



# REFRACTORIES

— FOR —

# CEMENT



Global **Refractory** Solutions



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







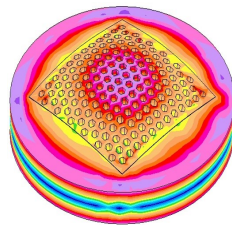
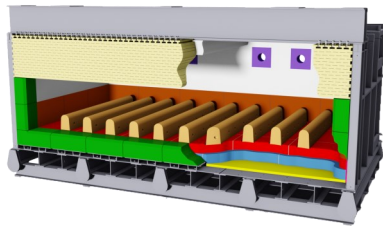
# RESEARCH & ENGINEERING

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:

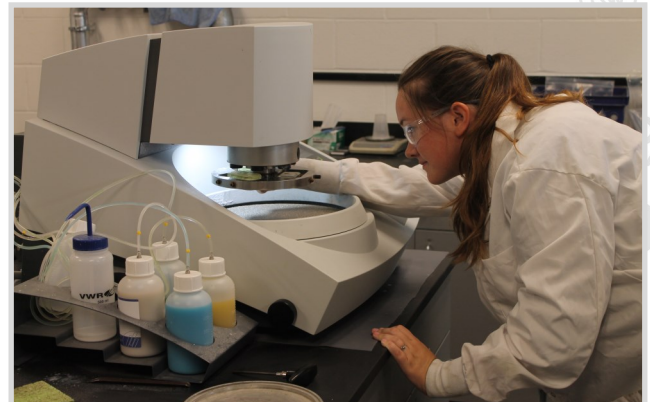
- Patented technologies
- Optimized product zoning
- Thermal models to optimize and validate designs
- Proven safety lining system designs
- Unique installation properties and techniques
- Leading edge refractory system designs

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





# PRODUCTS

refractory



## Product Lines for Cement Applications

<b>NANO-TEK<sup>®</sup></b>	No cement, colloidal bonded; vibration cast, pump cast, shotcrete, gun
<b>TUFFCRETE<sup>®</sup></b>	Low cement; vibration cast, pump cast, shotcrete
<b>TUFF-FLO</b>	Low cement; vibration cast, pump cast
<b>ARMORGUN<sup>®</sup></b>	Low cement gunite
<b>DURACON<sup>®</sup></b>	Low cement; vibration cast
<b>ULTRACON</b>	Ultra low cement; vibration cast
<b>DURABOND G</b>	Phos-bond, single component gunite
<b>QUICK-FIRE<sup>®</sup></b>	Phos bond, two component castable / gunite
<b>FAST-TURN<sup>®</sup></b>	Accelerated dry out technology applied to several mixes
<b>INSULMIX<sup>®</sup></b>	Lightweight gunite, castable
<b>PUMPLITE</b>	Lightweight castable; pump cast, shotcrete
<b>ARMORMAX<sup>®</sup></b>	High metal fiber content; cast, pump, shotcrete
<b>INSUL-FIRE</b>	No cement insulating mixes for rapid initial heat up



### Efficient installation for industrial applications

Allied has developed a comprehensive and innovative line of monolithic refractories for the cement industry. These products are subjected to the strictest quality standards in the industry. All gunning and shotcreting materials undergo in-lab trials during development.

TUFFCRETE<sup>®</sup> and NANO-TEK<sup>®</sup> no-cement mixes are pumped and shotcreted in our lab through a 1 1/2 in (2.5 cm) nozzle to assure smooth installation in the field. This reduces downtime and provide improved performance in operation.

Our pumping mixes can reach a vertical height of 340 ft (103 m) with 460 ft (140 m) of pipe and hose. This allows successful installation throughout the tower.





# PRODUCTS

refractory

Kiln	
<b>Tail Ring</b>	TUFFCRETE® 60 M, TUFFCRETE® 60 MZ, TUFFCRETE® 60 X, DURACON® 32, DURACON® 70 C, GUNCAST® 60 Z
<b>Chain Section</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 60 M, DURACON® 32, DURACON® 70 C, GUNCAST® 60, TUFF-GUN 60 M
<b>Retainer Ring</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 76, TUFFCRETE® 86, DURACON® NR-SA, DURACON® 86
<b>Nose Ring</b>	DURACON® NR-SA, DURACON® 70 C, DURACON® 86, TUFFCRETE® 65 M, NANO-TEK® 805 ARZ, METAL-ROK® Precast Shapes
<b>Firing Hood / Smoke Box</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 65 M, TUFFCRETE® 60 MZ, TUFFCRETE® 60 M, NANO-TEK® 805 ARZ, TUFFCRETE® ARZ, GUNCAST 60
<b>Burner Pipe</b>	DURACON® NR-SA, TUFFCRETE® 70 ABR, TUFFCRETE® 604 Z, TUFF-FLO 32 Z, TUFFCRETE® AZS 5 HZR, TUFFCRETE® 608, NANO-TEK® 90 P

Grate Coolers	
<b>Drop Wall</b>	TUFFCRETE® 65 M, TUFFCRETE® 70 ABR, NANO-TEK® 805 ARZ, TUFFCRETE® 60 M, DURACON® 70 C, ARMORGUN 60, GUNCAST 60 Z
<b>Cooler Curbs</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 60 M, TUFFCRETE® 60 MZ, TUFFCRETE® 63 X, NANO-TEK® 61 HS, GUNCAST 60 Z, DURACON® 70 C
<b>Upper Walls</b>	TUFFCRETE® 60 M, TUFFCRETE® 60 MZ, TUFFCRETE® 60 X, GUNCAST 60, GUNCAST 60 Z, DURABOND 60 G, NANO-TEK® 61 HS
<b>Bull Nose</b>	NANO-TEK® 805 ARZ, TUFFCRETE® 70 ABR, TUFFCRETE® 65 M, DURACON® NR-SA, DURACON® 70 C, ARMORGUN 60, TUFF-GUN 70 ABR
<b>Cooler Roof</b>	TUFFCRETE® 60 M, NANO-TEK® 61 HS, TUFFCRETE® 70 ABR, TUFFCRETE® 60 X, DURACON® 32, DURACON® 70 C, GUNCAST 60
<b>Tertiary Off Take</b>	TUFFCRETE® 60 M, TUFFCRETE® 60 X, TUFFCRETE® 70 ABR, GUNCAST 60, GUNCAST 60 Z, NANO-TEK® 60 G
<b>Tertiary Duct</b>	TUFFCRETE® 60 M, TUFFCRETE® 60 X, TUFFCRETE® 70 ABR, TUFFCRETE® ARZ, GUNCAST 60
<b>TA Damper</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 65 M, METAL-ROK® Precast Shapes

Tower	
<b>Cyclone Walls &amp; Roof</b>	TUFFCRETE® 60 M, TUFFCRETE® 60 MZ, TUFFCRETE® 60 X, NANO-TEK® 61 HS, ARMORGUN 60 Z, GUNCAST® 60 Z, DURABOND 60 G
<b>Cone Sections / Feed Pipes</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 60 M, TUFFCRETE® 60 MZ, TUFFCRETE® 60 X, TUFFCRETE® ARZ, GUNCAST® 60 Z, ARMORMAX® 608 60 Z
<b>Calciner</b>	TUFFCRETE® 60 M ARZ, TUFFCRETE® 60 M, TUFFCRETE® AZS 4 X, GUNCAST® 60 Z, DURABOND 60 Z, NANO-TEK® AZS, NANO-TEK® 805 ARZ
<b>Riser</b>	TUFFCRETE® 60 MZ, TUFFCRETE® AZS 5 HZR, TUFFCRETE® 60 M ARZ, TUFFCRETE® 28 SiC Z, ARMORGUN 60 SiC, ARMORGUN® AZS 5 R
<b>Feed Shelf</b>	TUFFCRETE® 60 M ARZ, TUFFCRETE® AZS 5 HZR, TUFFCRETE® 60 MZ, TUFFCRETE® 28 SiC Z,, ARMORGUN® AZS 5 R, NANO-TEK® AZS
<b>Sugar Scoop</b>	TUFFCRETE® 60 M ARZ, TUFFCRETE® AZS 4X, TUFFCRETE® 60 MZ, TUFFCRETE® 28 SiC Z, NANO-TEK® AZS, NANO-TEK® 805 ARZ
<b>Eye Brow</b>	TUFFCRETE® AZS 5 R, TUFFCRETE® 28 SiC Z, TEK-PAK 80 SiC PLASTIC, NANO-TEK® 805 ARZ
<b>Backup Lining</b>	INSULMIX 24 G®, INSULMIX® 2350, INSULMIX® 2025, PUMPLITE 60, PUMPLITE 80, INSULMIX 2450, INSULMIX 2680

Planetary Coolers	
<b>Drop Out Area</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 65 M, TUFFCRETE® 28 SiC Z, NANO-TEK® 805 ARZ, GUNCAST 60 Z, DURABOND 60 G
<b>Cooler Elbows</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 28 SiC Z, TUFFCRETE® 70 X, TUFFCRETE® 65 M, GUNCAST 60 Z
<b>Cooler Tubes</b>	TUFFCRETE® 70 ABR, TUFFCRETE® 60 M ARZ, GUNCAST 60, DURABOND 60 G, NANO-TEK 60 G





The **TUFFCRETE**<sup>®</sup> line of refractory products is a series of low cement castables specially designed for shotcreting, pumping and vibration-cast installation or self-leveling behind forms. **TUFFCRETE**<sup>®</sup> provides easy installation and exhibits low cement level, low porosity, high strength and abrasion resistance.

### The **TUFFCRETE**<sup>®</sup> Advantage

- **Versatile:** TUFFCRETE<sup>®</sup> Can be installed via shotcreting, vibration casting, self-flow or pump casting. Products are optimized to pump great distances at low water levels through 2" pipe and 1 1/2" nozzles with a minimum of 3-4 hours of working time.
- **User-friendly:** Designed to install with minimal rebound, no dust at the nozzle and ample time for pumping, shaping and trimming
- **Diverse:** Over **30** products are available
- **Superior Physical Properties:** Installed TUFFCRETE<sup>®</sup> demonstrates outstanding CMOR, MOR and HMOR strengths as well as low porosity and abrasion loss.
- **Resistance to chemical attack:** Several TUFFCRETE<sup>®</sup> mixes are optimized to resist chemical attack and are routinely subjected to alkali cup testing.
- **Quality-assured:** Manufactured with industry-leading quality control standards that guarantee consistency



### OPTIMIZING TUFFCRETE<sup>®</sup> INSTALLATION

TUFFCRETE<sup>®</sup> products react well with sodium nitrite, a gelling agent that allows the material to be effectively shotcreted overhead with proper anchoring. The addition of sodium nitrate will not decrease set time, allowing abundant time for shaping and smoothing with the added benefit of ideal bond system hydration. Extended working time decreases the possibility of laminations in the lining—a common feature in competitor materials. While TUFFCRETE<sup>®</sup> mixes will also work with more aggressive activator agents such as hydrated lime, sodium silicate and sodium aluminate, sodium nitrite is the favored agent. Allied's preferred installation method is use of pressure tanks with high air pressure and volume to assure a reliable and consistent delivery of the gelling agent. The sodium nitrite is blended in the air stream and projected into the material at the nozzle via a precision control needle valve.



in our  
element

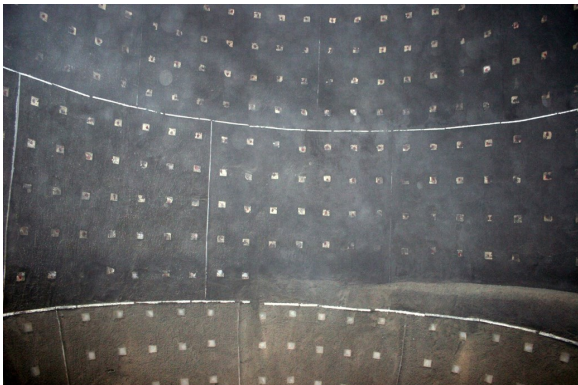
TUFFCRETE®



TUFFCRETE® 70 ABR SHOTCRETED TAIL RING



TUFFCRETE® 60 X PUMP CAST COOLER



TUFFCRETE® 60 MZ SHOTCRETED CYCLONE



TUFFCRETE® 60 Z SHOTCRETE COOLER WALL



TUFFCRETE® 65 M SHOTCRETED CHAIN SECTION



TUFFCRETE® SHOTCRETE SURFACE TROWELLED SMOOTH



TUFFCRETE® 60 X SHOTCRETED CYCLONE ROOF



TUFFCRETE® FUSED SILICA SHOTCRETED DUCT





# MAINTANANCE PRODUCTS

DURABOND®	Dry phos-bonded gun mixes for flashing over old refractory allowing rapid heat up
NANO-TEK®	Colloidal bonded refractory suitable for patching and flashing with rapid heat up
CW PLASTIC	Phosphate bonded plastics for patching
QUICK-FIRE®	Two component phosphate bonded castables & gun mixes. Product ranges from 55% - 90% alumina

## QUICK-FIRE®

### Product line features

- Rapid dry-out characteristics
- Designed to bond to existing refractory
- Fast setting properties
- Excellent resistance to chemical attack
- Superior thermal shock resistance
- Available in gunning formulations
- Global availability

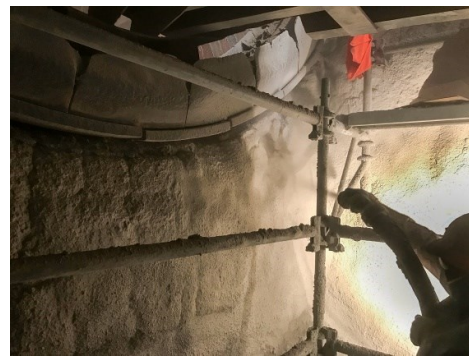


QUICK-FIRE® bonding to existing refractory

## NANO-TEK®

### Product line features

- Rapid dry-out characteristics
- Designed to bond to existing refractory
- Fast setting properties
- Excellent resistance to chemical attack
- Superior thermal shock resistance
- Available in casting, gunning and shotcrete formulations
- Global availability



Cooler flashed with NANO-TEK® 60 ZG



Cooler flashed with QUICK-FIRE® 60 G



Firing hood flashed with QUICK-FIRE® 60 G



Cooler flashed with NANO-TEK® 60ZG. Majority still in place after 9 months of service.





# PRECAST SHAPES

Allied boasts four precast shapes facilities in China, Europe and the USA, the largest being at our corporate manufacturing location. The 100,000+ sq. ft facility in Columbus, OH has 8 dry-out furnaces, seven that are capable of firing to 1200°F and one high fire furnace. A large, temperature and humidity controlled room houses shapes made with materials sensitive to casting conditions.

Our application engineering capabilities enable us to design and manufacture complex shapes of almost any shape and size. Shapes can be designed and produced from existing drawings or from an existing shape and have several benefits:

- Faster installation
- Minimized heat-up times
- Easier slag or dross removal due to lower porosity
- Consistent and controlled manufacturing process

## Precast shapes for the Cement Industry

- Cooler Curbs
- Cooler Walls
- Nose Rings
- Feed Slopes
- Bull Nose
- Cyclone Roofs
- Hot Wall
- Firing Hood

## METAL-ROK®



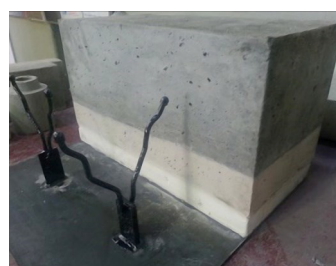
METAL ROK® precast shapes for ultimate durability and performance in T.A.D. dampers and nose ring blocks.



CRITICAL SOLUTION: Previous T.A.D. Damper, products manufactured with a competitor's a very high metal fiber content material was providing 3-5 months of service. Allied's proprietary METAL-ROK® technology has extended damper life past 18 months.



## Precast Firing Hood Shapes



# TECHNICAL DATA

— FOR —

# CEMENT PRODUCTS



Global **Refractory** Solutions





# TECHNICAL DATA

## TUFFCRETE® (Vibration Cast, Pump Cast, Shotcrete)

PRODUCT	CHEMISTRY				C.C.S. 1500°F / 815°C	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS 1500°F / 815°C
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>			
TUFFCRETE® 2800	44.4	48	-	-	12,000	142	6
TUFFCRETE® SD	44.9	49.1	-	-	8700*	141	9-12
TUFFCRETE® 47	47.1	46.5	-	-	10,290	138	7-10*
TUFFCRETE® ARZ	43.9	44.3	4.9	1.1	13,200*	145	5-8*
TUFFCRETE® 60 X	60.3	33.8	-	-	11,800	155	6-9
TUFFCRETE® 60 A SR	59.6	36.2	-	-	15,200	161	-
TUFFCRETE® 60 M	60.5	34.2	-	-	15,500	157	6-10
TUFFCRETE® 60 MZ	58.1	32.8	-	3.9	11,000*	160	-
TUFFCRETE® 60 M ARZ	54.5	33.9	5	1.1	16,400*	161	3-5*
TUFFCRETE® 61 ULC	61	35.9	-	-	10,200	163	4-8
TUFFCRETE® 63 X	62.4	31.4	-	-	15,000*	158	5-9*
TUFFCRETE® 65 M	64.8	30.5	-	-	20,085	163	3-6
TUFFCRETE® 604 Z	59.5	32.3	-	-	12,000*	157	-
TUFFCRETE® 608	59.3	28.3	7.9	-	30,000	162	4-5
TUFFCRETE® 66 M	64.5	30.2	-	-	11,400*	161	-
TUFFCRETE® 70	69	25	-	-	13,200*	163	7-10
TUFFCRETE® 70 ABR	69.9	24.8	-	-	21,000	168	3-6
TUFFCRETE® 70 M	71.3	23.6	-	-	23,000	166	4-6
TUFFCRETE® 70 X	68	25.8	-	-	14,300*	161	7-9
TUFFCRETE® 733	65	24.5	2.7	1.8	12,100*	161	5-7
TUFFCRETE® 74	74.3	20.2	-	-	9,050*	168	-
TUFFCRETE® 76	77.4	17.4	-	-	12,000	171	3-6
TUFFCRETE® 80	79.6	14	-	-	11,600*	172	-
TUFFCRETE® 86	85.4	10.1	-	-	18,000	176	4-6
TUFFCRETE® 90	90.4	8.2	-	-	9,000*	186	-
TUFFCRETE® 28 SiC Z	44.4	21.5	28.3	1.1	18,300	164	3-5
TUFFCRETE® 60 SiC	21.3	12.1	63.6	-	16,500	162	3
TUFFCRETE® AZS 4 X	51.3	21.3	3.9	19.5	22,000	180	5-10*
TUFFCRETE® AZS R	53.2	18.8	-	23.5	13,300*	175	3-8*
TUFFCRETE® AZS 5 R	49.8	18.2	5.1	22.6	14,800	178	3-6
TUFFCRETE® AZS 5 HZR	42	21.2	5.3	27.7	19,500	187	2-6
TUFFCRETE® FS	15.6	81.8	-	-	10,000	125	9

\* = Shotcrete data



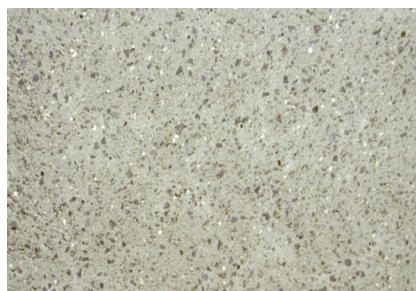
# TECHNICAL DATA

## DURACON® (Vibration Cast)

PRODUCT	CHEMISTRY				C.C.S. 1500°F / 815°C	MATERIAL REQUIRED	ABRASION LOSS 1500°F / 815°C
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>			
DURACON® 28	46.2	48.1	-	-	7,800	139	-
DURACON® 28-10	43.6	41	9.7	-	8,600	141	6-10
DURACON® 30	47.2	46.3	-	-	9,985	146	-
DURACON® 32	63.1	31.6	-	-	15,410	158	5-6
DURACON® 68 SA	67.9	26.8	-	-	11,000	164	5-9
DURACON® 70 C	69.2	25.6	-	-	16,500	169	4-8
DURACON® NR-CB	77.9	16.2	-	-	8,400	169	-
DURACON® NR-SA	77	18.1	-	-	12,650	173	5-6
DURACON® 86	87	8.7	-	-	15,900	183	2-5
DURACON® AZS 5 R	49.8	19.8	4.1	22.3	14,700	186	3-6
LCF 798 P	61.5	35	-	-	8,700	168	-

## TUFF-FLO (Vibration Cast, Pump Cast)

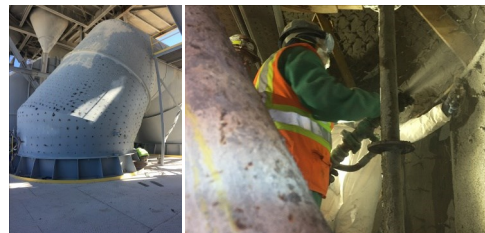
PRODUCT	CHEMISTRY				C.C.S. 1500°F / 815°C	MATERIAL REQUIRED	ABRASION LOSS 1500°F / 815°C
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>			
TUFF-FLO 47	47.1	46.5	-	-	10,600	139	7-10
TUFF-FLO 50	50.2	44.4	-	-	8,000	145	7-10
TUFF-FLO 60 A	59.6	36.2	-	-	15,200	161	-
TUFF-FLO 65 M	64.3	31.2	-	-	15,700	161	3-6
TUFF-FLO 32 SA	76.2	19	-	-	18,200	169	2-6
TUFF-FLO 32 Z	71.9	20.2	-	3.5	16,300	172	3-7
TUFF-FLO 33	77.5	18.3	-	-	18,725	173	2-5
TUFF-FLO 98	98.6	0.1	-	-	15,500	189	-
TUFF-FLO 34 SP	90.8	0.3	-	-	9,500	190	-



Cut cross section from a shotcreted pad of TUFFCRETE® 60 X



TUFFCRETE® 65 M shotcreted in rotary kiln



Loop duct shotcreted with TUFFCRETE® 60 X at top of tower. Approximately 450 feet of pipe and hose utilized to reach from ground level.





# TECHNICAL DATA

## GUNNING MIXES

PRODUCT	CHEMISTRY				C.C.S.	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>	1500°F / 815°C		1500°F / 815°C
ARMORGUN <sup>®</sup> 50	48.8	44.9	-	-	9,100	136	6-10
ARMORGUN <sup>®</sup> 60	59.8	34.2	-	-	9,400	138	5-7
ARMORGUN <sup>®</sup> 60 X	62.8	31	-	-	10,800	144	5-7
ARMORGUN <sup>®</sup> 60 Z	57.2	32.9	-	3.9	11,600	146	4-8
ARMORGUN <sup>®</sup> 70	69.7	23.4	-	-	12,500	149	5-7
ARMORGUN <sup>®</sup> 70 X	69.4	25.7	-	-	15,000	147	-
ARMORGUN <sup>®</sup> 60 SiC	22.4	13	61.3	-	14,200	143	-
ARMORGUN <sup>®</sup> AZS 5 R	49.6	19.7	5.1	20.8	9,100	165	6-9
GUNCAST <sup>®</sup> 12	33.5	45.1	-	-	4,825	122	-
GUNCAST <sup>®</sup> 25	43.9	40.8	-	-	5,775	122	12
GUNCAST <sup>®</sup> 26 LI	45.9	41.1	-	-	8,050	129	11
GUNCAST <sup>®</sup> 28 LI	48	41.4	-	-	7,350	124	8
GUNCAST <sup>®</sup> 30 LI	57.6	35.1	-	-	3,800	133	-
GUNCAST <sup>®</sup> 60	58.8	32.3	-	-	10,400	141	5-7
GUNCAST <sup>®</sup> 60 Z	55.1	33.7	-	3	14,000	141	5-7
GUNCAST <sup>®</sup> 70 HS	67.7	26.2	-	-	11,200	145	5-7
GUNCAST <sup>®</sup> 94	93.6	5.6	-	-	10,400	158	7-8
GUNCAST <sup>®</sup> FS	26.5	64.2	-	-	5,250	118	-
GUNCAST <sup>®</sup> DENSE ABRADE LT	74.8	9	-	-	5,500	168	4-8
TUFF-GUN <sup>®</sup> 47	47.9	46.6	-	-	15,000	136	4-5
TUFF-GUN <sup>®</sup> ARZ	44.5	43.8	4.8	1.1	20,600	132	3-4
TUFF-GUN <sup>®</sup> 60 M ARZ	57.3	31.9	4.9	1	18,300	147	3
TUFF-GUN <sup>®</sup> AZS 5 R	50.1	18.3	5.1	22.5	17,500	173	2-3
TUFF-GUN <sup>®</sup> 60 SiC	20.7	12	63.7	-	17,300	150	3-4

## PHOS-BONDED PLASTIC

PRODUCT	CHEMISTRY				C.C.S.	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>	1500°F / 815°C		1500°F / 815°C
CENTURION PLASTIC	71.3	20.6	-	-	4,700	171	-
CW 85 HS PLASTIC	83.3	9	-	-	4,500	183	-
CW 95 HS PLASTIC	93.9	2.8	-	-	5,000	193	-



# TECHNICAL DATA

## NO CEMENT (Cast, Pump Cast, Shotcrete)

PRODUCT	CHEMISTRY				C.C.S. 1500°F / 815°C	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS 1500°F / 815°C
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>			
NANO-TEK <sup>®</sup> 55 A SR	56	36.3	4.9	1.3	9,050	158	-
NANO-TEK <sup>®</sup> 60 AR	62	32.8	-	-	12,000	154	5
NANO-TEK <sup>®</sup> 61 HS	61.4	35.2	-	-	14,200	153	-
NANO-TEK <sup>®</sup> 60 M ARZ	58.1	31.9	5	1.1	14,000	155	4
NANO-TEK <sup>®</sup> 60 Z HS	58.4	35.5	-	2.8	14,410	157	4
NANO-TEK <sup>®</sup> 805 ARZ	48.4	34.7	8.1	5.7	12,225	156	9
NANO-TEK <sup>®</sup> 70	67.4	29	-	-	10,360	160	-
NANO-TEK <sup>®</sup> 70 HS	67.4	29	-	-	15,590	160	-
NANO-TEK <sup>®</sup> 90	89.6	9.3	-	-	4,215	181	-
NANO-TEK <sup>®</sup> AZS	54.4	22	2.6	18.2	13,000	179	4.5
NANO-TEK <sup>®</sup> 33Z	36.4	22.3	5.8	33.5	18,000	190	3
NANO-TEK <sup>®</sup> 28 SiC Z	43.9	23.5	27.5	1.8	18,000	155	4
QUICK-FIRE <sup>®</sup> 55 (Phos-bonded)	55.4	36.7	-	-	2,230	145	-
QUICK-FIRE <sup>®</sup> 88 (Phos-bonded)	88.2	3.9	-	-	2,750	177	10

Note: QUICK-FIRE (CAST ONLY)

## NO CEMENT (Gunning Mixes)

PRODUCT	CHEMISTRY				C.C.S. 1500°F / 815°C	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS 1500°F / 815°C
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>			
NANO-TEK <sup>®</sup> 50 G	49.8	47.3	-	-	3,640	135	-
NANO-TEK <sup>®</sup> 60 G	62.1	34.4	-	-	5,200	144	-
NANO-TEK <sup>®</sup> 60 XG	59.1	36.5	-	-	4,675	137	-
NANO-TEK <sup>®</sup> 60 ZG	57.1	36	-	3.9	4,730	144	-
NANO-TEK <sup>®</sup> 90 G	91.2	8.4	-	-	3,330	175	-
DURABOND <sup>®</sup> 60	61.3	28.4	-	-	6,400	136	-
DURABOND <sup>®</sup> 60 ZG	58.9	29.7	-	3.1	6,200	1337	-
QUICK-FIRE <sup>®</sup> 60 G	64.2	27.1	-	-	3,000	138	-

DURABOND<sup>®</sup> Products are a single component dry phosphate bonded gunning castable that are mixed with water at the gunning nozzle. These products allow for rapid initial heat-up, bond well to existing refractory surfaces, very good resistance to chemical attack and have excellent ability to withstand thermal cycling.

QUICK-FIRE<sup>®</sup> Products are two component phosphate bonded castables and gun mixes and require the addition of QUICK-BOND<sup>®</sup> liquid in place of water. These products allow for rapid initial heat-up, bond well to existing refractory surfaces, very good resistance to chemical attack and have excellent ability to withstand thermal cycling.

NANO-TEK<sup>®</sup> Products are colloidal bonded castables and gun mixes that require the addition of colloidal liquid in place of water. These products allow for rapid initial heat-up, bond well to existing refractory surfaces, very good resistance to chemical attack and have excellent ability to withstand thermal cycling.





# TECHNICAL DATA

## INSULATING GUN MIXES

PRODUCT	CHEMISTRY		C.C.S.	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	K-FACTOR**		TEMPERATURE LIMIT	
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	1500°F / 815°C		WmK	BTU·in / ft <sup>2</sup> ·hr·°F	°C	°F
INSULMIX® 2035 LI	37.9	42.3	150-250	36	-	-	1100	2000
INSULMIX® 2250	30.2	50.4	200-600	50-54	0.25	1.7	1205	2200
INSULMIX® 2450	40.5	40.9	300-700	55-60	0.23	1.6	1315	2400
INSULMIX® 2680	48.3	39.3	500-1500	75-78	0.35	2.4	1430	2600
INSULMIX® 2460 LI	43.8	36.0	600-800	62	0.3	2.2	1315	2400
INSULMIX® 2350	38.2	39.9	200-400	65	0.23	1.6	1260	2300
INSULMIX® 24 G	42.0	43.5	1000-1500	93	0.44	3.1	1315	2400

## INSULATING (CAST, PUMP, SHOTCRETE)

PRODUCT	CHEMISTRY		C.C.S.	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	K-FACTOR**		TEMPERATURE LIMIT	
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	1500°F / 815°C		WmK	BTU·in / ft <sup>2</sup> ·hr·°F	°C	°F
PUMPLITE 40	37.2	40.0	100-250	41	0.22	1.5	1093	2000
PUMPLITE 60	40.7	43.3	350-550	57	0.32	2.2	1315	2400
PUMPLITE 60 LI	39.7	47.6	600-800	64	0.33	2.3	1370	2500
PUMPLITE 80	41.6	43.7	800-1100	78	0.49	3.4	1425	2600
PUMPLITE 80 LI	42.2	46.7	900-1400	80	0.49	3.4	1425	2600
PUMPLITE 90 LI	40.9	50.4	1200-1600	100	0.61	4.2	1650	3000

## INSULATING NO CEMENT CASTABLE

PRODUCT	CHEMISTRY		C.C.S.	MATERIAL REQUIRED (lb/ft <sup>3</sup> )	K-FACTOR**		TEMPERATURE LIMIT	
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	1500°F / 815°C		WmK	BTU·in / ft <sup>2</sup> ·hr·°F	°C	°F
INSUL-FIRE 57	32.5	42.5	160	65	0.27	1.87	982	1800
INSUL-FIRE 65	28	52.5	550	65	0.24	1.65	1100	2000

## HIGH METAL FIBER-CONTAINING (CAST, PUMP, SHOTCRETE)

PRODUCT	CHEMISTRY				C.C.S.	MATERIAL RE-QUIRED (lb/ft <sup>3</sup> )	ABRASION LOSS
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	ZrO <sub>2</sub>	1500°F / 815°C		1500°F / 815°C
ARMORMAX® 608	59.9	27.1	8.2	-	15,100	164	3-4
ARMORMAX® 70 SR	70.1	25.5	-	-	17,000	166	6
ARMORMAX® NR-SA	82.4	11.9	-	-	26,000	187	-
ARMORMAX® 85	84.8	10.5	-	-	25,500	1982	-
ARMORMAX® 90 SR	89.2	7.8	-	-	16,500	187	-
ARMORMAX® AZS 5 HZR	40.9	28.7	-	26.8	16,360	197	-
ARMORMAX® 28 SiC	45.4	21.8	27.3	1	12,000	168	1-2
ARMORMAX® 80 SiC	11.6	7.1	76.9	-	14,500	172	-

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