

ABRASIVES (MANUFACTURED)

(Fused aluminum oxide, silicon carbide, and metallic abrasives)
(Data in metric tons unless otherwise noted)

Domestic Production and Use: Fused aluminum oxide was produced by two companies at three plants in the United States and Canada. Production of crude fused aluminum oxide had an estimated value of \$3.0 million. Silicon carbide was produced by two companies at two plants in the United States. Production of crude silicon carbide had an estimated value of about \$30 million. Metallic abrasives were produced by 11 companies in eight States. Production of metallic abrasives had an estimated value of about \$100 million. Bonded and coated abrasive products accounted for most abrasive uses of fused aluminum oxide and silicon carbide. Metallic abrasives are used primarily for steel shot and grit and cut wire shot, which are used for sandblasting, peening, and stonecutting applications.

Salient Statistics—United States:

| | <u>2017</u> | <u>2018</u> | <u>2019</u> | <u>2020</u> | <u>2021^e</u> |
|---|-------------|-------------|-------------|-------------|-------------------------|
| Production: | | | | | |
| Fused aluminum oxide, crude ^{1,2} | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Silicon carbide ² | 35,000 | 35,000 | 35,000 | 35,000 | 35,000 |
| Metallic abrasives | 179,000 | 180,000 | 177,000 | 176,000 | 180,000 |
| Shipments, metallic abrasives | 197,000 | 196,000 | 195,000 | 194,000 | 200,000 |
| Imports for consumption: | | | | | |
| Fused aluminum oxide | 206,000 | 192,000 | 184,000 | 121,000 | 110,000 |
| Silicon carbide | 137,000 | 146,000 | 131,000 | 88,000 | 90,000 |
| Metallic abrasives | 29,600 | 29,900 | 27,900 | 25,800 | 29,000 |
| Exports: | | | | | |
| Fused aluminum oxide | 15,500 | 20,100 | 18,400 | 11,400 | 11,000 |
| Silicon carbide | 6,100 | 10,100 | 11,500 | 8,300 | 12,000 |
| Metallic abrasives | 31,000 | 33,600 | 31,200 | 18,100 | 20,000 |
| Consumption, apparent: | | | | | |
| Fused aluminum oxide ³ | 191,000 | 172,000 | 166,000 | 110,000 | 100,000 |
| Silicon carbide ⁴ | 166,000 | 171,000 | 155,000 | 115,000 | 110,000 |
| Metallic abrasives ⁵ | 196,000 | 192,000 | 192,000 | 202,000 | 200,000 |
| Price, average unit value of imports, dollars per ton: | | | | | |
| Fused aluminum oxide, regular | 489 | 681 | 716 | 666 | 630 |
| Fused aluminum oxide, high-purity | 1,220 | 1,290 | 1,250 | 1,180 | 1,300 |
| Silicon carbide, crude | 479 | 670 | 701 | 628 | 530 |
| Metallic abrasives | 1,020 | 1,180 | 1,310 | 1,130 | 1,300 |
| Net import reliance ⁶ as a percentage of apparent consumption: | | | | | |
| Fused aluminum oxide | >75 | >75 | >75 | >75 | >75 |
| Silicon carbide | >75 | >75 | >75 | >50 | >50 |
| Metallic abrasives | E | E | E | 4 | 5 |

Recycling: Up to 30% of fused aluminum oxide may be recycled, and about 5% of silicon carbide is recycled.

Import Sources (2017–20): Fused aluminum oxide, crude: China,⁷ 91%; France, 3%; Bahrain and Russia, 2% each; and other, 2%. Fused aluminum oxide, grain: Canada, 22%; Brazil, 19%; Austria, 15%; China,⁷ 12%; and other, 32%. Silicon carbide, crude: China,⁷ 88%; the Netherlands and South Africa, 4% each; and other 4%. Silicon carbide, grain: China,⁷ 47%; Brazil, 21%; Russia, 9%; Norway, 7%; and other, 16%. Metallic abrasives: Canada, 33%; China,⁷ 15%; Turkey, 12%; Germany, 10%; and other, 30%.

| <u>Tariff:</u> | <u>Item</u> | <u>Number</u> | <u>Normal Trade Relations</u> <u>12–31–21</u> |
|-----------------------|--|----------------------|--|
| | Artificial corundum, crude | 2818.10.1000 | Free. |
| | White, pink, ruby artificial corundum, greater than 97.5% aluminum oxide, grain | 2818.10.2010 | 1.3% ad valorem. |
| | Artificial corundum, not elsewhere specified or included, fused aluminum oxide, grain | 2818.10.2090 | 1.3% ad valorem. |
| | Silicon carbide, crude | 2849.20.1000 | Free. |
| | Silicon carbide, grain | 2849.20.2000 | 0.5% ad valorem. |
| | Iron, pig iron, or steel granules | 7205.10.0000 | Free. |

ABRASIVES (MANUFACTURED)

Depletion Allowance: None.

Government Stockpile: None.

Events, Trends, and Issues: In 2021, China was the world's leading producer of abrasive fused aluminum oxide and abrasive silicon carbide. Imports, especially from China where operating costs were lower, continued to challenge abrasives producers in the United States and Canada. In recent years, imports of abrasives from Hong Kong have also increased. Foreign competition is expected to persist and continue to limit production in North America. The average unit value of imports had increased every year since 2016 for regular fused aluminum oxide and crude silicon carbide but have decreased since 2020. The average unit values of imports of regular fused aluminum oxide and crude silicon carbide during the first 7 months of 2021 were 6% and 14% lower, respectively, than those in 2020 and 13% and 33% lower, respectively, than those in 2019.

Abrasives consumption in the United States is greatly influenced by activity in the manufacturing sectors, particularly the aerospace, automotive, furniture, housing, and steel industries. Automobile and steel production were greatly affected by the global COVID-19 pandemic as well as a global semiconductor chip shortage, which in turn reduced the demand for metallic abrasives.

Domestic production remains consistent, although foreign trade continues to be negatively affected by the COVID-19 pandemic. Imports and exports showed signs of recovery from 2020, but they remained significantly below pre-pandemic levels. Additionally, a global container shortage arose that greatly delayed shipments and caused container prices to nearly double compared with prices in 2020.

World Production Capacity:

| | Fused aluminum oxide ^e | | Silicon carbide ^e | |
|-----------------------|-----------------------------------|-----------|------------------------------|-----------|
| | 2020 | 2021 | 2020 | 2021 |
| United States | 60,000 | 60,000 | 40,000 | 40,000 |
| Australia | 50,000 | 50,000 | — | — |
| Austria | 60,000 | 60,000 | — | — |
| Brazil | 50,000 | 50,000 | 40,000 | 40,000 |
| China | 800,000 | 800,000 | 450,000 | 450,000 |
| France | 40,000 | 40,000 | 20,000 | 20,000 |
| Germany | 80,000 | 80,000 | 35,000 | 35,000 |
| India | 40,000 | 40,000 | 5,000 | 5,000 |
| Japan | 15,000 | 15,000 | 60,000 | 60,000 |
| Mexico | — | — | 45,000 | 45,000 |
| Norway | — | — | 80,000 | 80,000 |
| Venezuela | — | — | 30,000 | 30,000 |
| Other countries | 80,000 | 80,000 | 200,000 | 200,000 |
| World total (rounded) | 1,300,000 | 1,300,000 | 1,000,000 | 1,000,000 |

World Resources:⁸ Although domestic resources of raw materials for fused aluminum oxide production are limited, adequate resources are available in the Western Hemisphere. Domestic resources are more than adequate for silicon carbide production.

Substitutes: Natural and manufactured abrasives, such as garnet, emery, or metallic abrasives, can be substituted for fused aluminum oxide and silicon carbide in various applications.

^eEstimated. E Net exporter. — Zero.

¹Production data for aluminum oxide are combined production data from the United States and Canada to avoid disclosing company proprietary data.

²Rounded to the nearest 5,000 tons to avoid disclosing company proprietary data.

³Defined as imports – exports because production includes data from Canada; actual consumption is higher than that shown.

⁴Defined as production + imports – exports.

⁵Defined as shipments + imports – exports.

⁶Defined as imports – exports.

⁷Includes Hong Kong.

⁸See Appendix C for resource and reserve definitions and information concerning data sources.