

WOLLASTONITE

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Wollastonite was mined by two companies in New York during 2016. U.S. production of wollastonite (sold or used by producers) was withheld to avoid disclosing company proprietary data but was estimated to have decreased from that of 2015. Economically valuable resources of wollastonite typically form as a result of thermal metamorphism of siliceous limestone during regional deformation or chemical alteration of limestone by siliceous hydrothermal fluids along faults or contacts with magmatic intrusions. Deposits of wollastonite have been identified in Arizona, California, Idaho, Nevada, New Mexico, New York, and Utah, but New York is the only State where long-term continuous mining has taken place.

The U.S. Geological Survey does not collect consumption statistics for wollastonite, but consumption was estimated to have decreased in 2016 compared to the previous year. Plastics and rubber markets (thermoplastic and thermoset resins and elastomer compounds) were estimated to account for more than 25% of wollastonite sales in the United States, followed by ceramics (frits, sanitaryware, and tile), paint (architectural and industrial paints), metallurgical applications (flux and conditioner), friction products (primarily brake linings), and miscellaneous uses (including adhesives, concrete, glass, and sealants). Globally, ceramics were estimated to represent more than 30% of wollastonite sales, followed by polymers (such as plastics and rubber) and paint. Lesser global uses for wollastonite included miscellaneous construction products, friction materials, metallurgical applications, and paper.

In ceramics, wollastonite decreases shrinkage and gas evolution during firing; increases green and fired strength; maintains brightness during firing; permits fast firing; and reduces crazing, cracking, and glaze defects. In metallurgical applications, wollastonite serves as a flux for welding, a source for calcium oxide, a slag conditioner, and protects the surface of molten metal during the continuous casting of steel. As an additive in paint, it improves the durability of the paint film, acts as a pH buffer, improves resistance to weathering, reduces gloss and pigment consumption, and acts as a flattening and suspending agent. In plastics, wollastonite improves tensile and flexural strength, reduces resin consumption, and improves thermal and dimensional stability at elevated temperatures. Surface treatments are used to improve the adhesion between wollastonite and the polymers to which it is added. As a substitute for asbestos in floor tiles, friction products, insulating board and panels, paint, plastics, and roofing products, wollastonite is resistant to chemical attack, stable at high temperatures, and improves flexural and tensile strength.

Salient Statistics—United States: The United States was thought to be a net exporter of wollastonite in 2016. Exports were estimated to have decreased compared to those in 2015 and were probably less than 10,000 tons, whereas imports were estimated to have increased and were probably less than 4,000 tons. Comprehensive trade data were not available for wollastonite because it is imported and exported under a generic U.S. Census Bureau Harmonized Tariff Schedule code that includes multiple mineral commodities. Ex-works prices for domestic wollastonite were reported in trade literature to range from approximately \$230 to \$490 per ton, and free-on-board prices for wollastonite from China, which tends to be minimally refined, ranged from \$80 to \$105 per ton. Products with finer grain sizes and acicular (highly elongated) particles sold for higher prices. Surface treatment, when necessary, also increased the selling price. Approximately 90 people were employed at wollastonite mines and mills in 2016 (excluding office workers).

Recycling: None.

Import Sources (2012–15): Comprehensive trade data were not available, but wollastonite was primarily imported from China, Finland, India, and Mexico.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Mineral substances not elsewhere specified or included	2530.90.8050	Free.

Depletion Allowance: 10% (Domestic and foreign).

Government Stockpile: None.

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Events, Trends, and Issues: U.S. housing starts in 2016 were 6% higher through August compared to the same time period during 2015, suggesting that sales of wollastonite to domestic construction-related markets, such as adhesives, caulks, cement board, ceramic tile, paints, stucco, and wallboard, might have increased. Trends in other domestic manufacturing sectors that use wollastonite were mixed; production of plastics and rubber and primary iron and steel products declined slightly, whereas output of motor vehicles and parts (which contain wollastonite in friction products and plastic and rubber components) rose by nearly 5%. In Western Europe and Asia, demand for wollastonite likely remained relatively unchanged owing to minimal growth in construction and manufacturing.

The leading U.S. producer of wollastonite continued to pursue a potential new mine within the Adirondack Forest Preserve of New York. According to a company representative, the project was in the development stage as of late 2016. Previous estimates suggest that the 81-hectare property contains 1.2 million to 1.5 million tons of wollastonite reserves, sufficient to extend mining operations in the area by an additional 10 years. Records published by the Mine Safety and Health Administration indicated that one domestic wollastonite mine was temporarily idled in September.

World Mine Production and Reserves: United States production of wollastonite ranks third globally. Many countries either do not publish wollastonite production or production is reported with a 2- to 3-year lag time.

	Mine production ^e		Reserves ¹
	<u>2015</u>	<u>2016</u>	
United States	W	W	World reserves of wollastonite exceed 100 million tons. Many deposits, however, have not been surveyed, precluding accurate reserves estimates.
Canada	² 5,600	6,000	
China	450,000	425,000	
Finland	10,000	10,000	
India	190,000	185,000	
Mexico	² 57,500	67,000	
Other countries	<u>6,000</u>	<u>6,000</u>	
World total (rounded)	³ 720,000	³ 700,000	

World Resources: Reliable estimates of wollastonite resources do not exist for most countries. Large deposits of wollastonite have been identified in China, Finland, India, Mexico, and the United States. Smaller, but significant, deposits have been identified in Canada, Chile, Kenya, Namibia, South Africa, Spain, Sudan, Tajikistan, Turkey, and Uzbekistan.

Substitutes: The acicular nature of many wollastonite products allows it to compete with other acicular materials, such as ceramic fiber, glass fiber, steel fiber, and several organic fibers, such as aramid, polyethylene, polypropylene, and polytetrafluoroethylene, in products where improvements in dimensional stability, flexural modulus, and heat deflection are sought. Wollastonite also competes with several nonfibrous minerals or rocks, such as kaolin, mica, and talc, which are added to plastics to increase flexural strength, and such minerals as barite, calcium carbonate, gypsum, and talc, which impart dimensional stability to plastics. In ceramics, wollastonite competes with carbonates, feldspar, lime, and silica as a source of calcium and silica. Its use in ceramics depends on the formulation of the ceramic body and the firing method.

^eEstimated. W Withheld to avoid disclosing company proprietary data.

¹See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

²Reported figure.

³Excludes U.S. production.