

REFRACTORIES

— FOR —

ALUMINUM



Global **Refractory** Solutions



ABOUT ALLIED



Allied Mineral Products is a world leader in the design and manufacture of monolithic refractories and precast shapes. With strong sales and service teams in the foundry, aluminum, steel, heat treat/forge and industrial markets, our success is based on our dedication to *Being There Worldwide with Refractory Solutions*.

Producing quality, consistent products is top priority at Allied and we have the products to meet your refractory needs. Our extensive product line includes innovative refractory technology and longstanding refractory alternatives.

Allied's focus on quality at every stage in the production process is unparalleled. A stringent raw material standard and global quality control testing before and after each batch is produced, provides customers with consistent products. We provide quick response times to any urgent request through flexible manufacturing systems at all our manufacturing facilities.

Global **Refractory** Solutions



12 MANUFACTURING FACILITIES
OVER **160** INTERNATIONAL SALES REPRESENTATIVES
3 RESEARCH AND TECHNOLOGY FACILITIES
SALES ACTIVITY IN MORE THAN **100** COUNTRIES
7 PRECAST SHAPES FACILITIES





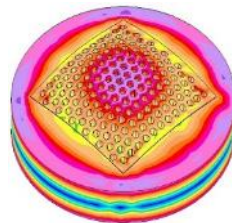
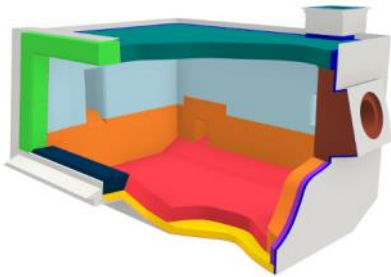
RESEARCH & ENGINEERING

After gaining a detailed understanding of your specific needs, our team evaluates operating criteria and physical design parameters to create a detailed engineered design encompassing:

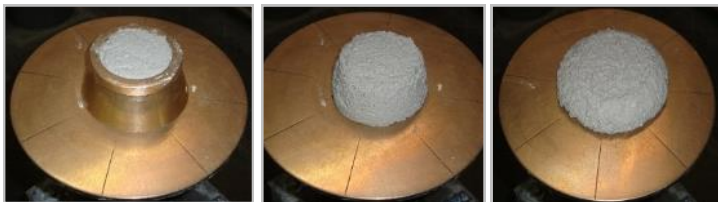
- Patented technologies
- Optimized product zoning
- Thermal models to optimize and validate designs
- Proven safety lining system designs
- Unique installation properties and techniques
- Leading edge refractory system designs

We're focused on developing new products, improving existing products and perfecting installation techniques. Our product development and testing is conducted in our state of the art research and technology center. We have an on-site gunning and shotcreting lab allowing extensive testing of installation properties.

As an innovative, technology-driven supplier we're devoted to providing customized refractory solutions for various industry operations. We offer a wide variety of high performance refractory products with superior raw material quality.



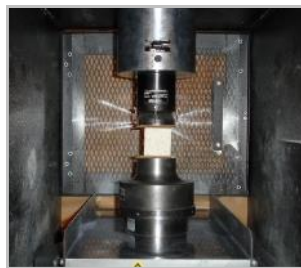
FEA Thermal Analysis



Flow Testing



Contact Tests



Strength Tests





PRODUCT INNOVATIONS



QUICK-FIRE®

QUICK-FIRE® is a two-component technology that utilizes a liquid phosphate bonding system that improves performance and can drastically reduce downtime. QUICK-FIRE® can be used as a veneer on top of an existing lining, or as a repair for a full lining thickness.

Product Benefits

- Rapid dry-out characteristics
- Designed to bond to existing refractory
- Fast setting properties
- Excellent non-wetting characteristics
- Superior thermal shock resistance
- Available in gunning, casting and troweling formulations



QUICK-FIRE® ONE

QUICK-FIRE® ONE is a line of single-component, rapid turnaround products that set faster than most cement bonded castables. QUICK-FIRE® ONE products require only a water addition for mixing instead of liquid phos acid. This single-component system allows the product to ship like typical refractory materials without the need for special transportation requirements.

- Rapid dry-out characteristics
- Designed to bond to existing refractory
- Fast setting properties
- Excellent non-wetting characteristics
- Superior thermal shock resistance
- Available in gunning, casting and troweling formulations
- Thermal shock resistance
- Abrasion resistance





PRODUCT INNOVATIONS

NANO-TEK[®] AL

NANO-TEK[®] is a family of colloidal silica-bonded refractory products providing good strengths and thermal shock resistance and adheres well to existing refractories. The NANO-TEK[®] AL line exhibits excellent resistance to molten aluminum and its alloys.

Product Benefits

- Accelerated heat-up
- Quick turnaround
- Excellent thermal shock resistance
- Abrasion resistance
- No cement
- Good mechanical strengths

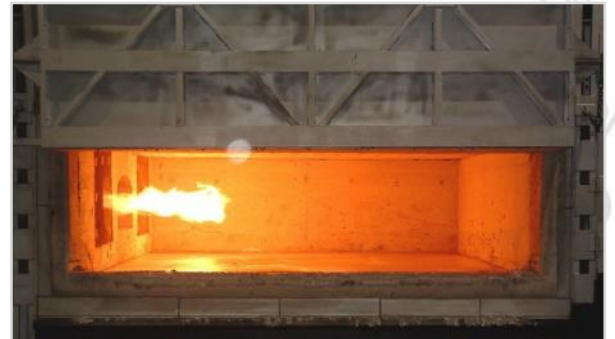


MATRIFLO

MATRIFLO products are a specialty line of high alumina, low cement castables designed for aggressive aluminum alloys.

Product Benefits

- Superior corrosion resistance
- High strength
- Excellent non-wetting properties
- Resistance to salt flux
- Thermal shock resistance
- Abrasion resistance



REDIGUN

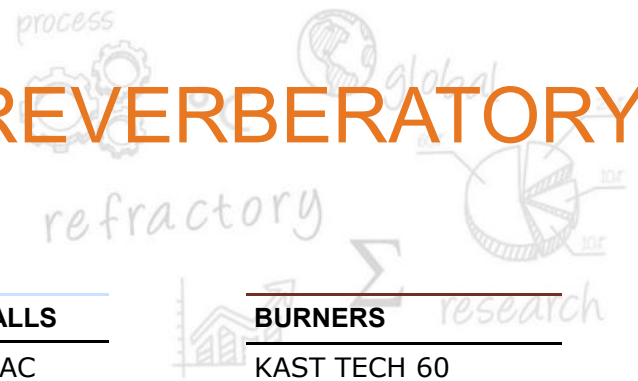
REDIGUN is a family of gunning plastic. The plastic gunning process provides a high-density monolithic lining comparable to rammed plastic at a much faster and consistent installation rate.

- Used for repairs or for full lining thickness installations
- Low rebound
- Quick and consistent installation
- Consistent optimal density
- Faster dry-out compared to low-cement castables





REVERBERATORY



ROOF

- MATRIPUMP 50
- MATRIPUMP AR 61
- NANO-TEK® 65
- NANO-TEK® 70
- TUFF-FLO 608

UPPER SIDE WALLS

- MATRIPHOS 85AC
- MATRIPUMP AR 61
- NANO-TEK® 70
- QUICK-FIRE® 88
- QUICK-FIRE® ONE 86

BURNERS

- KAST TECH 60
- LCF 798A
- MATRIPHOS 85AC
- NANO-TEK® 70
- QUICK-FIRE® 88
- QUICK-FIRE® ONE 86

JAMBS / LINTELS

- ARMORMAX® 70SR
- NANO-TEK® 65-3 SiC
- NANO-TEK® 70
- QUICK CAST® 62
- QUICK-FIRE® 88
- QUICK-FIRE® ONE 86
- TUFF-FLO 608

RAMP / SILL

- MATRIFLO 70 ACX COARSE
- MATRIFLO 85 ACX
- MATRIFLO AL C
- MATRIFLO SiC 6 COARSE
- MATRIPUMP 608 AL
- NANO-TEK® 75 18SiC AL
- QUICK-FIRE® 90
- QUICK-FIRE® ONE 83 ABR

SUBHEARTH

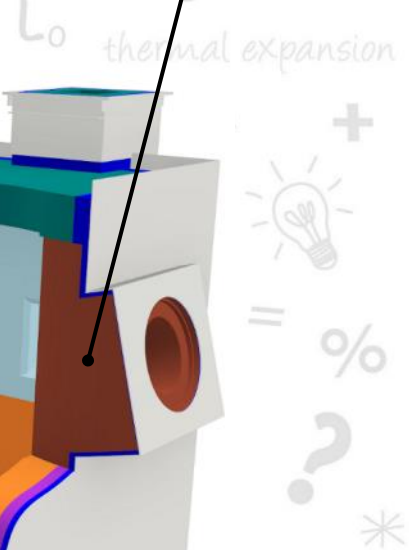
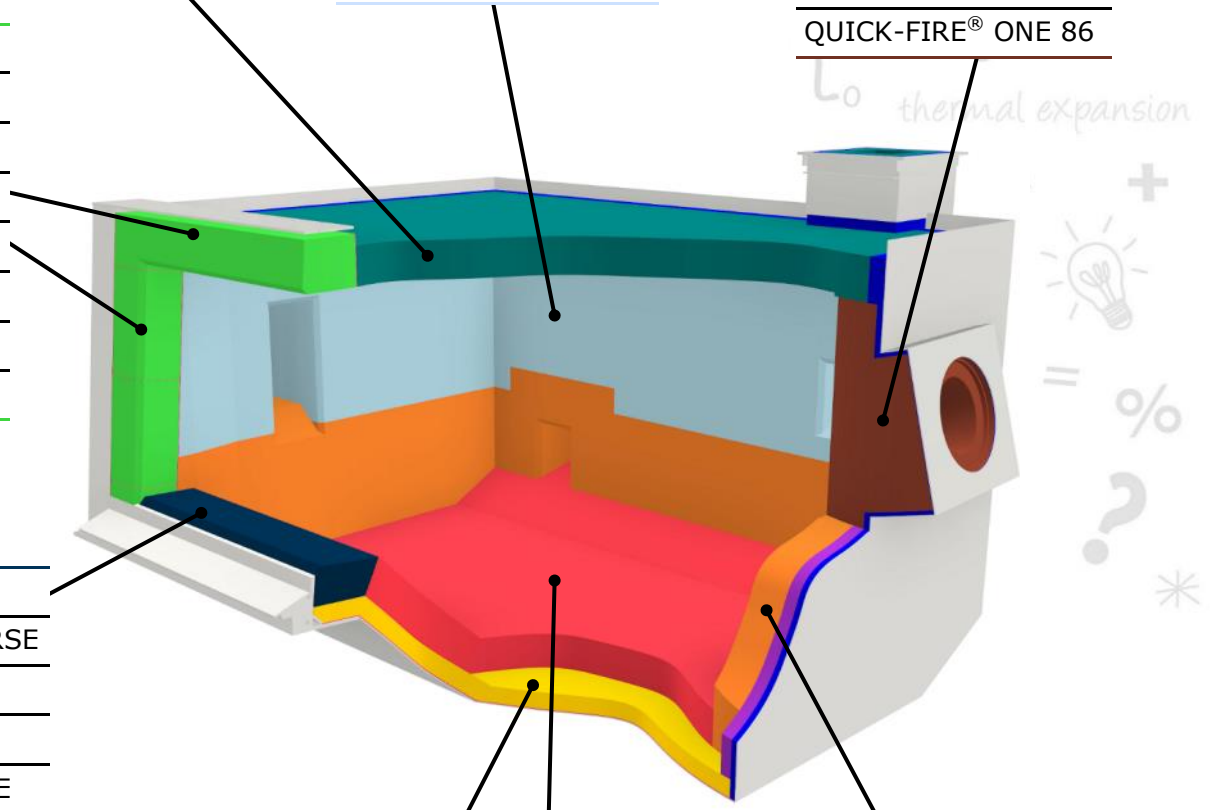
- BETAMAX® 24 LT
- MATRICAST 2600 AC
- MATRIGUN 25 ACX
- MATRIPUMP 45 AL
- NANO-TEK® 45 AL

HEARTH

- MATRIFLO 80 ACX PUMP
- MATRIFLO 85 ACX
- MATRIPUMP 63 ACX
- MATRIPUMP 70 ACX
- NANO-TEK® 80 AL
- QUICK CAST® 61 ACX
- QUICK-FIRE® ONE 86

LOWER SIDEWALLS

- MATRIFLO 80 ACX PUMP
- MATRIFLO 85 ACX
- NANO-TEK® 80 AL
- QUICK-FIRE® 88
- QUICK-FIRE® ONE 86





process global
STACKMELTER

refractory Σ research



ROOF

- MATRICAST 3110C
- MATRIPUMP 50
- MATRIPUMP AR 61
- NANO-TEK[®] 70

SIDEWALLS

- MATRIFLO 80 ACX PUMP
- MATRIFLO 85 ACX
- MATRIFLO 93 AC
- WAM[®] AL II
- WAM[®] AL II HD
- WAM[®] AL II HDF
- WAM[®] AL III
- WAM[®] AL III HD

HEARTH / RAMP

- MATRIFLO 80 ACX PUMP
- MATRIFLO 85 ACX
- MATRIFLO 93 AC

STACK

- ARMORMAX[®] 70 SR (upper)
- MATRIFLO 80 ACX PUMP
- MATRIFLO 85 ACX
- MATRIFLO 93 AC
- QUICK CAST[®] 61 ACX

BURNERS

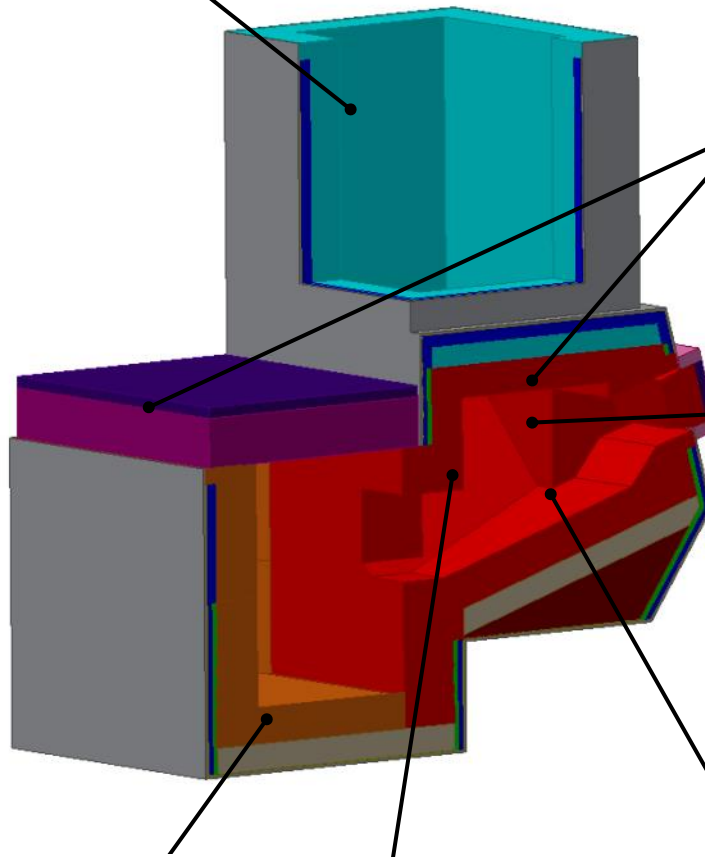
- KAST TECH 60
- LCF 798A
- MATRIPHOS 85AC
- NANO-TEK[®] 70
- QUICK-FIRE[®] 88
- QUICK-FIRE[®] ONE 86

HEARTH & WALLS

- MATRICAST 70 AC
- QUICK CAST[®] 61 ACX
- QUICK-FIRE[®] 88
- WAM[®] AL II
- WAM[®] AL III

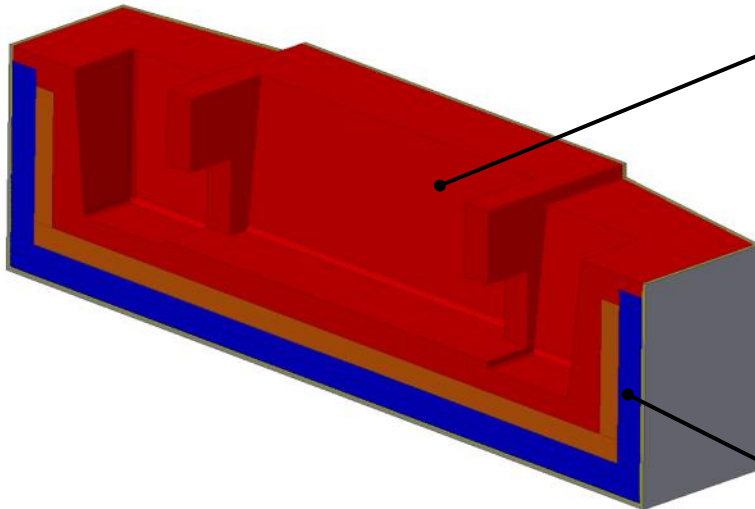
BULL NOSE

- ARMORMAX[®] 70 AC
- QUICK CAST[®] 81 ACX



in our
element

DIE CASTING HOLDER



FURNACE LINING

MATRICAST 70 AC

MATRIFLO 85 ACX

MATRIPUMP 63 ACX

QUICK-FIRE® 88

QUICK-FIRE® ONE 86

WAM® AL II

WAM® AL III

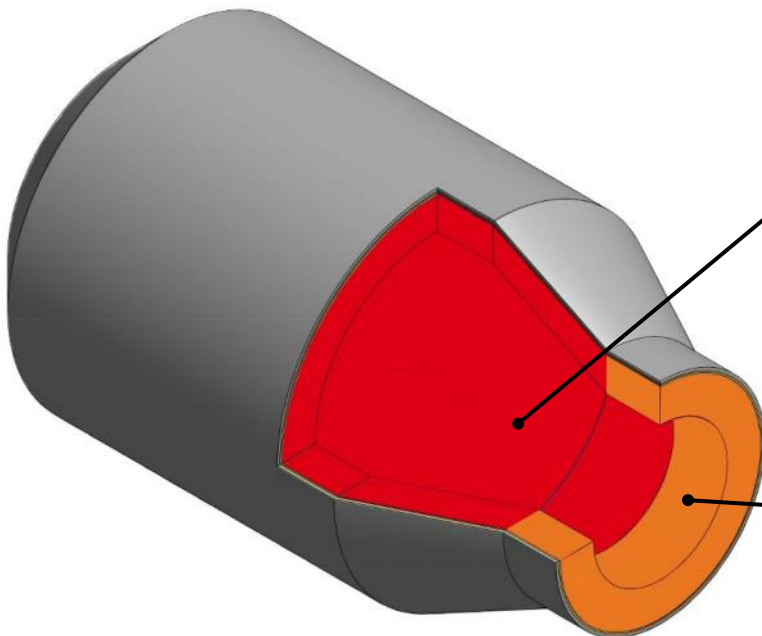
SAFETY LINING

BETAMAX® 24 LT

BETAMAX® HS LT

DRI-LITE® 79AL-M

ROTARY



FURNACE LINING

MATRIPUMP 608 AL

NANO-TEK® 60 AL

QUICK CAST® 61 ACX

NOSE RING

ARMORMAX® 70 SR

MATRICAST 60 SiC

MATRICAST 82 SiC

MATRIPUMP 608 AL

NANO-TEK® 75 18SiC AL

QUICK CAST® 80 SiC FINE



CORELESS

refractory



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SLIP PLANE MATERIALS

GM40SRP

MINRO-WEAVE CLOTH

SINTERFOIL 50

VAPORSHIELD

WORKING LINING

DRI-VIBE® 520A

DRI-VIBE® 522A-FR

DRI-VIBE® 558A-FR

PRECAST CRUCIBLES

$$\frac{\Delta L}{L_0} = \alpha_L \Delta T$$

thermal expansion

WORKING LINING COATINGS

MATRIKOTE 90 AC

MINRO-Z WASH Z77

WASH 148A

SPOUT

MINRO-AL® PLASTIC A76

MINRO-AL® PLASTIC A85

PRECAST SHAPES

QUICK-FIRE® 88

QUICK-FIRE® ONE 86

STRUCTURAL COMPONENTS

PRECAST SHAPES

QUICK CAST® 62

TUFF-FLO 50

CRUCIBLE BACK-UP

DRI-VIBE® 291A

DRI-VIBE® 88A NB

COVER

MINRO-FIRE CAST F80

TUFF-FLO 50

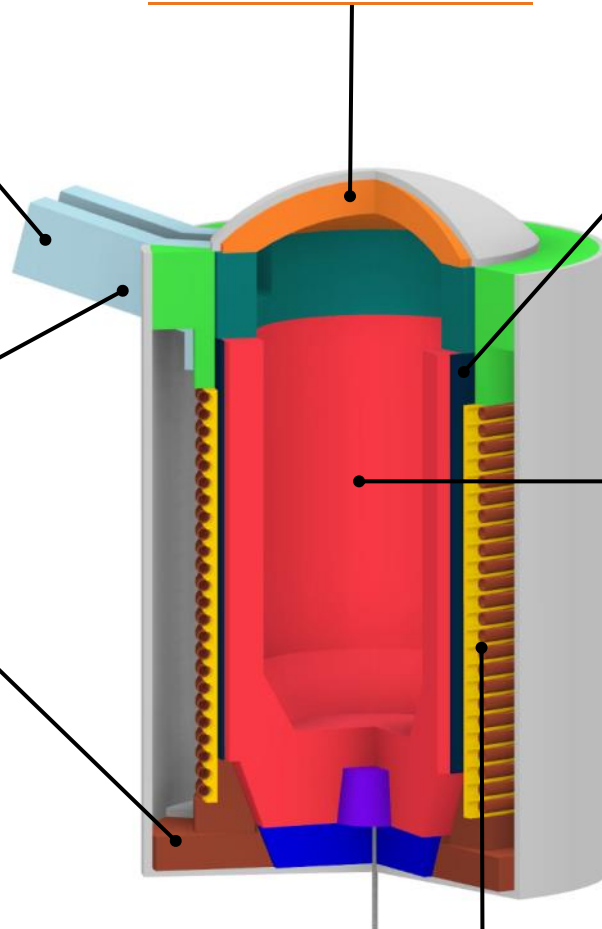
GROUT

COIL-CAST 97A

GROUT 163 ACF

GROUT 563A

GROUT 663A





process
global
CHANNEL

refractory
research

COVER

INSULMIX® 33100

MATRIPUMP 50

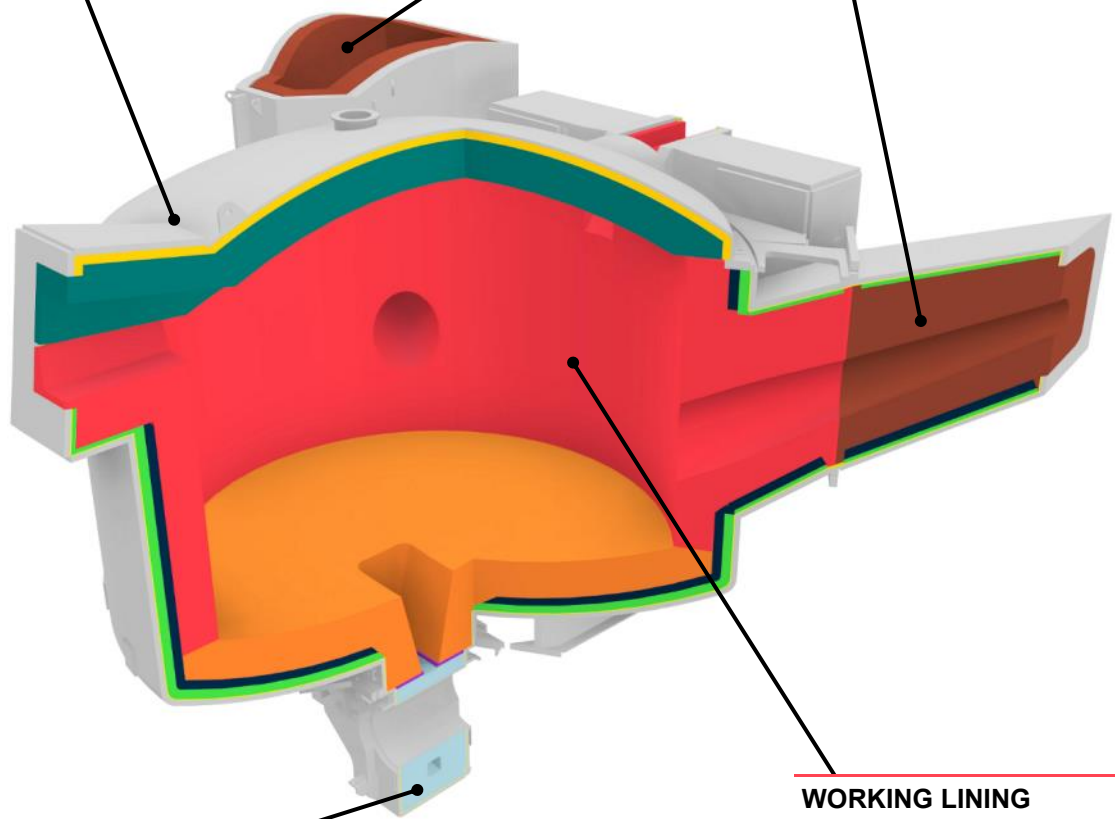
MINRO-FIRE CAST F80

RECIEVER / SPOUT

MATRIFLO 80 ACX PUMP

MATRIFLO 85 ACX

MATRIFLO SiC 6



INDUCTOR

DRI-VIBE® 522A-FR

DRI-VIBE® 558A-FR

WORKING LINING

MATRIFLO 80 ACX PUMP

MATRIFLO 85 ACX

QUICK CAST® 61 ACX

pansion





LAUNDERS/TROUGHS TRANSFER LADLES

HEATED LAUNDRER

WORKING LINING

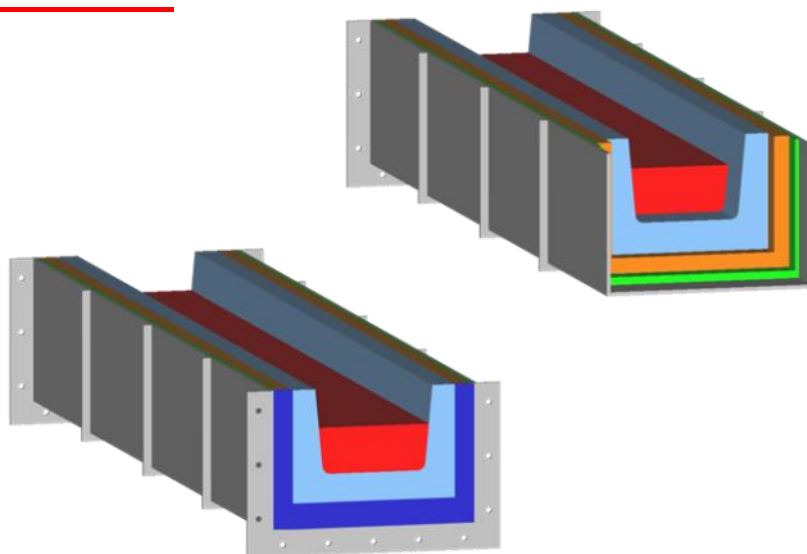
MATRIFLO 85 ACX
QUICK CAST® 61 ACX
QUICK-FIRE® 88
QUICK-FIRE® ONE 86
WAM® AL II
WAM® AL III

BACK-UP LINING

BETAMAX® 24 LT
DRI-LITE® 79 AL-M

COVER

BETAMAX® 26 LT
BETAMAX® HS LT



UNHEATED LAUNDRER

BACK-UP LINING

DRI-LITE® 65 A-L
DRI-LITE® 79 AL-M

WORKING LINING

MATRIFLO FSM ACX
MATRISIL CV
MATRISIL LC
WAM® AL II
WAM® AL III

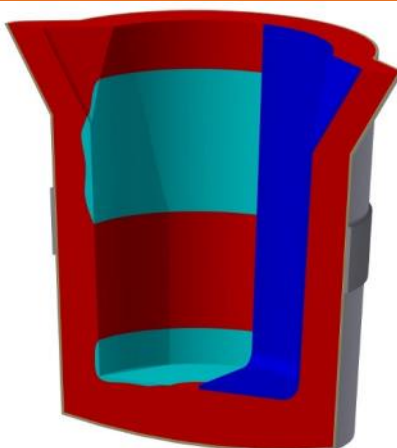
LADLES

REPAIR

QUICK-FIRE® ONE PATCH B
QUICK-FIRE® PATCH B
QUICK-FIRE® PATCH M

COATINGS

MATRIKOTE 90 AC
MINRO-Z WASH Z77



WORKING LINING

BETAMAX® HS LT
MTRICAST 82 SiC
MATRIFLO FSM ACX
QUICK CAST® 61 ACX



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global
refractory

FLOORING

TUFFLOOR® is designed for areas exposed to extreme thermal cycling and intermittent exposure to liquid metal spills, dross and slag. This product is versatile product and can be installed as a complete floor, over existing (or new) concrete, or as precast tiles. TUFFLOOR® has over 20 years of proven performance in ferrous and non-ferrous foundries, primary metal production facilities (aluminum, steel, iron, zinc, copper, ferro-alloys), rolling mills and many other hot flooring applications.

Benefits include:

- Fast project turn around time with strength development
- Exceeds cold crushing strength of conventional concrete
- Reduced maintenance time and expense
- Safer working surfaces
- Minimized wear on mobile equipment
- Custom colors available
- Excellent freeze-thaw properties



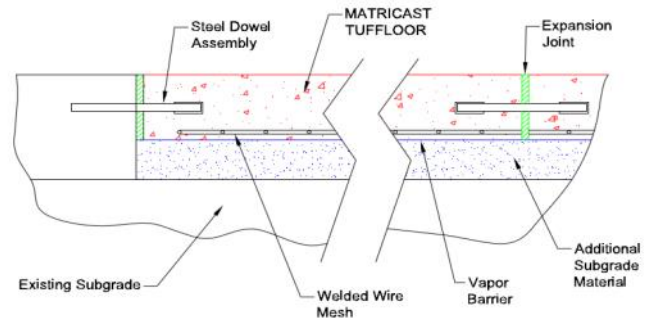
TUFFLOOR® - Headquarters Entrance



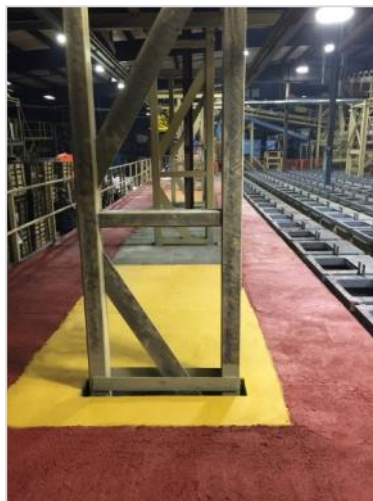
Variety of colors available



TUFFLOOR® vs Standard Concrete
Thermal Cycling to 1400°F (760°C)



Engineering Design for a High-Load Application





ALUMINUM CONTACT PRODUCT FAMILIES

DRI-CAST	Dry powder product line, designed for patching fractured / worn refractory. No water required.
RAM MAX	Pneumatic rammed plastic
REDIGUN	Gunnable plastic for heat and air set
MATRIFLO	Specialty line of metal contact castables
MATRICAST	Allied's original product line for aluminum, consisting of low cement and high cement castables
MATRIGUN / BETAGUN	Gun mixes ranging from super duty to high alumina with non-wetting properties
MATRIKOTE	Zircon and high alumina coatings
MATRIPHOS	Phosphate bonded plastics containing aluminum non-wetting additive
MATRISIL	Fused silica based castables
QUICK-FIRE®	Two-component, phosphate bonded castables and gunning mixes. Product ranges from 55% - 90% alumina.
QUICK-FIRE® ONE	Single-component, phosphate bonded castables and gunning mixes
QUICK CAST®	Aluminum contact and super structure castables using low cement design
WAM® AL	Light weight, dense, high cement castables and gunning mixes for aluminum contact
NANO-TEK® AL	No cement castable, may be shotcreted, pumped or gunned
MATRIPUMP FF	Low cement castable with reduced heat up time



DRI-CAST 581A



QUICK-FIRE®



QUICK-FIRE®





TECHNICAL DATA

Name	Al ₂ O ₃ %	SiO ₂ %	Density	Max. Temp
ARMORMAX [®] 70 SR	70.1	25.5	2.66 g/cm ³ (166 lb/ft ³)	1430°C (2600°F)
BETAMAX [®] HS LT	50.6	29.0	1.37 g/cm ³ (85 lb/ft ³)	1290°C (2350°F)
BETAMAX [®] 24 LT	42.4	39.7	1.23 g/cm ³ (77 lb/ft ³)	1345°C (2450°F)
BETMAX [®] 26 LT	52.9	36.4	1.27 g/cm ³ (79 lb/ft ³)	1425°C (2600°F)
COIL-CAST 97A	96.6	0.1	3.03 g/cm ³ (189 lb/ft ³)	1650°C (3000°F)
INSULMIX [®] 33100	94.5	0.4	1.60 g/cm ³ (100 lb/ft ³)	1815°C (3300°F)
DRI-CAST 581A	70	15	2.64 g/cm ³ (165 lb/ft ³)	1650°C (3000°F)
DRI-LITE [®] 65A-L	37.6	56.0	0.96 g/cm ³ (60 lb/ft ³)	1400°C (2550°F)
DRI-LITE [®] 79AL-M	42.9	49.1	1.31 g/cm ³ (82 lb/ft ³)	1370°C (2500°F)
DRI-VIBE [®] 520A	90.7	4.5	3.04 g/cm ³ (190 lb/ft ³)	1204°C (2200°F)
DRI-VIBE [®] 522A-FR	80.7	8.3	2.88 g/cm ³ (180 lb/ft ³)	1425°C (2600°F)
DRI-VIBE [®] 558A-FR	90.7	4.5	3.04 g/cm ³ (190 lb/ft ³)	1095°C (2000°F)
GROUT 163 ACF	91.0	3.1	2.51 g/cm ³ (160 lb/ft ³)	1760°C (3200°F)
GROUT 563A	86.1	4.8	2.72 g/cm ³ (170 lb/ft ³)	1760°C (3200°F)
GROUT 663A	87.6	4.4	2.72 g/cm ³ (170 lb/ft ³)	1760°C (3200°F)
KAST TECH 60	55.9	36.6	2.34 g/cm ³ (146 lb/ft ³)	1649°C (3000°F)
LCF 798A	61.5	35.0	2.64 g/cm ³ (165 lb/ft ³)	1705°C (3100°F)
MATRICAST 70 AC	69.1	25.1	2.58 g/cm ³ (161 lb/ft ³)	1540°C (2800°F)
MATRICAST 2600 AC	45.2	42.4	1.99 g/cm ³ (127 lb/ft ³)	1425°C (2600°F)
MATRICAST 3110C	60.0	32.2	2.39 g/cm ³ (149 lb/ft ³)	1705°C (3100°F)
MATRICAST SiC	63.2	20.0	2.59 g/cm ³ (162 lb/ft ³)	1760°C (3200°F)
MATRIFLO 85 ACX	85.6	8.5	2.74 g/cm ³ (171 lb/ft ³)	1540°C (2800°F)
MATRIFLO 93 AC	92.8	0.4	3.17 g/cm ³ (198 lb/ft ³)	1650°C (3000°F)
MATRIGUN 25 ACX	43.9	40.8	1.95 g/cm ³ (122 lb/ft ³)	1300°C (2370°F)
MATRIKOTE 90 AC	90.4	1.5	2.88 g/cm ³ (180 lb/ft ³)	1650°C (3000°F)
MATRIPHOS 85 AC	80.7	12.2	2.80 g/cm ³ (175 lb/ft ³)	1650°C (3000°F)
MATRIPUMP AR 61	60.8	34.2	2.47 g/cm ³ (154 lb/ft ³)	1650°C (3000°F)
MATRIPUMP 50	54.3	39.6	2.47 g/cm ³ (154 lb/ft ³)	1650°C (3000°F)
MATRIPUMP 63 ACX	65.6	28.5	2.59 g/cm ³ (162 lb/ft ³)	1540°C (2800°F)
MATRIPUMP 70 ACX	73.3	20.5	2.74 g/cm ³ (171 lb/ft ³)	1482°C (2700°F)
MATRIPUMP 72 ACX	78.6	15.6	2.68 g/cm ³ (167 lb/ft ³)	1540°C (2800°F)
MATRIPUMP 45 AL	47.0	46.9	2.35 g/cm ³ (147 lb/ft ³)	1370°C (2500°F)
MATRISIL CV	22.7	73.4	2.05 g/cm ³ (128 lb/ft ³)	1200°C (2200°F)
MATRISIL LC	20.3	76.3	2.05 g/cm ³ (128 lb/ft ³)	1370°C (2500°F)



TECHNICAL DATA

Name	Al ₂ O ₃ %	SiO ₂ %	Density	Max. Temp
MATRISIL SR	22.1	75.0	2.06 g/cm ³ (128 lb/ft ³)	1370°C (2500°F)
MINRO-FIRE CAST F80	53.2	39.3	2.24 g/cm ³ (140 lb/ft ³)	1650°C (3000°F)
MINRO-Z WASH Z77*	1.2	35.4	-	1650°C (3000°F)
NANO-TEK [®] 45 AL	44.6	50.4	2.08 g/cm ³ (130 lb./ft ³)	1425°C (2600°F)
NANO-TEK [®] 45 AL G	44.0	50.4	1.94 g/cm ³ (121 lb./ft ³)	1540°C (2800°F)
NANO-TEK [®] 60 AL	62.3	31.6	2.40 g/cm ³ (150 lb./ft ³)	1500°C (2730°F)
NANO-TEK [®] 65	60.7	35.1	Vibration: 2.52 g/cm ³ (157 lb/ft ³) Shotcrete: 2.40 g/cm ³ (150 lb/ft ³)	1705°C (3100°F)
NANO-TEK [®] 70	68.1	28.6	Vibration: 2.58 g/cm ³ (161 lb/ft ³) Shotcrete: 2.47 g/cm ³ (154 lb/ft ³)	1705°C (3100°F)
NANO-TEK [®] 75 18SiC AL	73.9	3.7	2.93 g/cm ³ (183 lb./ft ³)	1705°C (3100°F)
NANO-TEK [®] 80 AL	82.4	11.1	2.72 g/cm ³ (170 lb./ft ³)	1500°C (2730°F)
NANO-TEK [®] 84 AL G	84.5	11.4	2.52 g/cm ³ (157 lb./ft ³)	1760°C (3200°F)
PHOS FREE PLASTIC FINE	88.2	10.2	2.90 g/cm ³ (181 lb/ft ³)	1730°C (3150°F)
QUICK CAST [®] 61 ACX	65.3	29.0	2.59 g/cm ³ (162 lb/ft ³)	1540°C (2800°F)
QUICK CAST [®] 62	66.1	27.2	2.64 g/cm ³ (165 lb/ft ³)	1705°C (3100°F)
QUICK CAST [®] 81 ACX	76.7	18.7	2.74 g/cm ³ (171 lb/ft ³)	1540°C (2800°F)
QUICK-FIRE [®] PATCH B	78.5	10.0	2.53 g/cm ³ (158 lb/ft ³)	1650°C (3000°F)
QUICK-FIRE [®] PATCH M	62.7	26.2	2.33 g/cm ³ (145 lb/ft ³)	1650°C (3000°F)
QUICK-FIRE [®] 88	88.2	3.9	2.84 g/cm ³ (177 lb/ft ³)	1650°C (3000°F)
QUICK-FIRE [®] 90	89.2	2.1	2.90 g/cm ³ (181 lb/ft ³)	1700°C (3100°F)
QUICK-FIRE [®] ONE 83 ABR	82.9	3.9	2.58 g/cm ³ (161 lb/ft ³)	1650°C (3000°F)
QUICK-FIRE [®] ONE 84 G	87.2	4.5	2.42 g/cm ³ (151 lb/ft ³)	1600°C (2910°F)
QUICK-FIRE [®] ONE 86	86.4	4.2	2.55 g/cm ³ (159 lb/ft ³)	1650°C (3000°F)
QUICK-FIRE [®] ONE PATCH B	79.9	10.3	2.46 g/cm ³ (153 lb/ft ³)	1650°C (3000°F)
TUFF-FLO 608	32.7	24.6	2.60 g/cm ³ (162 lb/ft ³)	1650°C (3000°F)
RAM MAX [®] 70 P FINE	69.1	22.8	2.44 g/cm ³ (152 lb/ft ³)	1760°C (3200°F)
RAM MAX [®] 85 P FINE	81.9	11.1	2.82 g/cm ³ (177 lb/ft ³)	1760°C (3200°F)
TUFFLOOR [®]	35.1	42.5	2.11 g/cm ³ (132 lb/ft ³)	1040°C (1900°F)
WASH 148A	91.7	5.8	-	1700°C (3100°F)
WAM [®] AL II	61.4	0.7	1.73 g/cm ³ (108 lb/ft ³)	1430°C (2600°F)
WAM [®] AL II HD	77.7	0.4	2.71 g/cm ³ (169 lb/ft ³)	1650°C (3000°F)
WAM [®] AL III	75.5	0.4	1.76 g/cm ³ (110 lb/ft ³)	1200°C (2200°F)
WAM [®] AL III HD	78.1	0.4	2.66 g/cm ³ (166 lb/ft ³)	1650°C (3000°F)
WAM [®] AL HDF	64.3	0.4	2.46 g/cm ³ (154 lb/ft ³)	1650°C (3000°F)



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