

DuPont™ Zircore®/Kyasill™ FOUNDRY SAND

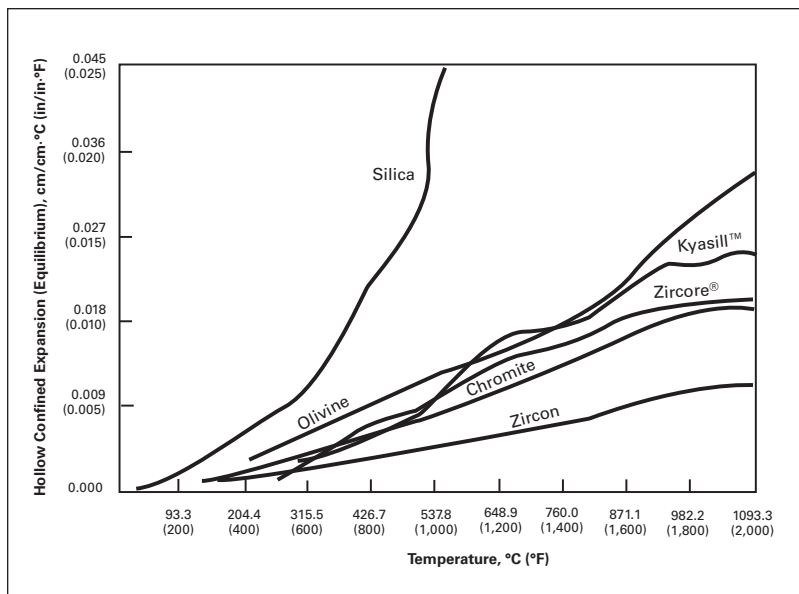
DUPONT FOUNDRY AND REFRACTORY MINERAL PRODUCTS

DuPont's foundry mineral products (Zircore® and Kyasill™) are naturally occurring rounded grain minerals mined from our heavy mineral deposits in Starke, Florida. The foundry products, composed primarily of zircon and aluminum silicates, are washed to give clean products free from dirt and ultrafines. They are separated from other heavy minerals by physical processes to produce uniform high-quality products.

Physical and Chemical Properties

DuPont offers two grades of Florida foundry mineral products that vary in the level of zircon (zirconium silicate) and aluminum silicates.

Figure 1. Thermal Expansion Coefficients of Mineral Sands



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Table 1
Mineral, Chemical, and Physical Properties

Typical Screen Analysis**					
U.S. Sieve No.*	Sieve Opening, μm	Zircore®		Kyasill™	
		% Retained on Sieve Mean	Std. Dev.	% Retained on Sieve Mean	Std. Dev.
50	300	<1	—	<1	—
70	212	8	3.4	12	4.7
100	150	39	9.6	45	8.1
140	106	45	7.4	38	8.0
200	75	7	5.3	4	4.5
PAN	<53	<1	—	<1	—
AFS Grain Fineness Number		87	7.0	82	6.7

Chemical Composition

	Zircore®		Kyasill™	
	Specifications %	Typical %**	Specifications %	Typical %**
ZrO ₂	27 min.	38	27 max.	22
Al ₂ O ₃	—	23	—	41
Free Silica	10 max.	3	15 max.	5

Mineral Composition

	Zircore®		Kyasill™	
	Specifications %	Typical %**	Specifications %	Typical %**
Zircon	40 min.	57	40 max.	32
Staurolite	7 max.	3	10 max.	6
Quartz	10 max.	3	15 max.	5
Other Aluminum Silicates		35		59

Physical Properties

Range	Zircore®	Kyasill™
Bulk Density (Uncompacted)	2403–2563 kg/m ³ (150–160 lb/ft ³)	2003–2163 kg/m ³ (125–135 lb/ft ³)
Specific Gravity	3.59–4.19	3.25–3.85
Hardness (Mohs)	6.5–7.0	6.5–7.0
Melting Point	1815–2038°C (3300–3700°F)	1538–1815°C (2800–3300°F)
Coefficient of Linear Expansion	10.8 × 10 ⁻⁶ cm/cm·°C (6 × 10 ⁻⁶ in/in·°F)	12.6 × 10 ⁻⁶ cm/cm·°C (7 × 10 ⁻⁶ in/in·°F)
pH	5.5–6.5	5.5–6.5

* U.S. Sieve Series according to ASTM E-11-70.

** These columns give typical values based on historical production performance. DuPont does not make any express or implied warranty that future production will conform to these typical values.

Table 2
Uses of Florida Foundry Mineral Products

	Features
Shell Mold and Cores	<ul style="list-style-type: none"> Low binder requirements Good casting quality Low cost Low thermal expansion aids dimensional accuracy Excellent recycle qualities Good refractory properties Thermal stability
Investment Casting Molds	<ul style="list-style-type: none"> Back-up stucco Excellent casting surface Low thermal expansion Good refractory properties Low-cost stucco alternatives
Green Sand Molding	<ul style="list-style-type: none"> Requires a minimum amount of clay and water Easy mulling and ramming Low thermal expansion Good refractory properties
No-Bake Binders	<ul style="list-style-type: none"> Good mold strengths Low binder requirements Good permeability for venting of gases and wash penetration Low cost
Silicate-CO ₂ Process and Oil Sand Cores	<ul style="list-style-type: none"> Low binder requirements Good permeability to aid rapid setting Low cost

Personal Safety

DuPont Florida foundry mineral products, as shipped, do not pose an inhalation health hazard because they contain practically no particles in the respirable dust size range. However, if in handling or use, the sands are broken down, inhalation of the dust from DuPont foundry products may be harmful to the respiratory system.

DuPont foundry mineral products may contain up to 15% crystalline silica (Kyasill™) and up to 65% zircon (Zircore®). Long-term inhalation overexposure to respirable crystalline silica may cause silicosis.

The U.S. Department of Labor (OSHA)* has ruled that an employee's exposure to particulates, not otherwise regulated, should not exceed 5 mg/m³ (respirable dust), 15 mg/m³ (total

dust), 8-hr time-weighted average (TWA). When these limits might be exceeded, employees should wear dust masks or respirators approved by NIOSH for such dusts.

OSHA* also has ruled that an employee's exposure to airborne zirconium compounds in any 8-hr work shift of a 40-hr week shall not exceed a time-weighted average of 5 mg/m³ of material as Zr (equivalent to 10 mg/m³ as zircon). Zircore® and Kyasill™ mineral products are not recommended for use in abrasive blasting applications.

Packaging

The two grades of Florida foundry mineral products are available in 22.7-kg (50-lb) multiwall paper bags, semi-bulk (2-ton) bags, or in bulk hopper railcars or trucks. Department of Transportation (DOT) Hazard Classification*: NOT REGULATED.

* Due to changing governmental regulations, such as those of the Department of Transportation, Department of Labor, U.S. Environmental Protection Agency, and the Food and Drug Administration, references herein to governmental requirements may be superseded. Each user should consult and follow the current governmental regulations, such as Hazard Classifications, Labeling, Food Use Clearances, Worker Exposure Limitations, and Waste Disposal Procedures for the products described in this literature.

DuPont Titanium Technologies

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