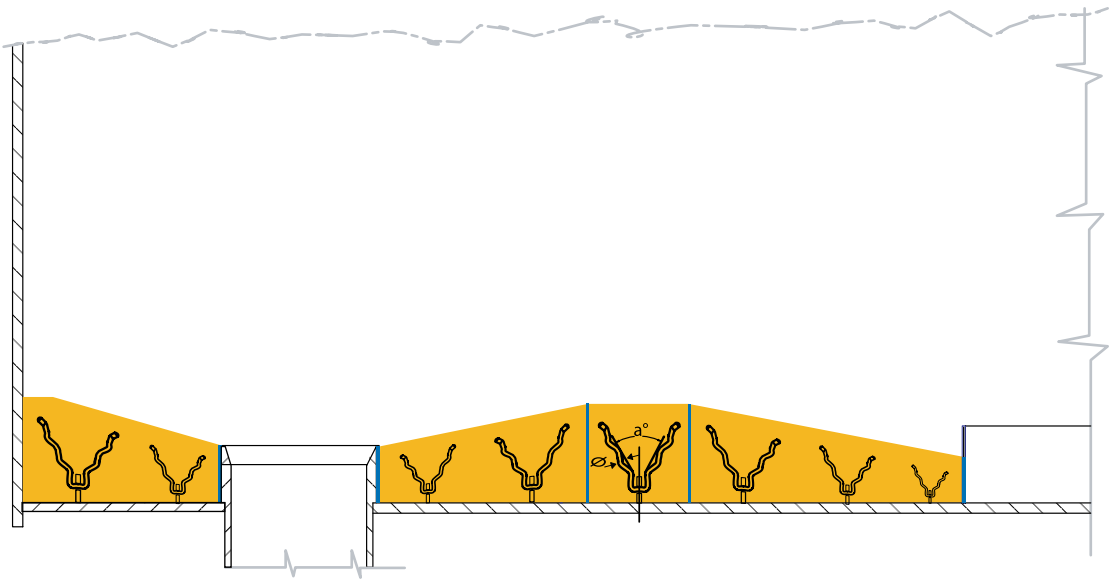
Rotary Kiln Calcination of Alumina



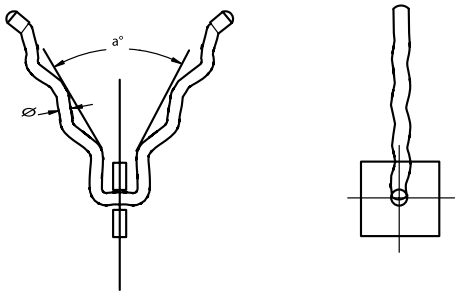
	(COOLING ZONE)	MAT PLUS 80/MAT PLUS 80 E
	(INLET ZONE)	MAT PLUS 80/MAT PLUS 80 E
	(BURNER)	MAT PLUS 80 / MAT PLUS 50 ML-E
	(CALCINATION ZONE)	MAT PLUS 80/MAT PLUS 80 E

MOVABLE METALLIC ANCHORS

Barrage of Alumina Rotary Kiln

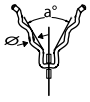


Movable Metallic Anchors



(REFRACTORY LINING) **MAT PLUS 80/MAT PLUS 80 E**

(EXPANSION JOINTS) **CERAMIC FIBERS**



MOVABLE METALLIC ANCHORS

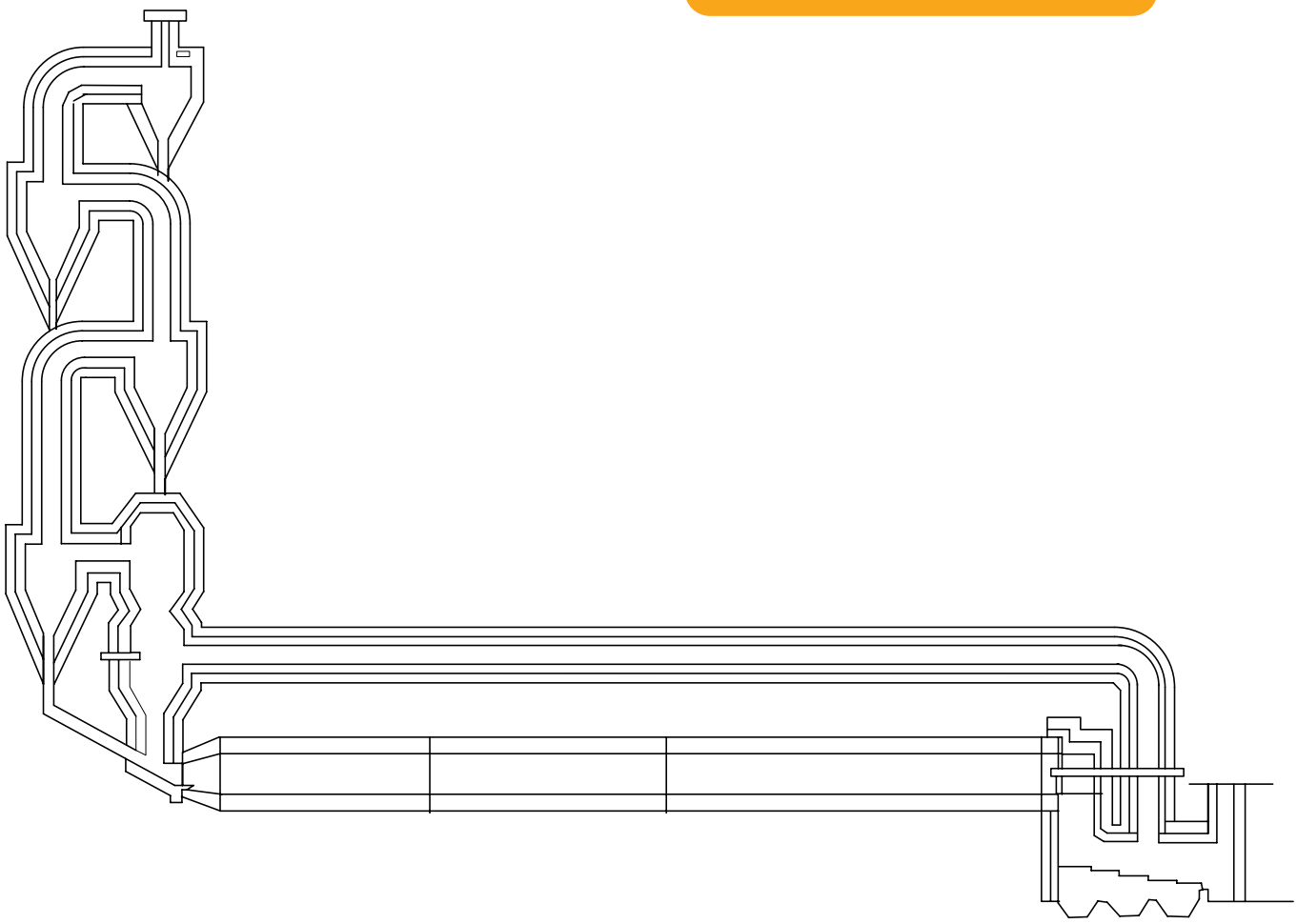
Installation of Refractory Material by "Gunning"

Rotary Kiln Entrance

MATHIOS REFRACTORIES S.A.

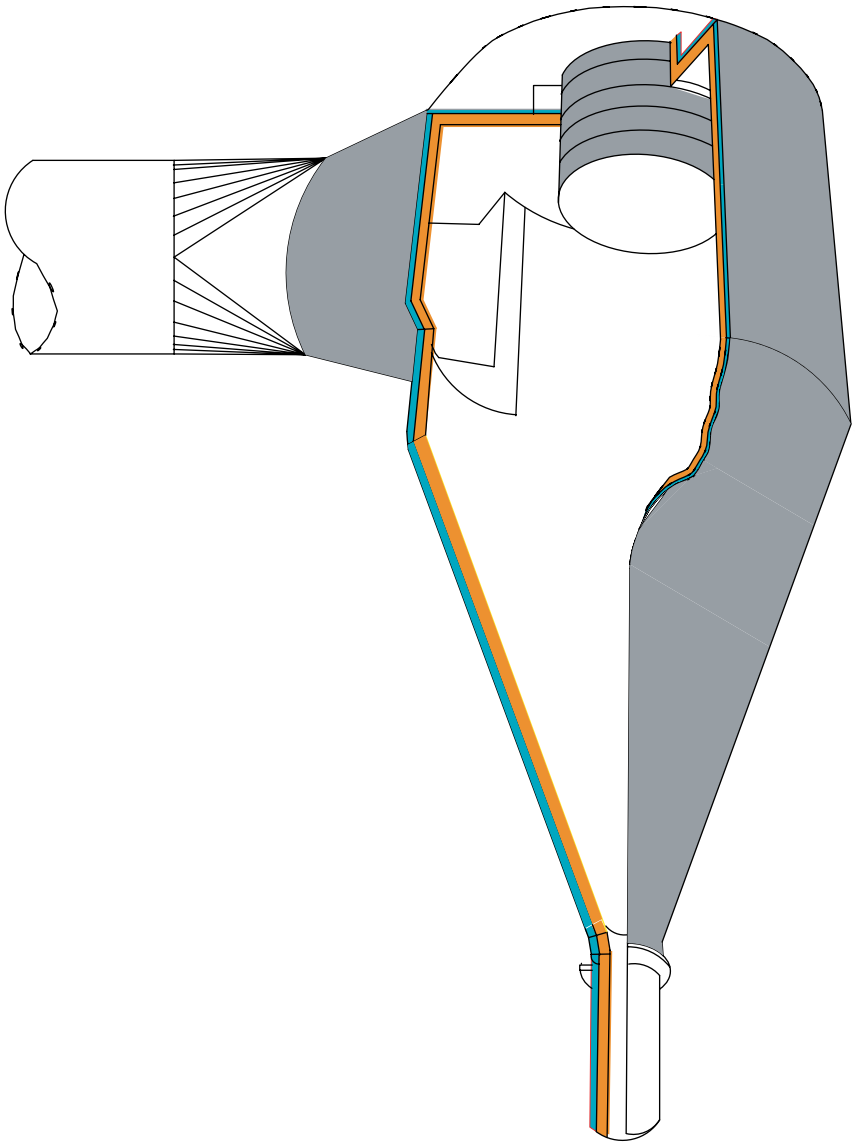
Cement industry

Cement Plant



Cyclone

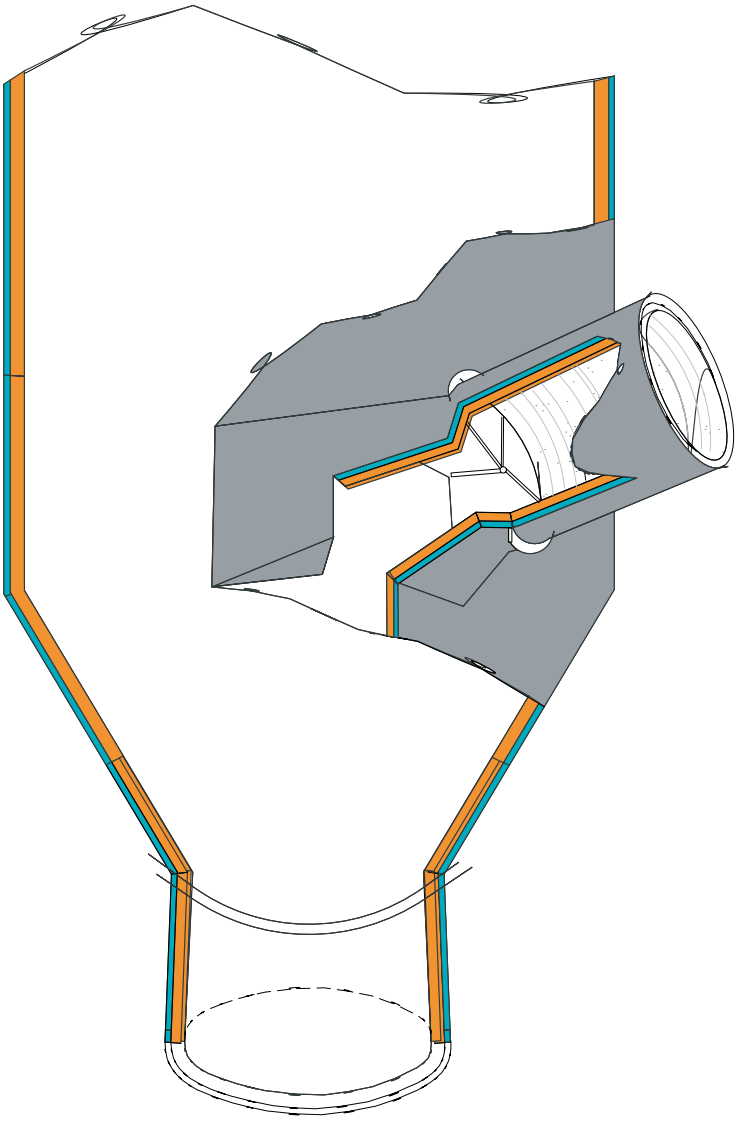
Cement industry



(INSULATING LINING)	MAT 125 / MAT 125 G
(REFRACTORY LINING)	MAT PLUS MC 35 / MAT PLUS MC 50 / MAT 32 GS / MAT 50 GS / IDEAL M 334

MATHIOS REFRACTORIES S.A.

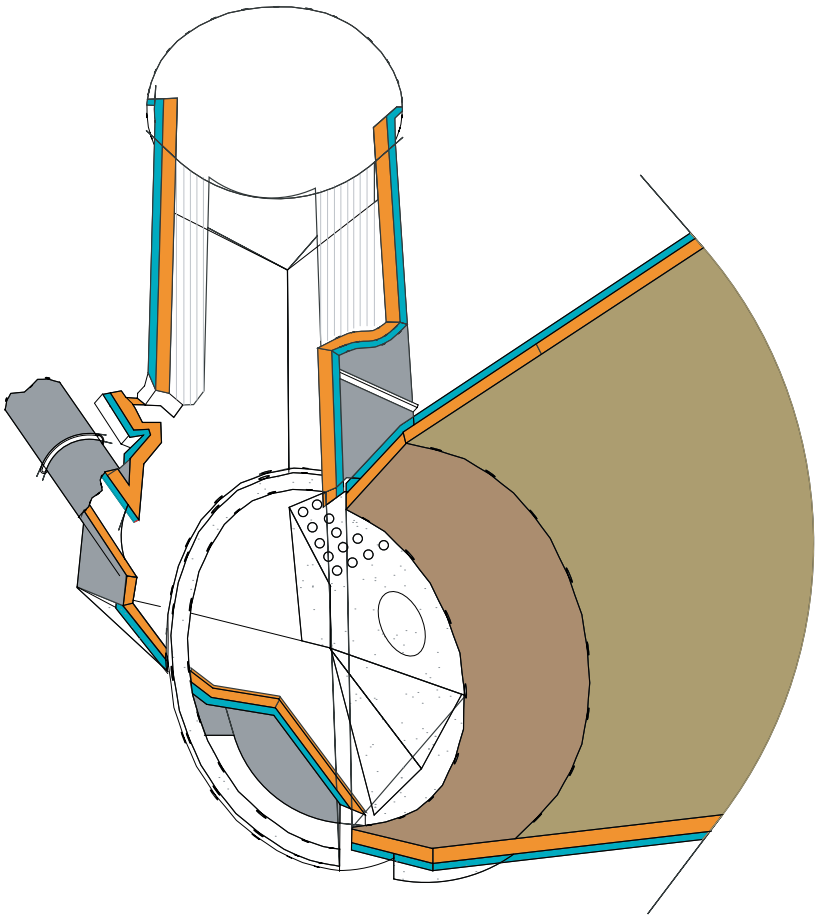
Calcinator



	(INSULATING LINING)	MAT 125 / MAT 125 G
	(REFRACTORY LINING)	IDEAL MU-48 / MAT PLUS 58-A / MAT PLUS 60-M MAT 80 GS / MAT GUN30 SiC

Riser Duct / Inlet Zone

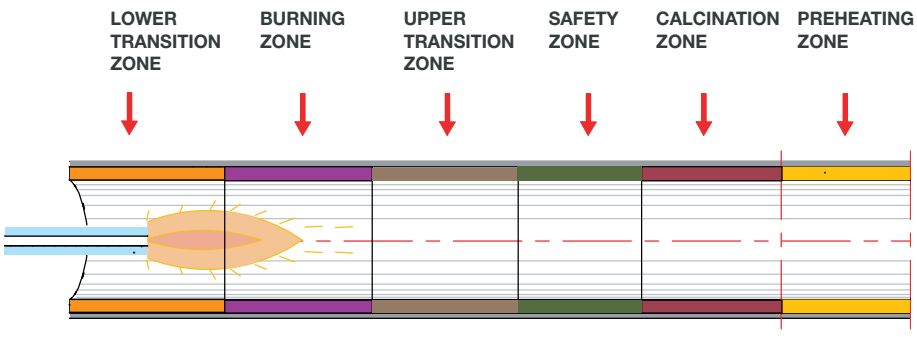
Cement industry



	(INSULATING LINING)	MAT 125 / MAT 125 G
	(REFRACTORY LINING)	MAT PLUS 60 M / MAT PLUS 60 A / MAT PLUS 25 ZR MAT PLUS 30 SiC / MAT 30 ZR-G

MATHIOS REFRACTORIES S.A.

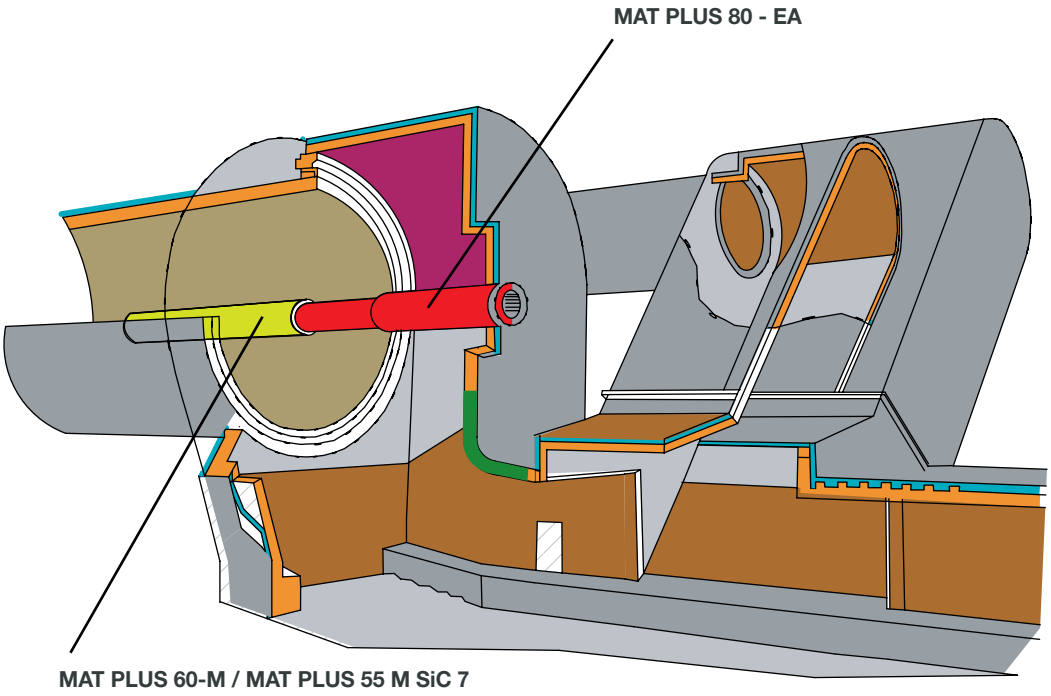
Rotary Kiln



	(SAFETY ZONE)	**IDEAL A 63 / IDEAL MU 60 / IDEAL MU 72 / IDEAL B 80**
	(CALCINATION ZONE)	**IDEAL A 63 / IDEAL MU 60 / IDEAL B 50 Z**
	(PREHEATING ZONE)	**IDEAL M 310 / IDEAL M 334 / IDEAL 282**

Great Cooler/ Bull Nose/ Tertiary Air/Burner

Cement industry



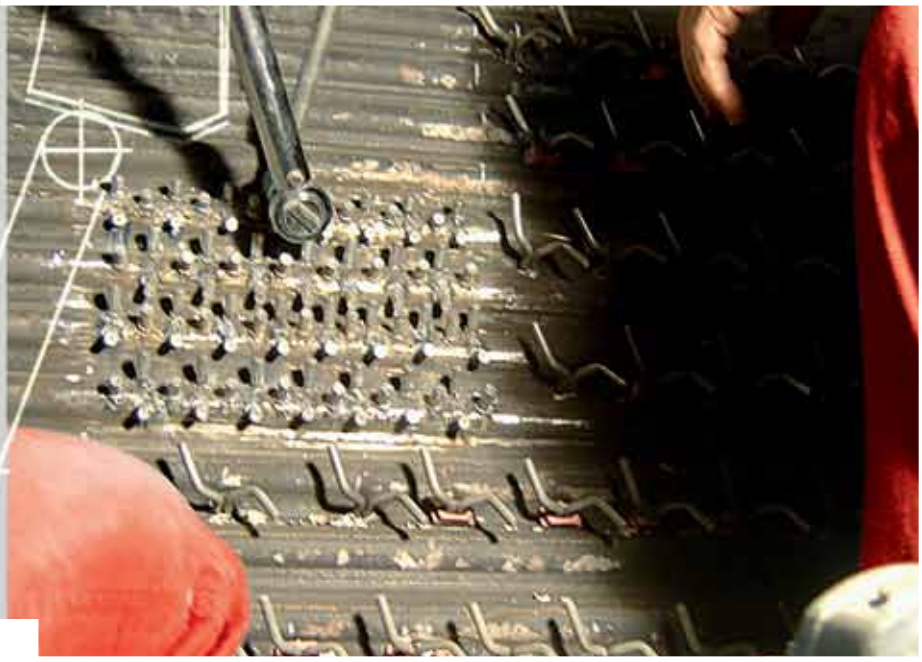
(BULL NOSE)	MAT PLUS 60 M / MAT PLUS 80
(INSULATING LINING)	MAT 125 / MAT 125 G
(REFRACTORY LINING)	MAT PLUS 80 / MAT PLUS 50 ML-E / MAT PLUS 30 SIC MAT PLUS 95 T
(KILN HOOD)	MAT PLUS 60 M / MAT 58 M- GS / MAT 80 GS

MATHIOS REFRACTORIES S.A.

Construction

Power plants

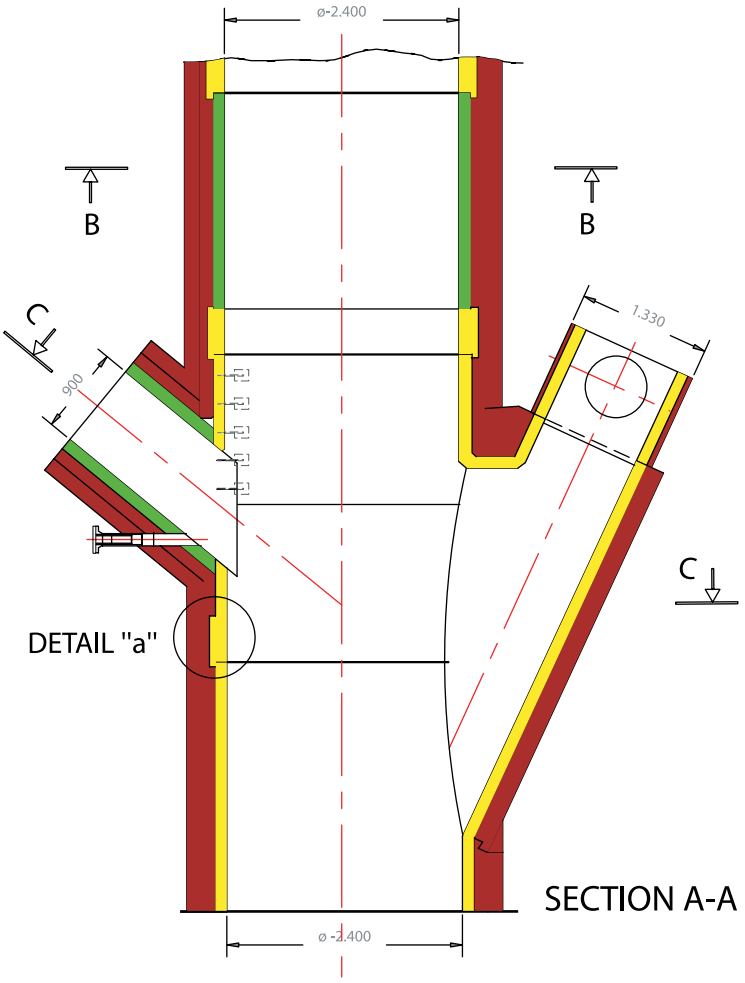
Inspection of metal chimney (inner part)



Welding of special MVP anchors and studs

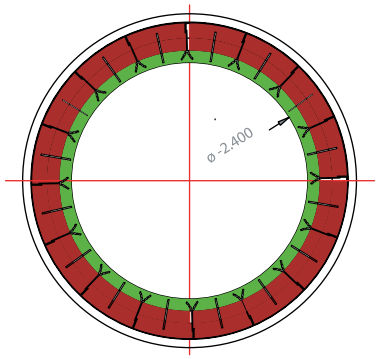
MATHIOS REFRACTORIES S.A.

Flue Gas Resuction Duct

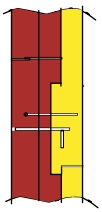


DETAIL "a"

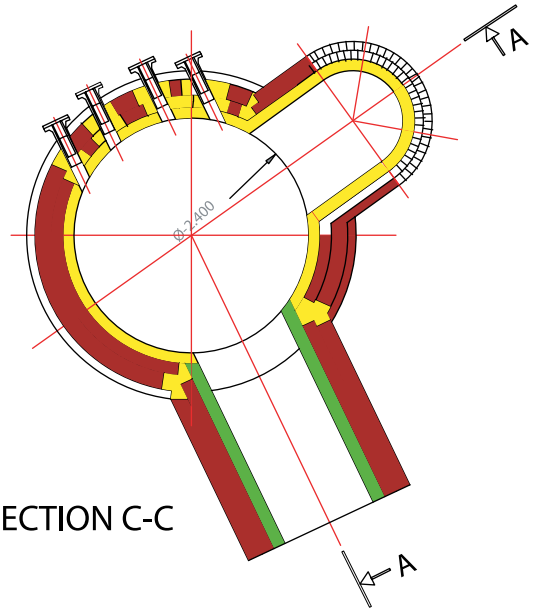
SECTION A-A



SECTION B-B



DETAIL "a"

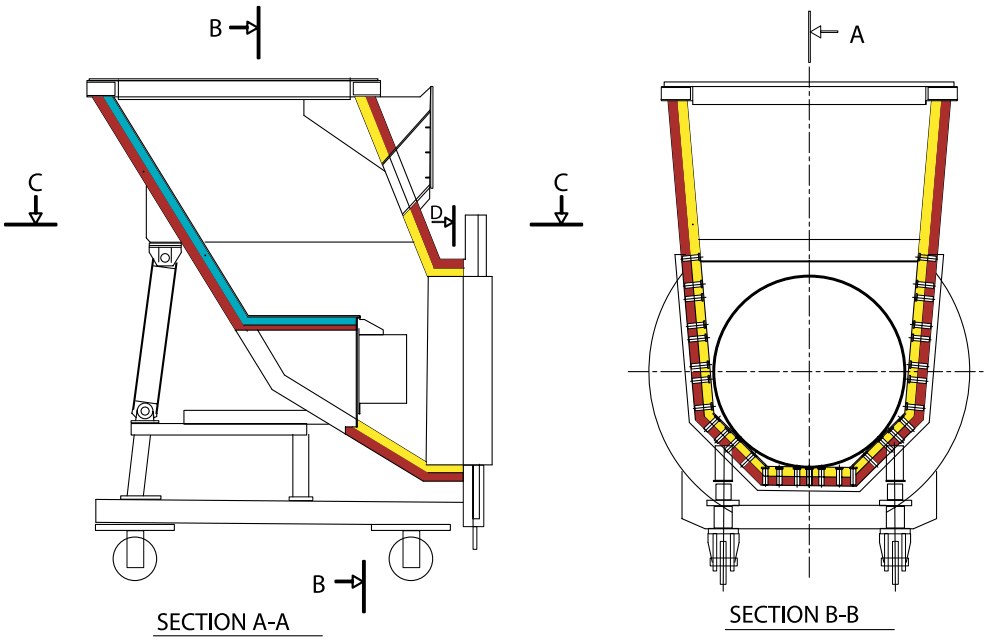


SECTION C-C

(REFRACTORY LINING)	MAT 50 SMG / IDEAL M 334 MAT 50 G-S / MAT 80 G-S
(HIGH ABRASION REFRACTORY LINING)	MAT PLUS MC 50 / MAT PLUS 50 ML-E IDEAL M334
(INSULATING LINING)	MAT 125 G / GR23 / ISO 450

Coal Mill Door

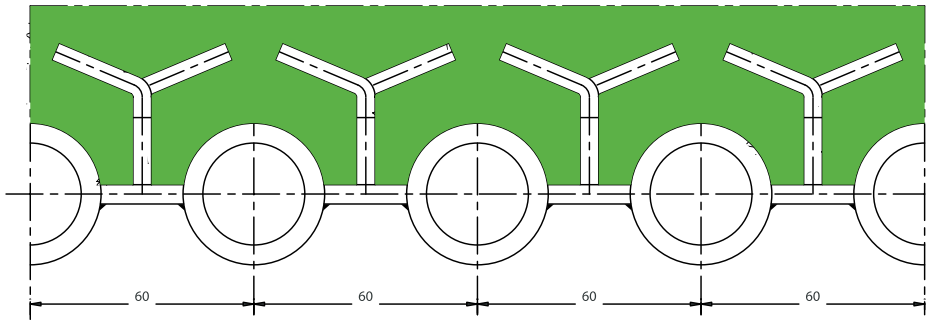
Power Generation



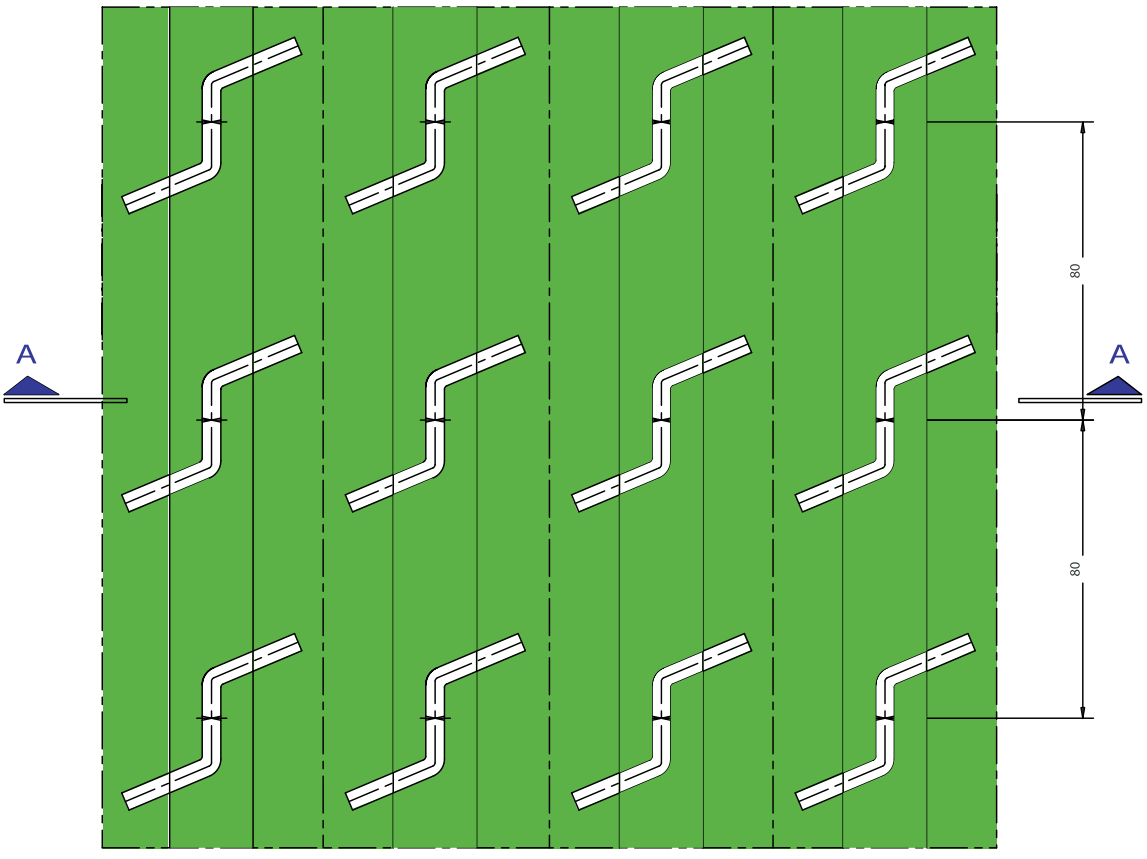
	(REFRACTORY LINING)	MAT PLUS 50 ML-E / MAT PLUS MC 50 / MAT PLUS 42
	(IMPACT ZONE)	MAT PLUS 80 H / MAT PLUS 92
	(INSULATING LINING)	INSULATING BRICKS / ISO 450

MATHIOS REFRACTORIES S.A.

Boiler Furnace Hopper



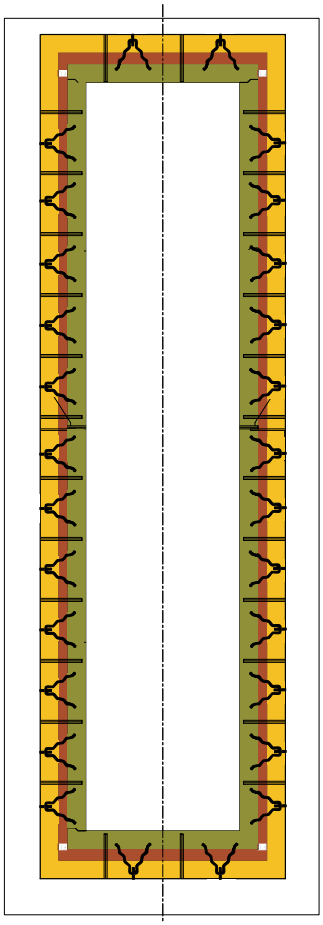
SECTION A-A

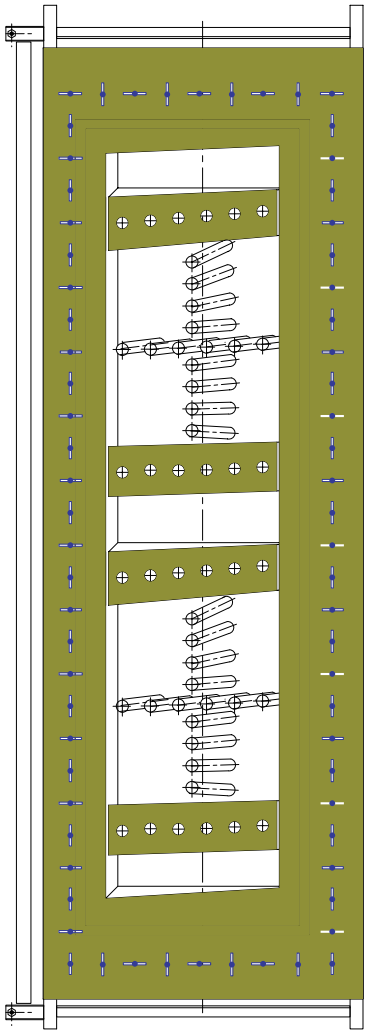


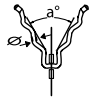
(REFRACTORY LINING) **MAT RAM 85 SiC - P / MAT PLUS 70 SiC / MAT GUN 70 SiC**

SPECIAL METALLIC ANCHORS MVP

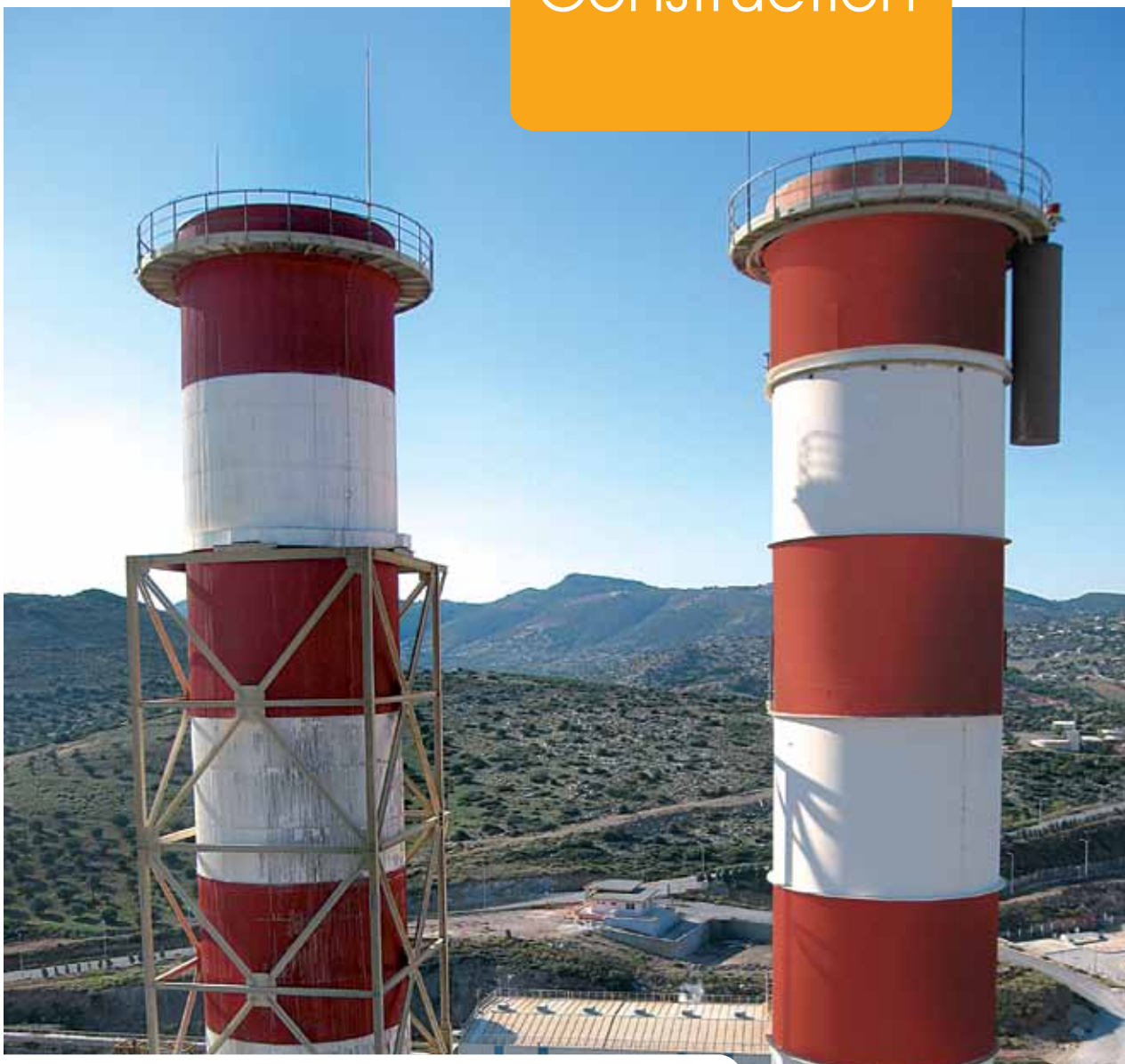
Refractory Lining of Main Coal Burners



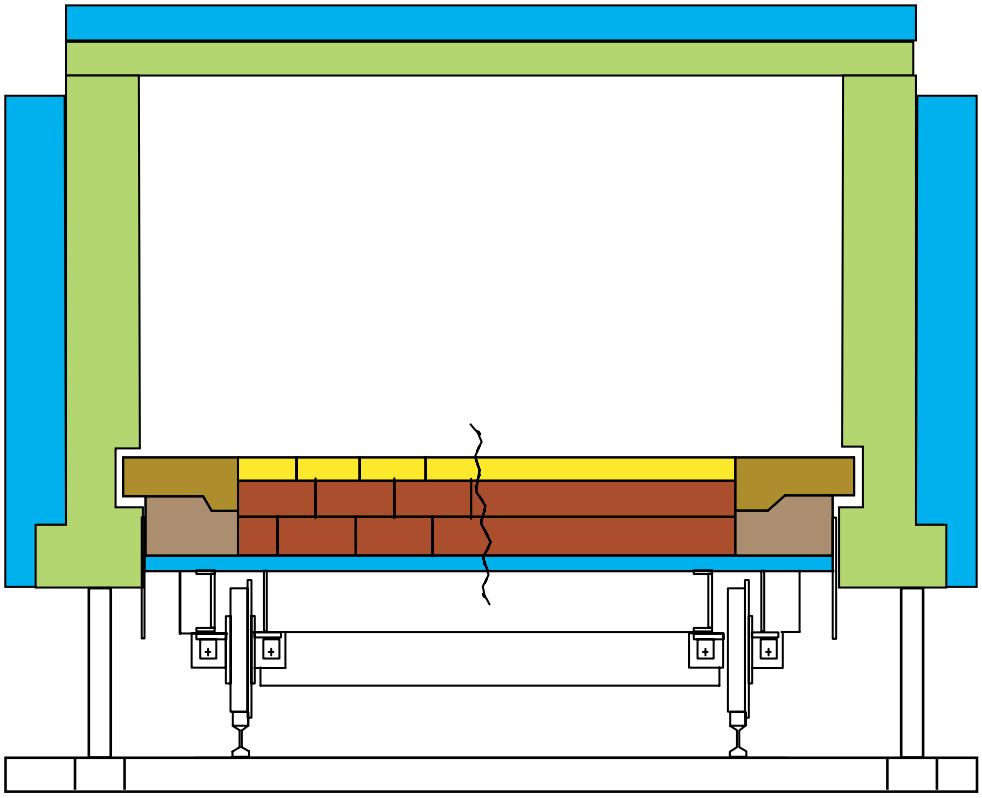


	(REFRACTORY LINING)	MAT PLUS 50 ML-E / MAT 80 G-S MAT PLUS MC 50
	(INSULATING LINING)	INSULATION BRICKS / MAT MW / MAT MW-G / GR 23
	(INSULATING LINING)	MAT 125 / MAT 125 G / ISO 450
	MOVABLE METALLIC ANCHORS	

Construction



Tunnel Kiln Car



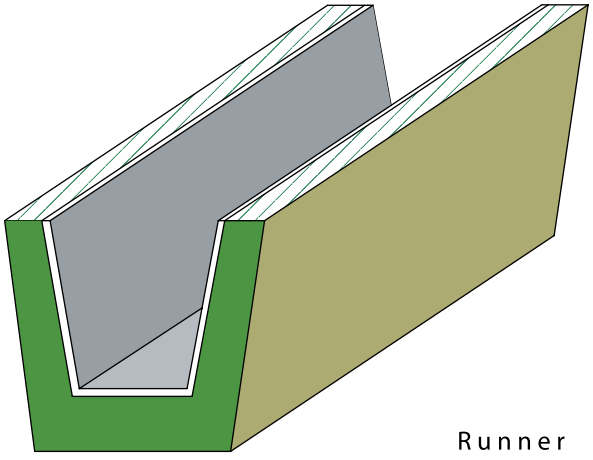
(REFRACTORY LINING)	MAT GR / MAT PLUS MC 35 / MAT PLUS 80
(PREFABRICATED SHAPES)	MAT GR / MAT 42 / MAT PLUS 80
(INSULATING LINING)	MAT 125 / MAT MW
(INSULATING LINING)	MAT 125 / MAT MW
(OUTSIDE WALLS)	MAT 106 / MAT 125
(REFRACTORY LINING)	MAT PLUS 42 / MAT PLUS MC 50 IDEAL M310 / IDEAL MU 48 / IDEAL B 60

Ceramic industry

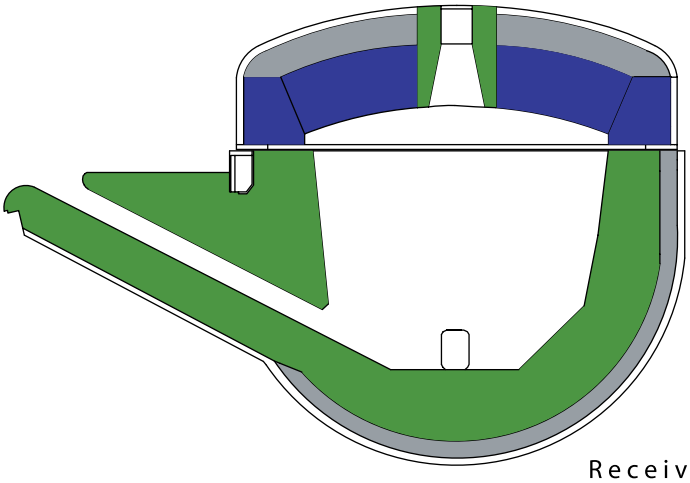
MATHIOS REFRACTORIES S.A.

Foundry

Runner Receiver



Runner



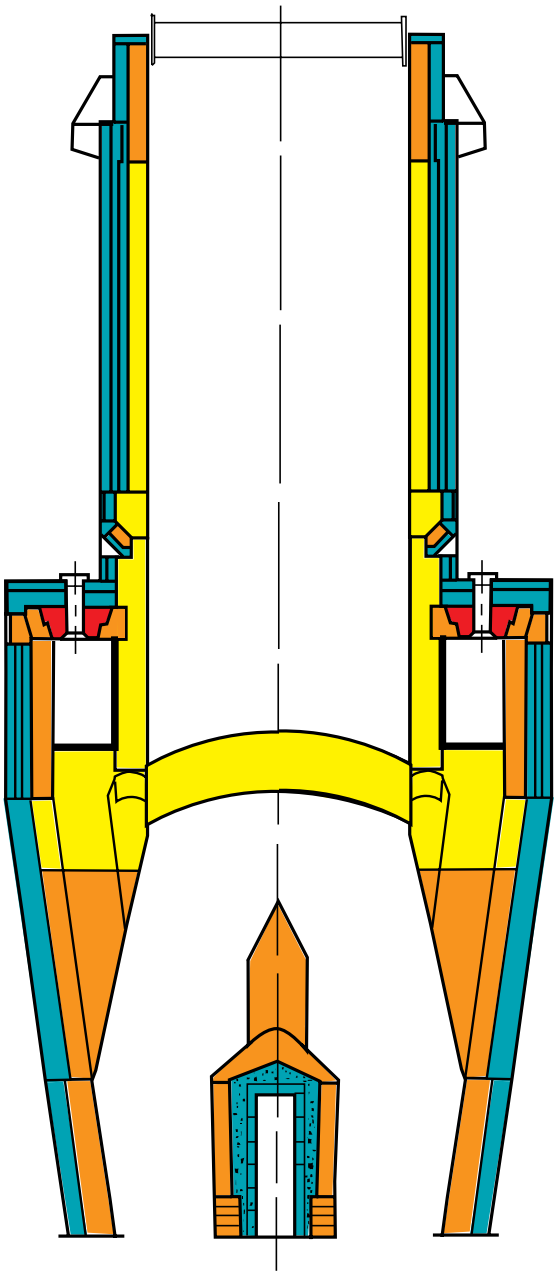
Receiver

	(METAL BATH)	MAT PLUS 93 SP / MAT SF 93 SP
	(COVER)	MAT RAM 50 C / MAT 96 S
	(INSULATION)	INSULATING MATERIAL

Lime industry

MATHIOS REFRACTORIES S.A.

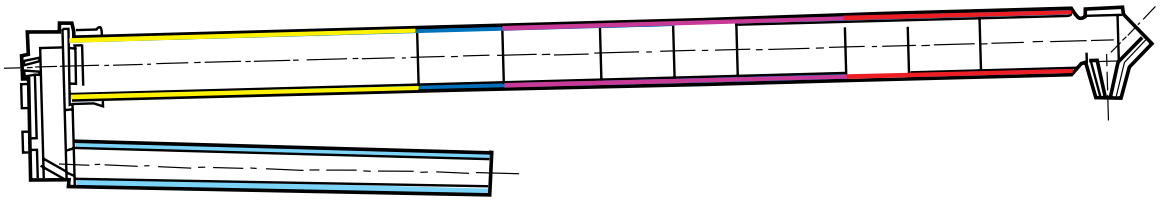
Lime Shaft Kiln



(BURNING ZONE)	MAT PLUS 50 ML / MAT PLUS 52 A IDEAL MU-60 / IDEAL B-60 / IDEAL B-75
(INLET, TRANSITION, COOLING ZONE)	MAT PLUS 42 / IDEAL M-310 / IDEAL MU-48 / IDEAL MU-60
(INSULATING LINING)	MAT MW / MAT 125 / MAT 106 / CALCIUM SILICATE INSULATING BRICKS / CERAMIC FIBERS
(REFRACTORY LINING)	MAT PLUS 80 EA

Lime Rotary Kiln

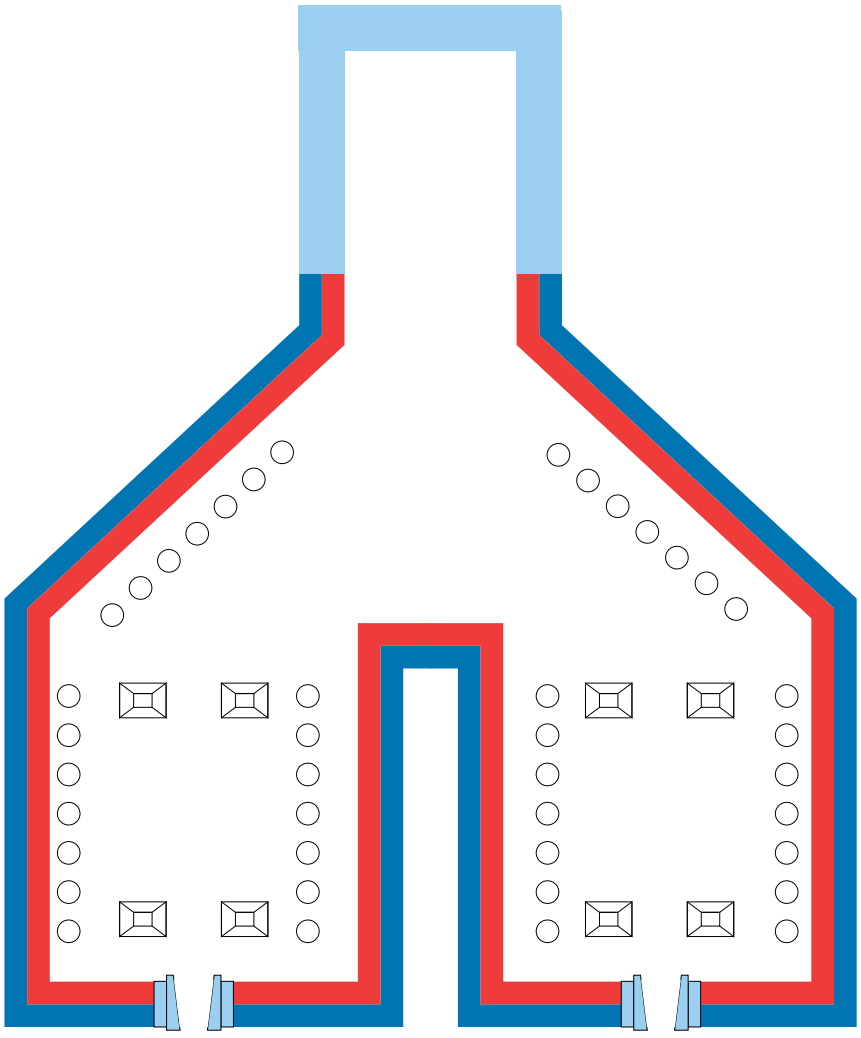
Lime industry



(SINTERING ZONE)	**MAT PLUS 60 A / IDEAL A 63**
(TRANSITION ZONE)	**MAT PLUS 60 A / IDEAL A 63**
(CALCININING ZONE)	**MAT PLUS 52 A / IDEAL MU 60**
(PREHEATING ZONE)	**MAT PLUS 80 EA / IDEAL B 50 Z**
(COOLER)	**MAT PLUS MC 50**

Crude & Vacuum Distillation Unit

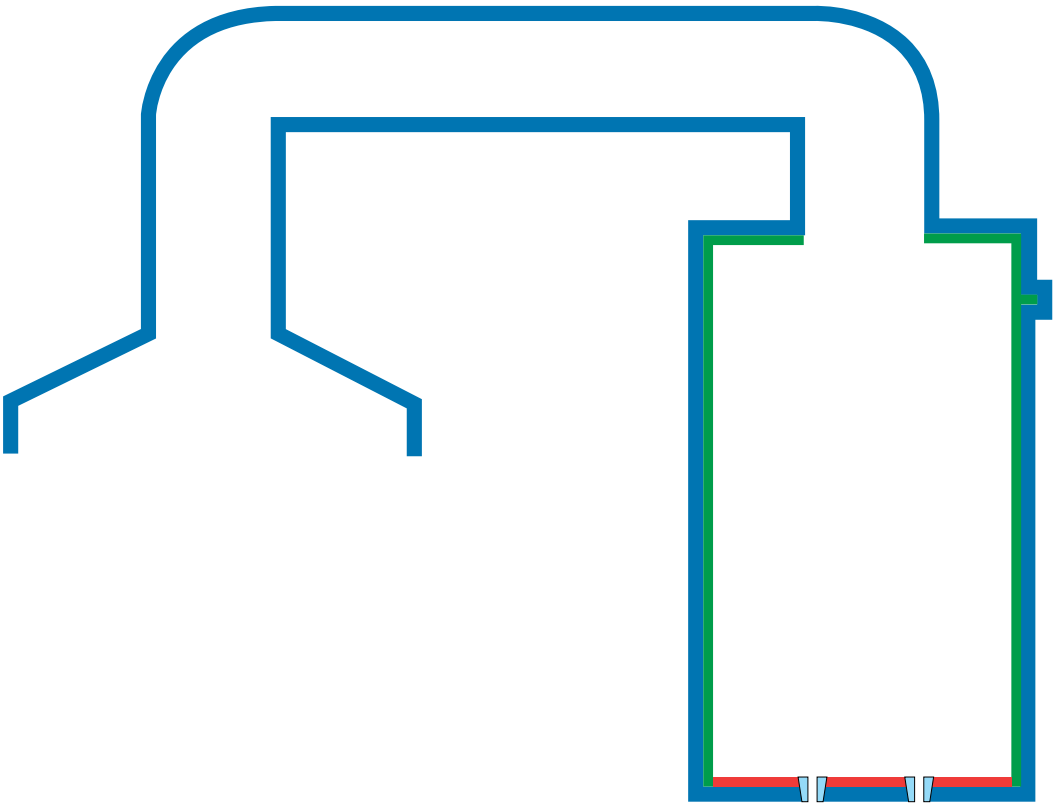
Refineries



	(INSULATING LINING)	**MAT 106**
	(REFRACTORY LINING)	**MAT 125**

Catalytic Reformer Furnaces (Fired Heaters)

Refineries



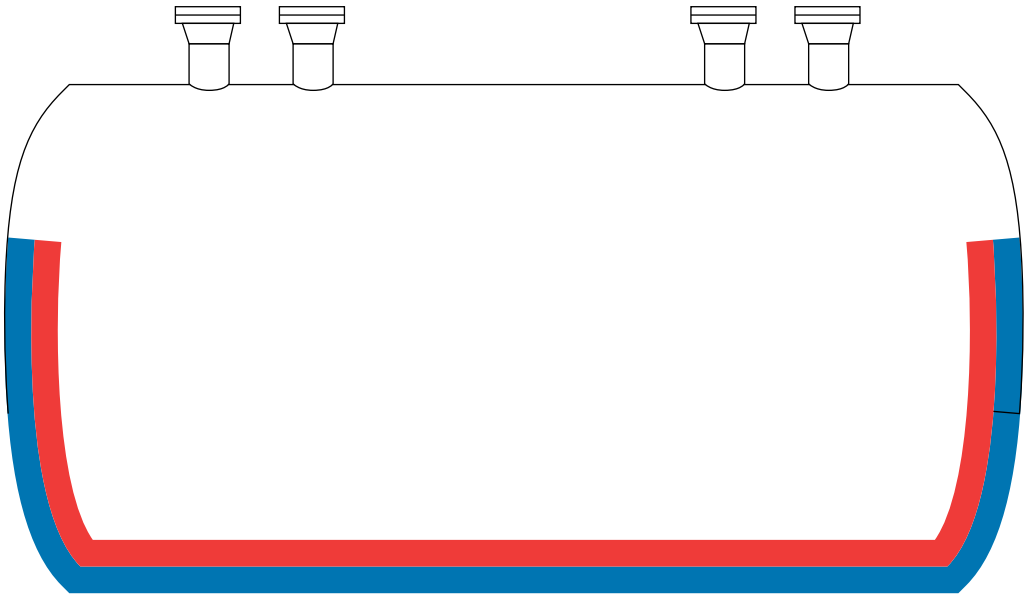
MAT 106 / MAT 106 G

MAT 125-G

IDEAL M - 334

Sulfur Recovery Unit (Bottom / Heads)

Refineries

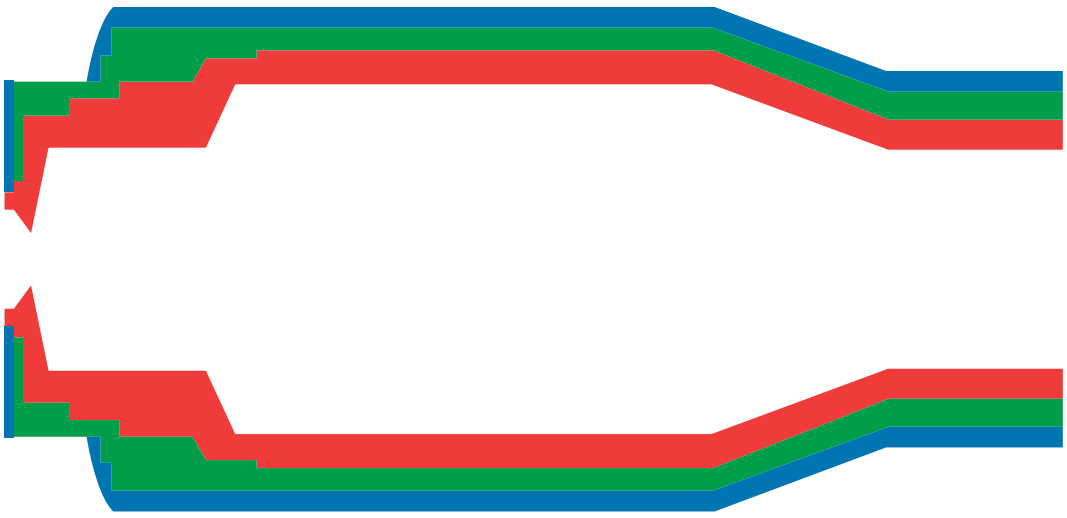


MAT 124

MAT 42-C

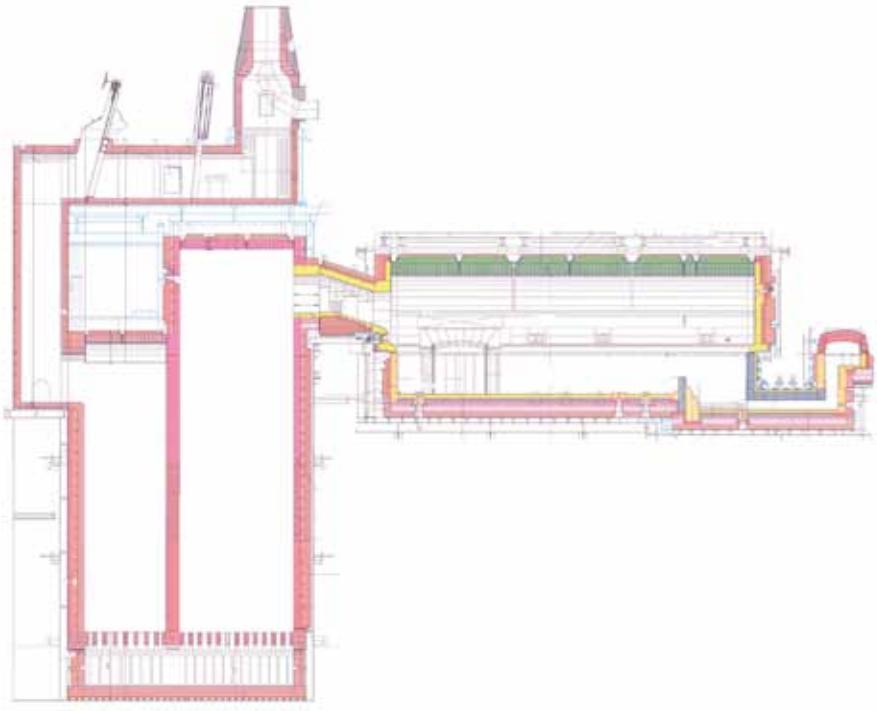
Sulfur Recovery Unit (Main Burner Main Combustion Chamber

Refineries



	(INSULATING LINING LOW TEMPERATURE)	**CALCIUM SILICATE P/HT**
	(INSULATING LINING HIGH TEMPERATURE)	**GM 23 / GM 26**
	(BURNING ZONE)	**MAT RAM 90 C**

Regenerator / Melting Furnace



Glass Industry

	(INSULATING BRICKS)	**ISO 450 / GR - 25 / GR - 26 / GR - 28 / GR - 30**
	(REFRACTORY BRICKS)	**IDEAL FC 77 / IDEAL FM 72 / IDEAL FM 76**
	(REFRACTORY CASTABLES)	**MAT PLUS 80 EA / MAT 125**

Refractory Products

Firebricks

Alumina Silicate

Acid Resistant

Monolithic Refractory

Castables

- Hydraulically Bonded
  - Regular Castables (R.C.)
  - Deflocculated Castables
    - Medium Cement Castables (M.C.C.)
    - Low Cement Castables (L.C.C.)
    - Ultra low Cement Castables (U.L.C.C.)

- Chemically Bonded

Insulating Castables

Refractory Products

Gunning Materials

Isulating Gunning

Refractory Gunning

- Regular Cement Gunning (R.C.G.)
- Medium Cement Gunning (M.C.G.)
- Low Cement Gunning (L.C.G.)
- Chemically Bonded

Plastic / Ramming Materials

Chemically Bonded

Ceramically Bonded

Mortar / Jointing Materials

Heat Setting

Air Setting

Regular Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	Fe_2O_3	CaO	
MAT GR	1300	Chamotte	R.C.*	V*/C*	>30	54	2.5	8.9	2.08
MAT 42 C	1350	Chamotte	R.C.*	V*/C*	> 44	< 41.5	< 2.9	9.1	2.15
MAT 42	1350	Chamotte	R.C.*	V*/C*	> 40	< 45	< 3.4	9.1	2.15
MAT 45 - TS	1450	Chamotte	R.C.*	C*/TR*	> 45	< 46.5	< 1.4	5.7	2.15
MAT 45	1440	Chamotte	R.C.*	V*/C*	>44.5	< 45	2.3	7.4	2.15
MAT 50	1480	Chamotte	R.C.*	V*/C*	> 49	< 43	1.4	6.0	2.20
MAT 50 - S	1500	High alumina raw materials	R.C.*	V*/C*	> 50	< 41	< 1.4	7.3	2.20
MAT 60 - TC	1500	Bauxite/Chamotte	R.C.*	C*/TR*	> 60	< 29	< 1.3	6.3	2.20
MAT 60	1550	Andalusite	R.C.*	V*/C*	> 60.5	< 30	< 0.8	7.3	2.50
MAT 60 F	1550	Andalusite	R.C.*	V*/C*	> 60.5	< 30	< 0.8	7.3	2.50
MAT 77 TS	1520	Bauxite	R.C.*	TR*/C*	>76.5	<13.5	<1.6	4.8	2.45
MAT 80 - TS	1620	Bauxite	R.C.*	C*/TR*/G*	> 80	< 8.5	< 1.6	4.6	2.55
MAT 82 - TS	1620	Bauxite	R.C.*	C*/TR*/G*	> 81	< 8.5	< 1.6	4.6	2.55
MAT 80	1600	Bauxite	R.C.*	V*/C*	> 80	< 6.9	< 1.8	7.2	2.55
MAT 80 - S	1630	Bauxite	R.C.*	V*/C*	> 83	< 6.0	< 1.4	5.2	2.55
MAT 90	1650	Corundum	R.C.*	V*/C*	> 90	< 0.6	< 0.5	6.0	2.85
MAT 94	1700	Tabular Alumina	R.C.*	V*/C*	> 93.5	0.15	0.15	5.9	2.85
MAT 95 F	1700	Tabular Alumina	R.C.*	V*/C*	> 94	0.15	< 0.1	5.4	2.85
MAT 95 F - PF	1700	Tabular Alumina	R.C.*	V*/C*	> 94	0.15	< 0.1	5.4	2.80
MAT 96 S	1800	Tabular Alumina	R.C.*	V*/C*	> 95	< 0.12	< 0.1	4.4	2.87

*R.C.=Regular Castable *C=Casting *G=Gunning
*V=Vibration *TR=Trowelling

Reinforcement Stainless Steel Fibers

PRODUCT NAME	Melting Temperature at °C	Critical Oxidation Temperature at °C		Chemical Composition (%)		Coefficient of Thermal Expansion (870 °C) at 10^{-6}/°C
		Cycling Heating	Continuous Serv.	Cr	Ni	
304	1400 - 1455	870	980	18 - 20	8 - 12	20.2
310	1400 - 1455	1040	1150	24 - 26	19 - 22	18.5
330	1345 - 1425	1050	1165	17 - 19	34 - 36	17.6
430	1480 - 1530	850	815	14 - 18	-	13.7
446	1425 - 1510	1205	1200	23 - 27	-	13.1
METAL - X	1480 - 1530	1250	1300	23	0.5	15.0

* **all fibers are available in 6 - 12 - 20 - 25 - 35 - 50 mm Length**
with Typical Equivalent Diameters **0.18 - 0.34 - 0.47 - 0.50 - 0.64 - 0.83** mm respectively

Regular Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1500°C	at 800°C		at 110°C	at 1100°C					
35	28	22	-	0.79	6	-0.05	-0.65	0.52	2130	11 - 14	12	~ 25
42	32	28	-	0.92	6	-0.05	-0.15	0.55	2200	10 - 13	12	~ 25
35	28	24	-	0.92	6	-0.05	-0.45	0.54	2200	11 - 13	12	~ 25
40	28	25	-	0.96	6	-0.05	-0.20	0.55	2200	10 - 13	12	~ 25
45	35	30	-	0.96	6	-0.05	-0.45	0.58	2200	10 - 13	12	~ 25
55	45	40	-	1.08	6	-0.05	-0.20	0.58	2250	10 - 12	12	~ 25
80	60	42	-	1.12	6	-0.05	-0.10	0.60	2250	10 - 12	12	~ 25
55	45	35	-	1.24	3	-0.05	-0.30	0.62	2250	12 - 14	12	~ 25
65	50	42	-	1.32	6	-0.05	+0.20	0.65	2550	9 - 12	12	~ 25
55	43	38	-	1.32	3	-0.05	+0.20	0.65	2550	9 - 12	12	~ 25
46	32	27	-	1.31	6	-0.05	-0.25	0.70	2500	10 - 13	12	~ 25
42	30	24	-	1.30	6	-0.05	-0.25	0.75	2600	9 - 11	12	~ 25
45	35	24	-	1.30	6	-0.05	-0.20	0.75	2600	9.5 - 11	12	~ 25
65	48	35	-	1.37	6	-0.05	-0.20	0.75	2600	9 - 12	12	~ 25
90	70	50	-	1.36	6	-0.05	-0.20	0.75	2600	9 - 11	12	~ 25
65	50	42	60	1.48	6	-0.05	-0.15	0.80	2850	9 - 11	12	~ 25
80	60	50	60	1.59	6	-0.05	-0.15	0.81	2900	7.5 - 9.0	12	~ 25
80	60	50	50	1.63	6	-0.05	-0.15	0.82	2800	7.5 - 9.0	12	~ 25
75	60	45	50	1.63	3	-0.05	-0.15	0.82	2850	7.5 - 9.0	12	~ 25
90	80	70	70	1.68	6	-0.05	-0.10	0.82	2930	7.5 - 9.0	12	~ 25

MAT 42
MAT 80 TS
MAT 96-S

Gunning Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)			Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	
MAT GR - G	1270	Chamotte	G.M.*	G* / TR*	30	52.5	9.6	2.05
MAT 35 G	1280	Chamotte	G.M.*	G* / TR*	> 34.5	50	9.6	2.08
MAT 40 - G	1320	Chamotte	G.M.*	G* / TR*	> 41.5	< 45	9.3	2.15
MAT 44 - G	1350	Chamotte	G.M.*	G* / TR*	> 44	< 46.5	5.4	2.15
MAT 50 - G	1480	Chamotte	G.M.*	G* / TR*	> 48.5	< 42	6.6	2.15
MAT 50 SMG	1500	Fireclay	G.M.*	G* / TR*	> 50	< 40	8.0	2.25
MAT 60 - G	1560	Andalusite	G.M.*	G* / TR*	> 59.5	< 32	7.4	2.25
MAT 60 SMG	1500	Bauxite	G.M.*	G*	> 62	< 28.5	4.7	2.25
MAT 80 G	1580	Bauxite	G.M.*	G*	> 79	< 8.5	7.5	2.55
MAT 80 - SPDG	1600	Bauxite	G.M.*	G*	> 80	< 8.2	7.3	2.55
MAT 90 - G	1650	Corundum	G.M.*	G*	> 87.7	< 2.8	6.0	2.85
MAT 95 G	1700	Tabular Alumina	G.M.*	G*	> 95	< 0.15	4.4	2.75

*G.M.=Gunning Material *TR=Trowelling
*G=Gunning

Medium Cement Gunning Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	Fe_2O_3	CaO	
MAT 32 GS	1320	Chamotte	M.C.G.M*	Gunning	32	58.5	1	4.9	2.05
MAT 40 GS	1350	Chamotte	M.C.G.M*	Gunning	40	53	1.5	4.8	2.1
MAT 48 G-S	1470	Chamotte	M.C.G.M*	Gunning	48.0	44.5	1.3	4.8	2.18
MAT 50 G-S	1500	Chamotte	M.C.G.M*	Gunning	50.0	43.0	1.5	4.8	2.20
MAT 57 G-S	1500	C.S.M*	M.C.G.M*	Gunning	57.0	37.5	1.1	4.8	2.30
MAT 57 H G-S	1470	H.A.R.M*	M.C.G.M*	Gunning	>56.0	34.5	1.2	-	2.25
MAT 57 A G-S	1520	Andalusite	M.C.G.M*	Gunning	57.0	36.5	0.8	4.8	2.40
MAT 58 M G-S	1500	S.M*	M.C.G.M*	Gunning	58.0	33.5	1.0	4.8	2.40
MAT 60 G-S	1550	S.M*	M.C.G.M*	Gunning	>58.5	33.5	1.1	4.6	2.20
MAT 74 G-S	1450	B.M*	M.C.G.M*	Gunning	>73.5	15.5	2.1	5.4	2.52
MAT 78 G-S	1500	Bauxite	M.C.G.M*	Gunning	>78.0	<11.5	< 2.2	4.7	2.51
MAT 80 G-S	1500	Bauxite	M.C.G.M*	Gunning	>79.5	11.8	2.1	4.8	2.53
MAT MC 55-G	1550	H.A.R.M*	M.C.G.M*	Gunning	>55.5	39.0	2.18	3.2	2.18

*C.S.M = Chamotte Sintered Mullite *S.M = Sintered Mullite *B.M = Bauxite Mullite
*H.A.R.M = High Alumina Raw Materials *M.C.G.M = Medium Cement Gunning Material

Gunning Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)			Grain Size (mm) (EN 1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C		at 110°C	at 1100°C					
35	28	20	6	-0.05	-0.78	0.50	2100	11-14 / At nozzle	12	~ 25
28	20	18	6	-0.05	-0.45	0.52	2130	13-16 / At nozzle	12	~ 25
45	34	28	6	-0.10	-0.40	0.55	2200	10-13 / At nozzle	12	~ 25
45	35	25	6	-0.10	-0.30	0.60	2200	10-13 / At nozzle	12	~ 25
50	35	23	6	-0.10	-0.30	0.60	2200	10-13 / At nozzle	12	~ 25
86	62	41	6	-0.10	-0.15	0.60	2300	10 - 13 / At nozzle	12	~ 25
45	32	24	6	-0.10	+0.20	0.60	2300	10-13 / At nozzle	12	~ 25
30	25	18	6	-0.10	-0.20	0.60	2300	At nozzle	12	~ 25
80	50	40	6	-0.10	-0.20	0.75	2600	At nozzle	12	~ 25
86	64	42	6	-0.10	-0,20	0.75	2600	At nozzle	12	~ 25
45	34	24	6	-0.10	-0.15	0.80	2900	At nozzle	12	~ 25
60	50	40	6	-0.05	-0.15	0.81	2800	At nozzle	12	~ 25

Medium Cement Gunning Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Grain Size (mm) (EN 1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1400°C		at 110°C	at 1100°C					
60	60	40	-	6	- 0.05	- 0.65	0.45	2100	At nozzle	-	-
60	55	40	40	6	- 0.05	- 0.65	0.48	2150	At nozzle	-	-
75	70	50	60	6	- 0.05	- 0.55	0.60	2230	At nozzle	-	-
60	55	40	55	6	- 0.05	- 0.55	0.60	2250	At nozzle	-	-
70	70	50	65	6	- 0.05	- 0.50	0.58	2350	At nozzle	-	-
>85	65	1000 (48)	-	6	- 0.05	- 0.30	-	2300	At nozzle	-	-
80	75	65	1500 (70)	6	- 0.05	- 0.25	0.58	2450	At nozzle	-	-
60	50	40	-	6	- 0.05	- 0.40	0.58	2450	At nozzle	-	-
70	58	55	-	6	- 0.05	- 0.50	0.60	2250	At nozzle	-	-
60	60	40	-	6	- 0.05	- 0.40	0.65	2570	At nozzle	-	-
70	60	50	-	6	- 0.05	- 0.30	0.74	2560	At nozzle	-	-
80	60	60	60	6	- 0.05	- 0.55	0.74	2580	At nozzle	-	-
20	17	1200 (14)	18	6	- 0.05	- 0.50	0.6	2230	At nozzle	-	-

Special Gunning Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)					Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	SiC	ZrO_2	
MAT 20 ZR - G	1450	ZAC / C.*	G.M.*	Gunning	50	19.5	6.0	-	22.0	2.62
MAT 30 ZR - G	1380	ZAC / Z.S.*	G.M.*	Gunning	39.0	20.0	5.5	-	30.0	2.78
MAT GUN 10 SIC	1500	SiC* / C*	G.M.*	Gunning	>42	<39.2	5.9	>9.5	-	2.20
MAT GUN 30 SIC	1500	SiC* / C*	G.M.*	Gunning	> 35	< 28	5.8	> 29	-	2.25
MAT GUN 50 SIC	1550	SiC* / C*	G.M.*	Gunning	> 26	< 17	5.8	> 48	-	2.35
MAT GUN 70 SIC	1550	SiC* / C*	G.M.*	Gunning	> 17	< 7	5.8	> 68	-	2.45

*G.M.=Gunning Material *C=Chamotte

*Z.S.=Zirkonium Silicate *SiC=Silicon Carbide

Special Gunning Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)			Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN 1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 800°C		at 110°C	at 1100°C					
70	65	60	1.02	6	-0.10	-0.35	0.70	2670	At nozzle	12	25
65	70	45	1.05	6	-0.10	-0.60	0.73	2830	At nozzle	12	25
80	65	50	2.98	6	-0.05	-0.05	0.48	2250	At nozzle	12	25
70	58	47	3.96	6	-0.05	-0.05	0.50	2300	At nozzle	12	25
70	60	48	5.28	6	-0.05	-0.05	0.53	2400	At nozzle	12	25
60	55	45	6.38	6	-0.05	-0.05	0.55	2500	At nozzle	12	25

MAT 50 SMG
MAT 80 G-S
MAT 30 ZR-G

Medium Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)			Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	
MAT PLUS MC 35	1320	Chamotte	M.C.C.*	V* / C*	35.0	58.0	3.5	2.15
MAT PLUS MC 35-AR	1320	Chamotte	M.C.C.*	V* / C*	35.0	56.5	4.0	2.15
MAT PLUS MC 45	1440	Chamotte	M.C.C.*	V* / C*	> 45.0	< 50.0	3.6	2.25
MAT PLUS MC 50	1500	Fireclay	M.C.C.*	V* / C*	> 50.0	< 44.0	3.6	2.30
MAT PLUS MC 50-R	1500	Fireclay	M.C.C.*	V* / C*	> 50.0	< 44.0	3.6	2.30
MAT PLUS MC 58	1550	Andalusite	M.C.C.*	V* / C*	> 57.0	< 39.0	3.6	2.60
MAT PLUS MC 58 F	1550	Andalusite	M.C.C.*	V* / C*	> 57.0	< 39.0	3.6	2.60
MAT PLUS MC 78	1500	Bauxite	M.C.C.*	V* / C*	> 77.5	13.8	3.6	2.75
MAT PLUS MC 88	1600	Corundum	M.C.C.*	V* / C*	> 87.5	7.0	3.6	3.02

*M.C.C.=Medium Cement Castable *V= Vibration *G= Gunning

*M.C.G.=Medium Cement Gunning *C=Casting

Refractory Cements & Aggregates

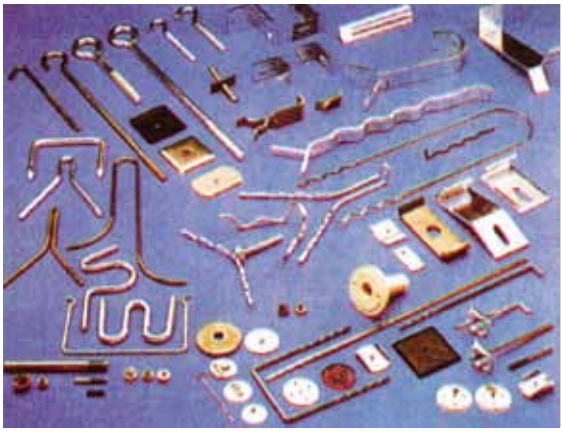
PRODUCT NAME	Pyrometric cone equivalent at °C	Chemical Analysis (%) (EN ISO 12677)			Bulk Density (g/m^3)
		Al_2O_3	SiO_2	CaO	
FONDU	1270 -1290	> 37.0	< 6.0	36.5 - 39.5	1.10
SECAR 51	1430 - 1450	> 50.0	< 6.0	35.9 - 38.9	0.90 - 1.00
SECAR 71	1590 - 1620	> 68.5	< 0.8	28.5 - 30.5	0.90
SECAR 80	1779 - 1810	> 79	< 0.4	16.2 - 17.8	0.70 - 0.80
ALAG (*)	1270 - 1290	> 36.0	< 6.0	35.0 - 40.0	1.60 - 1.70
THERNAL WHITE (*)	-	69.8 - 72.2	0.2 - 0.6	26.8 - 29.2	900

* **ALAG** is a synthetic calcium aluminate aggregate with approx. 40% Al_2O_3 exceptionally hard (Hardness Mohs: 7 - 7,5), dense and heat resistant. Its granulometry is 0 - 4 mm for Fine ALAG and 4 - 10 mm for Coarse ALAG.

* **THERNAL WHITE** is a hydraulic binder of high alumina content for the most demanding of building chemistry formulations.

Medium Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)			Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Material Required (kg/m^3)	Approx.Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C		at 110°C	at 1100°C				
70	75	75	6	-0.05	-0.45	2250	5.5 - 7.0	6	25
80	75	70	6	-0.05	-0.40	2250	5.5 - 7.0	6	25
95	80	75	6	-0.05	-0.40	2300	5.5 - 7.0	6	25
100	90	80	6	-0.05	-0.35	2350	5.5 - 7.0	6	25
105	115	95	6	-0.05	-0.30	2350	5.5 - 7.0	6	25
100	100	80	6	-0.05	-0.10	2650	5.0 - 6.5	6	25
80	75	70	3	-0.05	-0.10	2650	5.0 - 6.5	6	25
90	90	80	6	-0.05	-0.35	2800	5.5 - 7.0	6	25
100	100	80	6	-0.05	-0.15	3070	5.5 - 7.0	6	25



Low Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	ZrO_2	
MAT PLUS GR	1200	Chamotte	L.C.C.*	V*	> 29	< 63.5	2.6	-	2.00
MAT PLUS 35	1350	Chamotte	L.C.C.*	V*	> 35	< 58.0	2.6	-	2.10
MAT PLUS 42	1420	Chamotte	L.C.C.*	V*	> 42	< 53	2.6	-	2.25
MAT PLUS 50 - ML	1500	Chamotte	L.C.C.*	V*	> 50	< 46	1.7	-	2.30
MAT PLUS 50 ML-E	1550	Chamotte / Mulite	L.C.C.*	V*	> 50	< 46	1.7	-	2.30
MAT PLUS 52 A	1530	Andalusite	L.C.C.*	V*	> 52	< 42.5	1.7	-	2.36
MAT PLUS 58 A	1580	Andalusite	L.C.C.*	V*	> 58	< 38	1.6	-	2.55
MAT PLUS 20 ZR	1500	Synthetic Raw Materials	L.C.C.*	V*	49.5	25.0	2.4	20	2.85
MAT PLUS 25 ZR	1600	Synthetic Raw Materials	L.C.C.*	V*	> 50	< 20,5	1.8	~ 25	2.95
MAT PLUS 60 A	1670	Andalusite	L.C.C.*	V*	> 60	< 37	1.6	-	2.60
MAT PLUS 60 - M	1650	Sintered Mullite	L.C.C.*	V*	> 60	<35.5	1.7	-	2.48
MAT PLUS 60 - E	1600	SM*/ Chamotte	L.C.C.*	V*	> 60.5	36.8	1.8	-	2.55
MAT PLUS 62	1650	Sintered Mullite	L.C.C.*	V*	62	35.0	1.8	-	2.55
MAT PLUS 65 - M	1670	Sintered Mullite	L.C.C.*	V*	> 65	< 30.0	1.7	-	2.50
MAT PLUS 65 - R	1580	*H.A.R.M - Mullite	L.C.C.*	V*	> 65	32.5	1.7	-	2.50
MAT PLUS 70	1600	Bauxite - Chamotte	L.C.C.*	V*	> 70	< 25	1.7	-	2.50
MAT PLUS 70 F	1600	Bauxite - Chamotte	L.C.C.*	V*	> 70	< 25	1.7	-	2.48
MAT PLUS 80	1600	Bauxite	L.C.C.*	V*	> 80	< 11.7	2.5	-	2.70
MAT PLUS 80 - F	1600	Bauxite	L.C.C.*	V*	> 80	< 11.7	2.5	-	2.70
MAT PLUS 80 - PF	1600	Bauxite	L.C.C.*	V*	> 80.5	< 11.7	2.5	-	2.70
MAT PLUS 80 - H	1620	Bauxite	L.C.C.*	V*	> 84	< 9.8	1.6	-	2.90
MAT PLUS 80 - E	1650	Bauxite	L.C.C.*	V*	>79.5	13.5	1.7	-	2.80
MAT PLUS 80 - EA	1650	Bauxite - Andalusite	L.C.C.*	V*	>75	18.5	1.7	-	2.75
MAT PLUS 81 - E	1650	Bauxite	L.C.C.*	V*	81	13	1.7	-	2.75
MAT PLUS 85	1650	Bauxite - Corundum	L.C.C.*	V*	> 83	10.5	1.7	-	2.85
MAT PLUS 90	1680	Corundum	L.C.C.*	V*	> 90	< 4.8	1.6	-	3.10
MAT PLUS 90 - R	1680	Corundum	L.C.C.*	V*	90	2.4	1.6	-	3.05
MAT PLUS 92	1720	Corundum	L.C.C.*	V*	> 92	< 2.4	1.6	-	3.20
MAT PLUS 95 - W	1700	Corundum	L.C.C.*	V*	94.5	3.0	1.6	-	3.05
MAT PLUS 95 T	1750	Sintered Alumina	L.C.C.*	V*	> 94.5	< 3.0	1.5	-	3.05
MAT PLUS 98 T	1800	Sintered Alumina	L.C.C.*	V*	> 97.5	< 0.1	1.5	-	3.08

*L.C.C.=Low Cement Castable *S.M = Sintered Mullite

*V= Vibration *H.A.R.M = High Alumina Raw Materials

Low Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1500°C	at 800°C		at 110°C	at 1100°C					
70	75	80	-	0.92	6	0.10	-0.60	0.55	2050	5.5 - 7.0	6	25
70	75	80	-	1.06	6	-0.10	-0.50	0.55	2100	5.5 - 7.0	6	25
80	90	95	-	1.12	6	-0.10	-0.35	0.57	2300	5.5 - 7.0	6	25
70	80	80	90	1.22	6	-0.05	-0.25	0.57	2350	5.0 - 6.5	6	25
70	80	90	100	1.22	6	-0.05	-0.20	0.60	2350	5.0 - 6.5	6	25
80	90	90	100	1.56	6	-0.05	-0.20	0.63	2400	5.0 - 6.5	6	25
90	95	100	100	1.68	6	-0.05	+0.05	0.65	2600	5.0 - 6.5	6	25
70	75	80	100	1.62	6	-0.05	-0.05	0.68	2900	4.5 - 6.0	6	25
100	100	110	110	1.65	6	-0.05	-0.20	0.70	3000	4.5 - 6.0	6	25
80	85	95	95	1.74	6	-0.05	+0.05	0.65	2650	5.0 - 6.5	6	25
90	90	95	100	1.73	6	-0.05	-0.10	0.65	2530	4.5-6.0	6	25
70	85	95	100	1.74	6	-0.05	-0.20	0.65	2600	5.0-6.5	6	25
75	80	80	90	1.70	6	-0.05	-0.10	0.65	2600	4.5-6.0	6	25
90	90	95	100	1.85	6	-0.05	-0.10	0.65	2550	4.5-6.0	6	25
100	90	95	110	1.85	6	-0.05	-0.10	0.65	2550	4.5-6.0	6	25
70	75	80	95	1.98	6	-0.05	-0.20	0.65	2520	5.5 - 7.0	6	25
55	60	65	70	1.97	3	-0.05	-0.25	0.65	2500	6.0 - 7.5	6	25
100	100	120	110	2.32	6	-0.05	-0.10	0.70	2750	4.5 - 6.0	6	25
80	85	100	100	2.32	3	-0.05	-0 10	0.70	2750	4.5 - 6.0	6	25
100	100	120	120	2.26	6	-0.05	-0.10	0.70	2750	4.5 - 6.0	6	25
110	115	120	120	2.30	6	-0.05	-0.10	0.70	2950	4.5 - 5.5	6	25
85	90	100	100	2.32	6	-0.05	-0.30	0.65	2800	4.5 - 6.0	6	25
90	90	100	100	2.22	6	-0.05	0.05	0.65	2800	4.5 - 5.5	6	25
80	110	130	110	2.22	6	-0.05	-0.30	0.65	2800	4.5 - 6.0	6	25
90	90	100	100	2.30	6	-0.05	-0.30	0.70	2900	4.5 - 5.5	6	25
90	100	110	110	2.84	6	-0.05	-0.20	0.80	3150	4.0 - 5.5	6	25
60	60	70	85	2.85	6	-0.05	-0.15	0.80	3100	4.5 - 6.0	6	25
60	80	95	95	2.88	6	-0.05	-0.15	0.80	3250	4.0 - 5.5	6	25
60	75	85	100	2.88	6	-0.05	-0.10	0.80	3100	4.0 - 5.5	6	25
70	85	95	100	2.88	6	-0.05	-0.10	0.80	3100	4.0 - 5.5	6	25
40	45	55	80	2.92	6	-0.05	-0.10	0.80	3180	4.0 - 5.5	6	25

Self Flowing Low & Ultra Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)					Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	SiC	MgO	
MAT SF 50	1500	Chamotte	L.C.C.*	S.F.*	>50	47	1.7	-	-	2.18
MAT SF 56	1500	Chamotte	L.C.C.*	S.F.*	> 56	42.5	1.7	-	-	2.20
MAT SF 61 SIC	1500	Silicon Carbide	L.C.C.*	S.F.*	> 27	< 6	1.8	59	-	2.50
MAT SF 93	1700	Sintered Alumina	U.L.C.C.*	S.F.*	> 93	2.5	0.85	-	-	3.05
MAT SF 93 SP	1700	Sintered Alumina / Spinell	U.L.C.C.*	S.F.*	> 93	< 0.5	0.85	-	> 4.0	3.10
MAT SF 97 T-HA	1760	Sintered Alumina	U.L.C.C.*	S.F.*	> 97	1.0	0.85	-	-	3.10

Silicon Carbide Low Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	SiC	
MAT PLUS 9 SiC	1500	Chamotte / SiC*	L.C.C.*	V*	> 43	< 43	1.8	> 9	2.25
MAT PLUS 10 SiC	1550	SiC /* Corundum	L.C.C.*	V*	> 53	< 33	1.8	> 9	2.45
MAT PLUS 30 SiC	1500	SiC */ Chamotte	L.C.C.*	V*	> 34	< 33	1.8	> 29	2.28
MAT PLUS 30 SiC A	1500	SiC */ Andalusite	L.C.C.*	V*	40	27.5	1.8	>29	2.60
MAT PLUS 32 SiC	1500	SiC */ Corundum	L.C.C.*	V*	> 57	< 7	1.8	> 31	2.55
MAT PLUS 40 SiC	1500	SiC */ Chamotte	L.C.C.*	V*	> 29	< 27	1.8	> 39	2.33
MAT PLUS 50 SiC	1500	SiC */ Chamotte	L.C.C.*	V*	> 25	< 22	1.8	> 48	2.38
MAT PLUS 60 SiC	1500	SiC */ Chamotte	L.C.C.*	V*	>20.5	<18	1.8	> 58	2.42
MAT PLUS 70 SiC	1500	SiC* / Fireclay	L.C.C.*	V*	> 16	< 12	1.8	> 68	2.44
MAT PLUS 83 SiC	1550	SiC*	L.C.C.*	V*	> 12	< 4	1.7	79	2.50
MAT PLUS 57A SiC 5	1580	Andalusite / SiC	L.C.C.*	V*	> 56.5	< 36	1.7	5.0	2.55
MAT PLUS 55M SiC 7	1580	Sintered Mulite / SiC	L.C.C.*	V*	> 55.5	< 33	1.7	7.0	2.52

*L.C.C.=Low Cement Castable *V=Vibration *SiC=Silicon Carbide

Self Flowing Low & Ultra Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)					Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1400°C	at 1600°C	at 800°C		at 110°C	at 1100°C					
45	50	60	100	-	1.68	3	-0.05	-0.40	0.55	2230	6.5 - 7.5	6	25
50	50	60	100	-	1.70	3	-0.05	-0.35	0.55	2250	6.5 - 7.5	6	25
80	85	95	95	-	6.20	3	-0.05	-0.10	0.55	2550	5.0 - 6.5	6	25
50	60	70	100 (1500°C)	-	2.88	10	-0.05	-0.10	0.82	3100	4.5 - 5.5	6	25
50	65	70	100	120	2.12	6	-0.05	-0.10	0.85	3150	4.5 - 5.5	6	25
70	75	80	120	130	2.92	6	-0.05	-0.10	0.81	3150	4.5 - 5.5	6	25

Silicon Carbide Low Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1400°C	at 800°C		at 110°C	at 1100°C					
80	90	90	95	3.46	6	-0.05	-0.20	0.5	2300	5.5 - 6.5	6	25
95	95	95	95	4.46	6	-0.05	-0.15	0.6	2500	5.0 - 6.5	6	25
95	95	100	95	4.46	3	-0.05	-0.20	0.55	2330	5.5 - 6.5	6	25
90	100	100	100	4.52	8	-0.05	0.25	0.58	2650	4.0 - 5.5	6	25
100	100	100	95	4.96	6	-0.05	-0.20	0.6	2600	5.5 - 6.5	6	25
95	95	100	100	4.86	6	-0.05	-0.20	0.55	2380	5.5 - 6.5	6	25
95	95	100	100	5.86	3	-0.05	-0.20	0.55	2420	5.5 - 6.5	6	25
95	95	100	100	6.20	3	-0.05	-0.20	0.56	2460	5.5 - 6.5	6	25
95	95	100	100	6.86	3	-0.05	-0.25	0.56	2490	5.5 - 6.5	6	25
80	85	95	95	8.26	3	-0.04	-0.10	0.78	2550	5.0 - 6.5	6	25
85	90	90	100	3.34	8	-0.05	-0.15	0.60	2600	4.5 - 6.0	6	25
95	100	110	100	3.56	6	-0.05	-0.15	0.60	2570	4.5 - 6.0	6	25

Chromium Oxide Low Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	Cr_2O_3	
MAT PLUS 85 CR 8	1700	CO* / CHR.*	L.C.C.*	V*	85	< 0.9	1.5	8.0	3.20
MAT PLUS 88 CR 8-S	1700	S.R.M* / CHR.*	L.C.C.*	V*	87.5	1	1.6	8.0	5.08
MAT PLUS 88 CR 8	1700	S.A.* / CHR.*	L.C.C.*	V*	88	< 2.1	< 1.6	8.0	3.08
MAT PLUS 90 CR 4	1700	S.A.* / CHR.*	L.C.C.*	V*	91	< 2.2	< 1.6	4.0	3.02
MAT PLUS 90 CR 4-S	1700	S.R.M* / CHR.*	L.C.C.*	V*	90	< 2.8	1.6	4.0	3.00
MAT PLUS 94 CR 2	1700	S.A.* / CHR.*	L.C.C.*	V*	93.5	< 2.2	< 1.6	2.0	2.99
MAT PLUS 95 QC	1750	S.A.*	L.C.C.*	V*	> 95	< 3.0	1.4	2.0	2.95

*CO=Corundum *CHR.= Chrome Oxide *S.A.=Sintered Alumina *L.C.C. =Low Cement Castable *V= Vibration S.R.M*= Synthetic Raw Materials

Anti-Weeting To Molten Aluminium Low Cement Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	BaO	
MAT PLUS 60M-AL	1250	Sintered Mullite	L.C.C*	V*	> 57.0	33.5	1.7	3.0	2.45
MAT PLUS 65M-AL	1250	Sintered Mullite	L.C.C*	V*	> 62.0	28.0	1.7	3.0	2.48
MAT PLUS 80 EA-AL	1250	Bauxite - Andalusite	L.C.C*	V*	> 73.0	16.0	1.7	3.0	2.75
MAT PLUS 80-AL	1200	Bauxite	L.C.C*	V*	76.0	10.7	1.7	5.0	2.90

Ultra Low Cement Castable

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)				Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	Cr_2O_3	
MATCAST 85 ULC - E	1700	Bauxite - Corundum	U.L.C.C.*	V*	>84.5	9.0	0.85	-	2.90
MATCAST 95 ULC - CR1	1800	S.A.*	U.L.C.C.*	V*	95	>2.2	0.9	1.0	3.07
MATCAST 97 ULC-T	1800	S.A.*	U.L.C.C.*	V*	> 97.0	< 2.6	0.9	-	3.08

Chromium Oxide Low Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1500°C	at 800°C		at 110°C	at 1100°					
80	75	80	100	2.82	8	-0.05	-0.15	0.8	3250	4.5 - 6.0	6	25
45	55	70	100	2.87	10	-0.05	-0.15	0.82	3130	4.5 - 6.0	6	25
110	110	80	110	2.87	6	-0.05	-0.15	0.82	3130	4.5 - 6.0	6	25
120	110	80	110	2.91	6	-0.05	-0.15	0.82	3070	4.5 - 6.0	6	25
70	80	85	90	2.92	6	-0.05	-0.15	0.83	3050	4.5 - 6.0	6	25
80	90	90	85	2.92	6	-0.05	-0.15	0.83	3040	4.5 - 6.0	6	25
70	85	95	95	2.88	6	-0.05	-0.10	0.80	3000	4.5 - 6.0	6	25

Anti-Weeting To Molten Aluminium Low Cement Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)			Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 800°C		at 110°C	at 1100°C					
90	90	80	1.70	6	-0.05	-0.40	0.63	2500	4,5 - 6,0	6	~25
90	90	80	1.84	6	-0.05	-0.40	0.65	2530	4,5 - 6,0	6	~25
105	100	85	2.20	6	-0.05	-0.40	0.65	2800	4,5 - 6,0	6	~25
100	100	90	2.24	6	-0.05	-0.60	0.67	2950	4,0 - 5,5	6	~25

Ultra Low Cement Castable

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Approx. Water Addition (EN 1402-4) (lt/100 kg dry material)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1100°C	at 1500°C	at 800°C		at 110°C	at 1100°C					
40	50	60	110	2.25	10	-0.05	-0.35	0.70	2950	4.0 - 5.5	6	25
40	45	55	80	2.92	6	-0.05	-0.10	0.80	3120	4.0 - 5.5	6	25
40	45	55	80	2.92	6	-0.05	-0.10	0.80	3130	4.0 - 5.5	6	25

*S A =Sintered Alumina *U L C C =Ultra Low Cement Castable *V= Vibration

Insulating Castables

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (% (EN ISO 12677)			Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	
MAT 106 - LP	1000	Perlite	I. C.*	V* / C*	36.0	31.0	22.7	0.60
MAT 106 - L	1000	Vermiculite	I. C.*	Rodding	34.0	26.5	23	0.60
MAT 106 - P	1000	Perlite	I. C.*	V* / C*	37.5	27.0	25	0.75
MAT 106	1030	Vermiculite	I. C.*	Rodding	35.0	22.0	25	0.75
MAT 125 - P	1080	Perlite / EC*	I. C.*	V* / C*	>36.0	<35.0	18	0.95
MAT 125	1100	V* / E.C.*	I. C.*	V* / C*	27.0	33.5	20	0.96
MAT 124 - P	1120	V* / R.P.*	I. C.*	V* / C*	31.0	45.5	15	1.15
MAT 124	1150	V* / R.P.*	I. C.*	V* / C*	27.0	42.5	15	1.15
MAT MW - LM	1270	L.CH.*	I. C.*	V* / C*	37.0	43.5	8.6	1.45
MAT MW - L	1280	L.CH.*	I. C.*	V* / C*	38.0	43.5	9.8	1.55
MAT MW	1300	L.CH.*	I. C.*	V* / C*	38.0	42.5	9.8	1.60

P=Perlite E.C.=Expanded Clay L.CH.*=Lightweight Chamotte V*= Vibration
V= Vermiculite I.C.= Insulating Castable C*=Casting R.P.* = Recycled Porcelain

Insulating Gunning Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)			Bulk Density at 110°C (g/cm^3) (EN 1402-6)
					Al_2O_3	SiO_2	CaO	
MAT 106 L-GP	1000	Perlite	I.G.M.*	G* / TR.*	36.5	30.0	23	0.63
MAT 106 G-P	1020	Perlite	I.G.M.*	G* / TR.*	38.5	26.0	25	0.80
MAT 106 - G	1030	Vermiculite	I.G.M.*	G* / TR.*	32	20.5	26.5	0.80
MAT 125 G-P	1080	P*	I.G.M.*	G* / TR.*	34.5	37.0	17	0.98
MAT 125 - G	1120	L.R.M*	I.G.M.*	G* / TR.*	28.0	37.0	18.5	0.98
MAT 124 - GP	1100	P*	I.G.M.*	G* / TR.*	31.0	46.0	15	1.20
MAT 124 - G	1120	V* / R.P.*	I.G.M.*	G* / TR.*	27.0	43.0	15.5	1.20
MAT MW - G	1300	L.CH.*	I.G.M.*	G* / TR.*	38.0	43.0	9.8	1.63

P=Perlite E.C.=Expanded Clay G*=Gunning L.CH.*=Lightweight Chamotte
V= Vermiculite I.G.M.= Insulating Gunning Material TR*=Trowelling R.P.* = Recycled Porcelain L.R.M* = Lightweight Raw Material

MATHIOS REFRACTORIES S.A.

Insulating Castables

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)			Material Required (kg/m^3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1000°C	at 1100°C	at 800°C		at 800°C	at 1000°C	at 1100°C				
1.5	1.1	0.8	-	0.18	6	-0.65	-	-	650	80 - 95	12	15
1.3	0.9	0.7	-	0.17	6	-0.75	-	-	650	80 - 95	12	15
2.2	1.4	1.1	-	0.20	6	-0.70	-	-	800	70 - 80	12	16
2.4	1.6	1.3	-	0.19	6	-0.75	-	-	800	70 - 80	12	16
4.8	3.4	-	2.5	0.26	6	-0.35	-0.75	-	1000	34 - 48	12	20
5.0	3.8	-	2.8	0.28	6	-0.40	-0.75	-	1100	40- 50	12	20
4.0	3.2	-	2.5	0.38	6	-0.45	-	-0.80	1200	35- 45	12	20
5.5	4.0	-	3.5	0.37	6	-0.45	-	-0.85	1200	35 - 45	12	20
5.5	3.5	-	2.4	0.48	6	-0.25	-	-0.75	1500	27 - 32	12	20
11.0	6.5	-	5.0	0.47	6	-0.35	-	-0.75	1600	25 - 30	12	20
10.0	8.0	-	6.0	0.54	6	-0.25	-	-0.50	1650	22 - 27	12	22

Insulating Gunning Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)				Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN1402-3)	Permanent Linear Change (%) (EN 1402-6)			Material Required (kg/m^3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag)
at 110°C	at 800°C	at 1000°C	at 1100°C	at 800°C		at 800°C	at 1000°C	at 1100°C				
1.7	1.2	0.9	-	0.18	6	-0.80	-	-	850	75 - 90 / At nozzle	12	17
2.3	1.3	1.1	-	0.19	6	-0.80	-	-	850	70 - 90 / At nozzle	12	17
2.5	1.6	1.3	-	0.21	6	-0.85	-	-	800	70 - 85 / At nozzle	12	17
5.2	3.6	-	2.9	0.28	6	-0.40	-0.90	-	1030	37- 50 / At nozzle	12	20
5.0	3.8	-	2.7	0.28	6	-0.35	-0.85	-	1030	40- 55 / At nozzle	12	20
4.5	3.4	-	2.7	0.40	6	-0.50	-	-0.85	1250	35- 45 / At nozzle	12	20
5.7	4.2	-	3.6	0.39	6	-0.50	-	-0.90	1250	35- 45 / At nozzle	12	20
9.0	7.0	-	5.5	0.56	6	-0.25	-	-0.60	1680	22 - 28 / At nozzle	12	22

Plastic Ramming Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)		Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	
PYROPLASTIC SUPER	1450	C*	Plastic Material	R* / RA*	> 37.0	< 58.0	2.20
PYROPLASTIC SUPER 80	1620	B*	Plastic Material	R* / RA*	> 72.5	< 20.5	2.55
MAT RAM 50 M	1600	C / M*	Ramming Material	RA*	> 53	< 42.0	2.20
MAT RAM 50 C	1550	C*	Ramming Material	RA*	> 50	43	2.35
MAT RAM 60 C	1600	C* / B*	Ramming Material	RA*	> 60.0	32.5	2.45
MAT RAM 70 C	1600	B*/ CO*	Ramming Material	RA*	> 69.0	19.0	2.56
MAT RAM 70 C-M	1650	M* / CO*	Ramming Material	RA*	> 70.0	23	2.60
MAT RAM 80	1650	B*	Ramming Material	RA*	> 77.0	< 16.0	2.65
MAT RAM 80 C	1650	B*/ S.A.*	Ramming Material	RA*	> 80.0	13.5	2.75
MAT RAM 90 C	1750	CO*	Ramming Material	RA*	> 89.5	5.5	2.95

*C=Chamotte *B= Bauxite * CO= Corundum *M= Mullite *S.A.=Sintered Alumina *RA=Ramming *R=Rodding

Special Ramming Materials

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Type of Product (EN 1402-1)	Installation Method (2) (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)			Bulk Density at 110°C (g/cm³) (EN 1402-6)
					Al_2O_3	SiO_2	SiC	
MAT RAM 85 SIC - P	1550	Silicon Carbide	P.M.* / C.B.*	TR* / SM*	> 6.0	< 5.0	83.0	2.60
MAT RAM 90 SIC - P	1550	Silicon Carbide	P.M.* / C.B.*	TR* / SM*	> 1.5	< 5.5	89.0	2.50

*P.M.=Plastic Material *TR=Trowelling *C.B.=Chemical Bonded *SM=Smearing

Refractory Mortars

PRODUCT NAME	Classification Temperature (EN 1402-1) at °C	Main Raw Material Base (EN 1402-1)	Form of Delivery	Type of Product (EN 1402-1)	Installation Method (EN 1402-1)	Chemical Analysis (%) (EN ISO 12677)		
						Al_2O_3	SiO_2	SiC
FIRECLAY	1350	Chamotte	Dry	J. M. / H.S.*	Trowelling	> 30.0	< 61.5	-
MAT FIRE	1400	Chamotte	Dry	J. M. / H.S.*	Trowelling	> 40.0	< 45.0	-
SUPER	1450	Chamotte	Dry	J. M. / H.S.*	Trowelling	> 37.0	< 58.0	-
MAT MK - 4	1480	Chamotte	Dry	J. M. / H.S.*	Trowelling	> 37.0	< 58.0	-
MAC - II	1500	Chamotte	Wet	J. M. / C.B.*	Trowelling	> 33.0	< 59.0	-
SUPER AL	1600	Bauxite	Dry	J. M. / H.S.*	Trowelling	> 70.0	< 23.5	-
MAT HF - 4	1650	Corundum	Dry	J. M. / H.S.*	Trowelling	> 80.0	< 13.5	-
MAT SIC 75	1500	Silicon Carbide	Dry	R.M.*	Trowelling	12.0	4.0	74.0
MAC - I	1350	Quartz	Wet	J. M. / C.B.*	Trowelling	12.8	81.5	-
MAC - DRX	1500	Chamotte	Dry	J. M. / C.B.*	Trowelling	> 35.5	< 57.0	-

*J.M.=Jointing Material *C.B.=Chemical Bonded *H.S.= Heating Setting *R.M.=Refractory Mastic

Plastic Ramming Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)			Grain Size (mm) (EN 1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Shelf Life (months)	Packaging (kg/bag) or (kg/box)
at 110°C	at 800°C	at 1100°C		at 110°C	at 1100°C				
5	6.5	16	6	-1.1	-1.4	0.55	2300	6	25
5	6.5	18	6	-1.0	-1.4	0.72	2650	6	35
10	22	18	6	-0.10	-0.15	0.55	2250	6	25
35	60	65	6	-0.10	-0. 25	0.55	2350	6	25
40	60	65	6	-0.10	-0. 25	0.57	2450	6	25
40	60	65	6	-0.10	-0. 25	0.58	2560	6	25
40	60	65	6	-0.10	-0. 2	0.58	2600	6	25
6.0	22	40	6	-0.15	-0.25	0.72	2750	6	25
40	65	70	6	-0.10	-0.15	0.72	2750	6	25
40	65	70	6	-0.10	-0.15	0.75	2950	6	25

Special Ramming Materials

Cold Crushing Strength (N/mm^2) (EN 1402-6)					Thermal Conductivity (W/mK) (EN 993-14)	Grain Size (mm) (EN 1402-3)	Permanent Linear Change (%) (EN 1402-6)		Reversible Thermal Expansion at 1000°C (%)	Material Required (kg/m^3)	Shelf Life (months)	Packaging (kg/bag)
at 250°C	at 400°C	at 600°C	at 800°C	at 1100°C	at 800°C		at 250°C	at 1100°C				
40	50	65	80	80	8.2	3	-0.04	0.10	0.68	2650	6	25
30	45	60	65	70	8.26	3	-0.04	0.15	0.72	2550	6	25

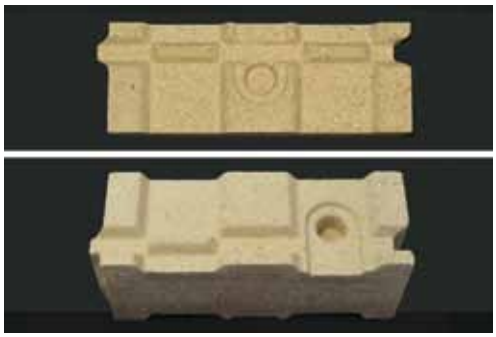
Refractory Mortars

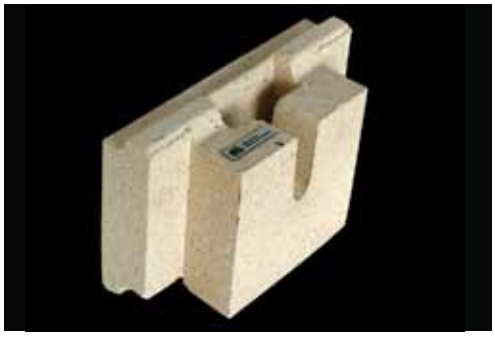
Grain Size (mm) (EN1402-3)	Approx. Water Addition (lt/100 kg dry material) (EN 1402-4)	Shelf Life (months)	Packaging (kg/bag) or (kg/drum)
1	~30	12	25
2	~20	12	25
1	~32	12	25
0.7	~35	12	25
1	-	6	35
1	~32	12	25
0.7	~35	12	25
0.15	~32	6	25
0.5	-	6	20
0.7	~25 - 32	12	25

Firebricks

PRODUCT NAME	Classification	Refractoriness (S.K.)	Refractoriness under load °C($t_{0.6}$)	Raw Material Basis	Bulk Density (g/cm³)	Apparent Porosity (% b.v.)
IDEAL 282	FC 30	20/23	1230	Fireclay	2.14	13
IDEAL M 382	FC 30	20/23	1250	Fireclay	2.16	13
IDEAL M 334	FC 30	30	1280	Fireclay	2.18	14
IDEAL M 334 AL	FC 30	26	1260	Fireclay	2.16	14
IDEAL M 334H	FC 35	31	1310	Fireclay	2.20	16
IDEAL M 308	FC 40	32	1315	Fireclay	2.22	18
IDEAL M 310	FC 40	33	1340	Fireclay	2.25	17
IDEAL A 45 SC25	HA 45	39	1550	Andalusite / SiC	2.60	14
IDEAL MU 44	HA 45	35/36	1415	Fireclay / Mullite	2.27	16
IDEAL MU 48	HA 45	37/38	1450	Fireclay / Mullite	2.32	16
IDEAL 50	HA 45	35	1370	Bauxite / Fireclay	2.35	18
IDEAL B 50Z	HA 45	35	1385	Fireclay	2.35	17
IDEAL MU 60	HA 55	39	1540	Mullite / High Al. Raw Mat.	2.48	14
IDEAL B 60	HA 55	36	1390	Bauxite / Fireclay	2.52	17
IDEAL A 63	HA 55	39	1540	Andalusite	2.60	14
IDEAL MU 65	HA 65	39	1550	Mullite / High Al. Raw Mat.	2.54	17
IDEAL B 65	HA 65	36	1410	Bauxite / Fireclay	2.56	18
IDEAL B 70	HA 65	36	1420	Bauxite / Fireclay	2.65	19
IDEAL MU 72	HA 75	39	1550	Mullite / High Al. Raw Mat.	2.60	18
IDEAL FM 72	HA 75	40	1700	Mullite	2.62	15
IDEAL FM 76	HA 75	40	1700	Mullite / Corundum	2.65	15
IDEAL B 75	HA 75	37	1430	Bauxite	2.73	19
IDEAL FC 77	HA 75	39	1660	Corundum / Andalusite	2.82	15
IDEAL MU 80S	HA 75	40	1600	Mullite / High Al. Raw Mat.	2.65	17
IDEAL B 80	HA 75	38	1470	Bauxite	2.77	19
IDEAL B 80C	HA 75	37	1420	Bauxite / Corundum	2.76	17
IDEAL B 85	HA 75	38	1500	Bauxite / Corundum	2.85	17
IDEAL BK 85	HA 75	38	1520	Bauxite / Corundum	2.80	18
IDEAL B 85S	HA 75	38	1540	Bauxite / Alumina	2.92	17
IDEAL B 85C	HA 75	37/38	1460	Bauxite / Corundum	2.87	17
IDEAL W 90	HA 85	40	1570	Corundum	3.15	17

Cold Crushing Strength (N/mm^2)	Chemical Analysis (%)					Thermal Linear Expansion (% at 1000°C)	Thermal Shock Resistance (950°C/Water Quench.)
	Al_2O_3	SiO_2	Fe_2O_3	P_2O_5	SiC		
55	30.0	64.0	1.1	-	-	0.48	> 5
65	31.0	63.5	1.2	-	-	0.48	> 5
65	33.0	61.5	1.3	-	-	0.51	10
55	34.0	62.0	1.4	-	-	0.50	8
60	36.5	58.0	1.4	-	-	0.53	15
50	40.0	55.0	1.5	-	-	0.55	12
50	42.5	52.5	1.5	-	-	0.57	20
60	45.0	26.5	0.9	-	25.0	0.50	> 100
55	44.0	51.5	1.4	-	-	0.58	20
60	> 48.0	47.5	0.9	-	-	0.60	20
55	50.0	44.5	1.7	-	-	0.62	20
50	> 49.0	46.5	1.5	-	-	0.62	20
70	60.0	36.5	0,8	-	-	0.60	30
65	> 60.0	34.5	1.6	-	-	0.65	30
65	> 62.5	34.5	1.1	-	-	0.65	> 30
70	65.0	32.0	0.8	-	-	0.64	> 30
65	> 65.0	29.0	1.7	-	-	0.67	30
70	> 70.0	23.0	1.8	-	-	0.67	30
70	> 71.0	24.5	1.1	-	-	0.68	30
90	72.0	26.5	0.3	-	-	0.65	30
90	76.0	23.0	0.3	-	-	0.66	30
80	> 75.0	13.8	2.1	-	-	0.68	30
80	77.0	21.0	0.6	-	-	0.68	30
65	> 79.0	19.0	0.6	-	-	0.70	30
85	> 80.0	13.0	1.9	-	-	0.70	30
90	> 80.0	11.0	1.8	1.9	-	0.72	30
85	82.5	11.5	1.9	-	-	0.73	> 30
85	83.0	11.5	1.8	-	-	0.73	> 30
100	> 83.5	10.2	1.9	-	-	0.74	30
120	> 84.5	9.8	1.9	1.9	-	0.74	30
80	> 89.5	7.5	0.5	-	-	0.78	20





Insulating Firebricks

PRODUCT TYPE	Classification Group (ISO 2245)	Classification Temperature at °C	Density (ASTM C-134) kg/m3	Cold Crushing Strength (ASTM C-93-84) MPa	'Modulus of Rapture (ASTM C-93-84) MPa	Specific Heat (KJ/kgK) at 1000°C
GR - 23	125-0.5-L	1260	480	1.2	1.0	1.05
GR - 25	135-0.8-L	1350	800	2.5	-	-
GR - 25-A	135-0.8-L	1350	820	2.5	-	-
GR - 25-B	135-0.9	1350	900	4.0	-	-
GR - 25-CA	135-1.1	1350	1100	5.4	-	-
GR - 25-HS	135-1.1	1350	1100	6.0	3.1	-
GR - 26	140-0.8-L	1430	800	1.6	1.5	1.10
GR - 26-HS	140-0.9-L	1430	870	4.0	-	-
GR - 28	150-0.9-L	1540	890	2.1	1.8	1.10
GR - 30	160-1.0-L	1650	1020	2.2	2.1	1.10
GR - 32	170-1.2-L	1760	1250	3.5	2.1	1.10

Insulating Firebricks - Calcium Silicate Insulating Boards

PRODUCT TYPE	Max Service Temperature °C	Density (ASTM C-134) kg/m3	Cold Crushing Strength (ASTM C-133-97) MPa	Total Porosity (ISO 5017)%	Specific Heat (KJ/kgK)	Thermal Conductivity (ASTM C-182) W/mK		
						at 200°C	at 400°C	at 600°C
ISO 450	900	425	1.3	82	-	0.10	0.12	0.14
ISO 550	900	500	2.5	81	-	0.12	0.14	0.16
ISO 750-S	900	750	7.0	68	0.80	0.15	0.17	0.19
CALCIUM SILICATE - N	950	245	0.9	-	0.75	0.07	0.10	0.14
CALCIUM SILICATE - P	950	290	1.15	-	0.75	0.08	0.10	0.14
CALCIUM SILICATE - HT	1050	290	1.9	1.5	0.80	0.07	0.10	0.14

Insulating Firebricks

Thermal Conductivity (ASTM C-182) W/mK						Chemical Analysis (%)						
at 400°C	at 600°C	at 800°C	at 1000°C	at 1200°C	at 1400°C	Al_2O_3	SiO_2	Fe_2O_3	TiO_2	CaO	MgO	Na_2O+K_2O
0.12	0.14	0.17	0.19	-	-	37.0	44.4	0.7	1.2	1.2	0.3	1.1
0.24	0.28	0.32	0.37	-	-	50.0	-	0.9	-	-	0.2	-
0.24	0.28	0.32	0.37	-	-	34.0	57.0	1.2	-	-	-	-
0.27	0.30	0.35	0.40	-	-	34.0	57.0	1.2	-	-	-	-
0.32	0.36	0.40	0.45	-	-	34.0	57.0	1.2	-	-	-	-
0.32	0.36	0.40	0.45	-	-	50.0	-	0.9	-	-	0.2	-
0.25	0.27	0.30	0.33	0.35	-	58.0	39.1	0.7	0.1	0.1	0.2	1.7
0.29	0.32	0.35	0.38	0.41	-	54.0	-	0.8	-	-	0.2	-
0.30	0.32	0.34	0.36	0.38	-	67.1	31.0	0.6	0.1	0.1	0.1	0.9
0.38	0.39	0.40	0.41	0.42	-	73.4	25.1	0.5	0.1	0.1	tr	0.9
0.49	0.50	0.51	0.53	0.56	0.60	77.0	21.5	0.3	tr	tr	0.1	0.9

Chemical Analysis (%)						
Al_2O_3	SiO_2	Fe_2O_3	TiO_2	CaO	MgO	Na_2O+K_2O
14.8	66.5	4.1	0.5	5.0	2.1	6.5
14.8	66.5	4.1	0.5	5.0	2.1	6.5
9.0	77.0	7.0	0.7	0.8	1.3	2.0
0.49	44.1	0.09	-	42.7	0.3	0.12
0.49	44.1	0.09	-	42.7	0.3	0.12
0.40	46.9	0.09	-	43.2	-	0.01

Exfoliated Vermiculite

PRODUCT NAME	Grain Size (mm)	Fusion Point at °C	Density at kg/m^3	Thermal Conductivity (under ambient conditions) at W/mK	Water Absorption Capacity (% b.v.)	pH
SUPER FINE	0 - 2	1200 - 1320	95 - 120	0.063 - 0.069	20 - 50	6 - 9
FINE	1 - 3	1200 - 1320	85 - 110	0.063 - 0.069	20 - 50	6 - 9
MEDIUM	1 - 4	1200 - 1320	80 - 100	0.063 - 0.069	20 - 50	6 - 9
LARGE	5 - 8	1200 - 1320	70 - 90	0.063 - 0.069	20 - 50	6 - 9

Acid - Proof Cements

PRODUCT NAME	Density (g/cm^3)	Compressive Strength (N/mm^2) (after 28 days)	Flexural Strength[1] (N/mm^2)	Tensile Strength[1] (N/mm^2)	Adhesion[1] to. (N/mm^2)		Flexibility 10^4 (N/mm^2)
					Ceramic[2]	Steel Concrete	
ASPLIT ET	2.05	100	30	40	40	10	1.4
ASPLIT CN 916	1.45	60	-	-	-	-	-
MAT ACID	2.00	40	6	-	-	1.2	0.8

1) **after the samples have been stored in the laboratory for 28 days in air.**
2) **on carbon bricks the adhesive strength of Asplit cements is greater than the inherent tensile strength of the bricks**

Acid - Resistant Tiles - Bricks

PRODUCT TYPE	Density (g/cm^3)	Compressive Strength (N/mm^2)	Water Absorption (w.t%)	Acid Solubility (% b.w.)	Chemical Analysis (%)		Acid Solubility (% b.w.)
					Al_2O_3	SiO_2	
TILES	-	160	1.0 - 2.5	-	22 - 24	72	-
BRICKS	2.15	100	5.0	1	24 - 26	70	1

Chemical Analysis (%)				
Al_2O_3	SiO_2	Fe_2O_3	$CaO+K_2O$	MgO
10-16	38-46	6-13	2-11	16-35
10-16	38-46	6-13	2-11	16-35
10-16	38-46	6-13	2-11	16-35
10-16	38-46	6-13	2-11	16-35

Acid - Proof Cements

Thermal Conductivity (W/mK)	Thermal Linear Expansion (10^6 1/K)	Thermal Resistance up to (°C)
1.7	45	120
1.6	-	180
1.2	12	900

Acid - Resistant Tiles - Bricks

Thermal Conductivity at 400°C (W/mK)	Thermal Linear Expansion (%)	Open Porosity (% b.v)
1.05	-	3-4
1.10	0.44	10

Ceramic and High Temperature Soluble Insulation Fibers

PRODUCT TYPE	Type of Product	Max. Service Temperature at °C	Density (kg/m^3)	Tensile Strength (KPa)	Compressive Strength (MPa)	Specific Heat (KJ/kgK) at 1090°C	Thickness (mm)
Ceramic Blanket	Blanket	1260	96 128	70 90	- -	1.13	13-25-38-50
Ceramic Blanket HT		1425	96 128	70 90	- -	1.13	13-25-38-50
SW-607		1100	96 128	65 90	- -	1.05 (at 540°C)	13-25-38-50
SW-607 MAX		1200	96 128	70 95	- -	1.13	14-25-38-50
Ceramic Board 100	Panels	1260	310	-	0.35	-	6-10-13-25-50)
Ceramic Board 115		1400	310	-	0.30	-	6-10-13-25-50)
Ceramic Paper	Paper	1260	210	750	-	-	1-2-3-4-5-6
SW-607 MAX Paper		1200	200-220	> 650	-	-	1-2-3-4-5-6
Ceramic Fiber	Bulk Fibers	1260	-	-	-	1.13	-
SW-607 HT Fiber		1300	-	-	-	1.70	-

1) **all blankets are also available in 64 and 160 Kg/m^3**

2) **SW 607 is an alkaline-earth silicate fibre which has been developed to be soluble in body fluids (information on request)**

SW 607 MAX fibre is a high temperature insulation glass fibre which has been developed to have a low biopersistence (information on request)

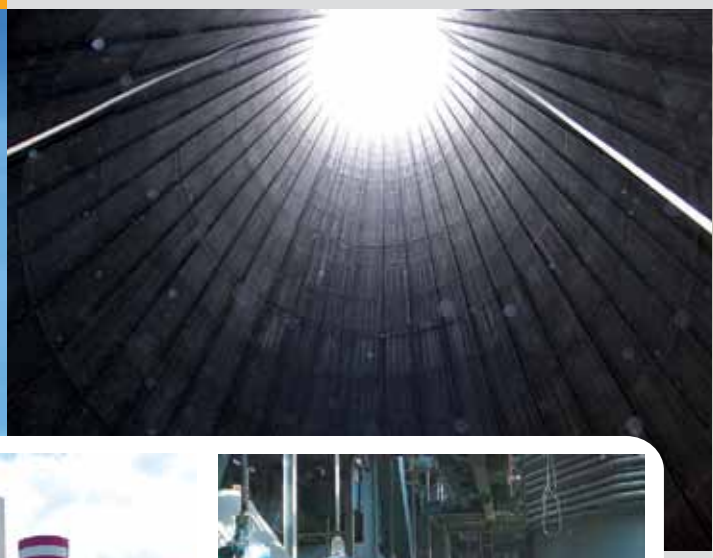
Mineral Fibers

PRODUCT TYPE	Type of Product	Max. Service Temperature at °C	Density (kg/m^3)	Thermal Conductivity (W/mK) at 100°C	Thermal Conductivity (W/mK) at 200°C	Thermal Conductivity (W/mK) at 350°C	Thickness (mm)
Blanket	Blanket supported with wire mesh	700	60	0.045	0.066	0.113	30 up to 100
			90	0.042	0.059	0.097	
			120	0.042	0.057	0.092	
Fiber Boards	Panel	700	40	0.050	-	-	30 up to 100
			50	0.049	-	-	
			75	0.048	-	-	
			100	0.045	0.086	-	
Bulk Fibers	Bulk Fibers	800	150	0.045	0.080	-	-
			-	0.043	-	-	

Thermal Conductivity (W/mK)					Chemical Analysis (%)					
at 200°C	at 400°C	at 600°C	at 800°C	at 1000°C	Al_2O_3	SiO_2	ZrO_2	$Fe_2O_3 + TiO_2$	CaO + MgO	$Na_2O + K_2O$
0.06	0.11	0.16	0.23	0.32	44.0	56.0	-	0.15	0.05	0.10
0.06	0.10	0.15	0.20	0.27						
0.06	0.11	0.16	0.23	0.32	35.0	50.0	15	0.15	0.09	0.10
0.06	0.10	0.15	0.20	0.27						
0.06	0.11	0.17	-	-	< 0.3	60.0-70.0	-	-	25.0 - 40.0	-
0.06	0.10	0.16	-	-						
0.09	0.13	0.19	0.28	0.39	< 0.3	60.0-70.0	-	-	25.0 - 40.0	-
0.08	0.12	0.16	0.24	0.34						
-	0.08	0.11	0.15	0.20	44.0	54.0	-	< 1.0	< 1.0	< 1.0
-	0.08	0.11	0.15	0.20	44.0	54.0	-	< 1.0	< 1.0	< 1.0
0.06	0.09	0.13	0.20	-	47.0	52.0	-	-	-	-
-	0.09	0.14	0.23	0.35	< 0.3	60.0-70.0	< 10	-	25.0 - 40.0	-
-	-	-	-	-	44.0	56.0	-	0.15	0.05	0.10
-	-	-	-	-	-	70.0-80.0	-	-	18.0-25.0	-

All data tables present typical values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They may not be regarded as binding specifications. All previous versions are replaced by the values stated here, thus become invalid.

High Quality Solutions



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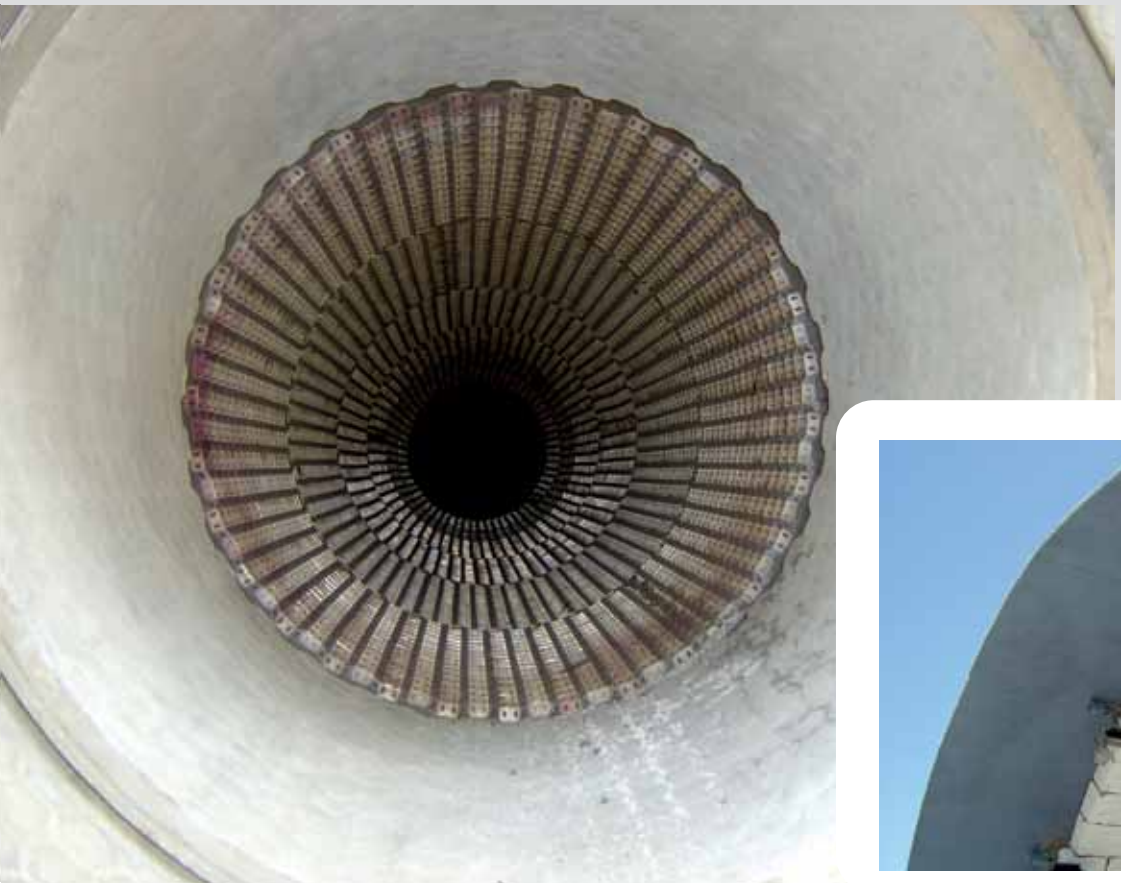
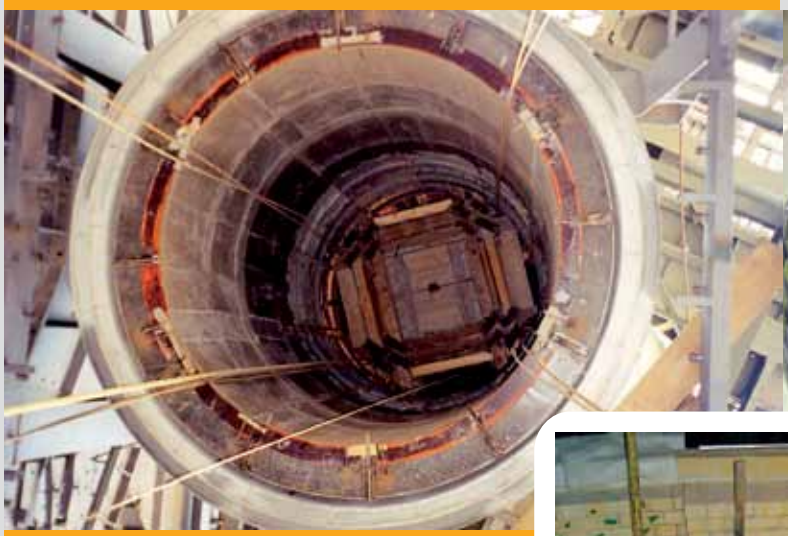


High quality solutions



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Research & Development

MATHIOS REFRACTORIES S.A. is developing and expanding the portfolio and the typical applications of the refractory materials through the latest technology equipment in the production line along with the highly experienced personnel of the R&D Department. The main activities of R&D Department include the optimization of the existing formulations and products, the fine tuning of formulations in order to meet the customer's requirements, the research and development of new - advanced refractory materials, pilot plant trials in different industrial sectors, the technical support of Sales Department, as well as the collaboration with Institutes and Universities.

Research & Development

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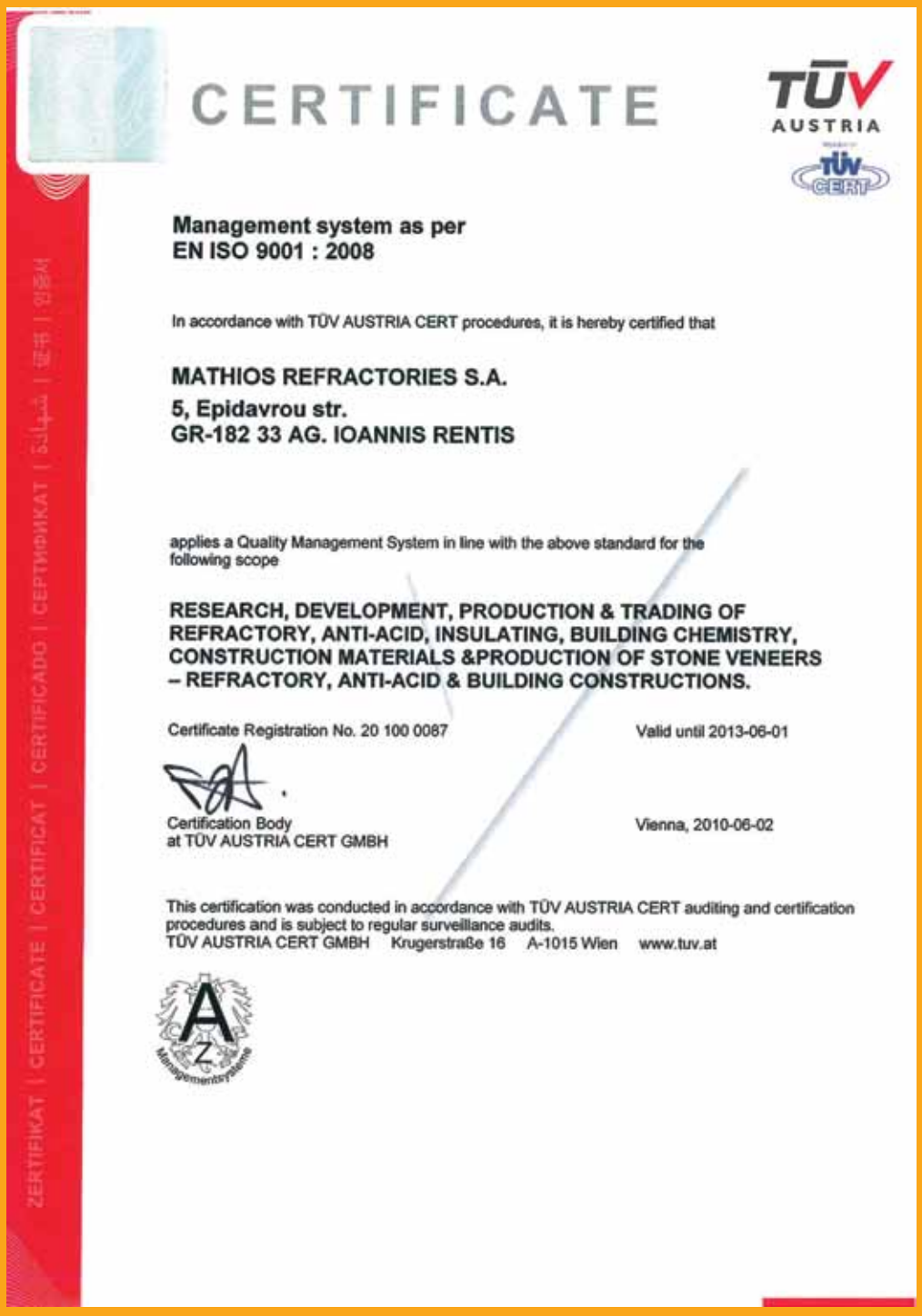

CERTIFICATE

TÜV AUSTRIA

TÜV CERT

Management system as per
EN ISO 9001 : 2008

In accordance with TÜV AUSTRIA CERT procedures, it is hereby certified that

MATHIOS REFRACTORIES S.A.
5, Epidavrou str.
GR-182 33 AG. IOANNIS RENTIS

applies a Quality Management System in line with the above standard for the following scope

RESEARCH, DEVELOPMENT, PRODUCTION & TRADING OF REFRACTORY, ANTI-ACID, INSULATING, BUILDING CHEMISTRY, CONSTRUCTION MATERIALS &PRODUCTION OF STONE VENEERS – REFRACTORY, ANTI-ACID & BUILDING CONSTRUCTIONS.

Certificate Registration No. 20 100 0087 Valid until 2013-06-01

Certification Body
at TÜV AUSTRIA CERT GMBH

Vienna, 2010-06-02

This certification was conducted in accordance with TÜV AUSTRIA CERT auditing and certification procedures and is subject to regular surveillance audits.
TÜV AUSTRIA CERT GMBH Krugerstraße 16 A-1015 Wien www.tuv.at

ZERTIFIKAT | CERTIFICATE | CERTIFICAT | CERTIFICADO | СЕРТИФИКАТ | شهادة | 证书 | 인증서

MATHIOS REFRACTORIES S.A. is certified according to EN ISO 9001:2000. In details, quality control tests are performed in every single production step with the involvement and assistance of highly experienced and well trained personnel. The sampling, the characterization, the determination of the consistency, the preparation and treatment of the test pieces, the measurement of physical and complementary properties of the refractory products are performed according to harmonized European Standards. The same certification EN ISO 9001:2000 also stands for the Construction Department thus leading to high quality construction services in terms of refractory and acid proof constructions through the latest technology equipment and the specialized personnel. Aspropyrgos factory is also certified according to EN ISO 14001:2004.

Zertifikat

kiwa
Partner for progress

Nummer 55773-1

Gültig von 01. April 2010

Gültig bis 31. März 2013 Seite 1 von 1

Sicherheitsmanagementsystem-Zertifikat

SCC**

Uneingeschränktes Zertifikat

Kiwa International Cert GmbH bescheinigt hiermit, dass die

Mathios Refractories S.A.

Epidavrou st. 5
18233 Athen, Griechenland

mit Niederlassung Mathios GmbH in Bochum, Deutschland

ein Sicherheitsmanagementsystem in Übereinstimmung mit dem Standard SCC** uneingeschränktes Zertifikat eingeführt hat und dass dieses dem Regelwerk „Sicherheits Certifikat Contraktoren" (SCC) Version 2006 entspricht.

Geltungsbereich:
Forschung, Entwicklung, Produktion und Verkauf von feuerfesten Materialien, säurebeständigen-, isolierenden Konstruktionsmaterialien, Produktion von feuerfesten Materialien und Verkleidungssteinen sowie Montage

TGA-ZM-19-94-62

S ICHERHEITS
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