

## WOLLASTONITE

(Data in metric tons unless otherwise noted)

**Domestic Production and Use:** Wollastonite was mined by two companies in New York during 2017. 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 2016. Economic 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 been about the same in 2017 as compared with the previous year. Ceramics (frits, sanitaryware, and tile), friction products (primarily brake linings), metallurgical applications (flux and conditioner), paint (architectural and industrial paints), plastics and rubber markets (thermoplastic and thermoset resins and elastomer compounds), and miscellaneous uses (including adhesives, concrete, glass, and sealants) accounted for wollastonite sales in the United States.

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 2017. Comprehensive trade data were not available for wollastonite because it is imported and exported under a generic Harmonized Tariff Schedule code that includes multiple mineral commodities. Ex-works prices for domestic wollastonite were reported in trade literature to range from approximately \$210 to \$445 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 94 people were employed at wollastonite mines and mills in 2017 (excluding office workers).

**Recycling:** None.

**Import Sources (2013–16):** Comprehensive trade data were not available, but wollastonite was primarily imported from China, Finland, India, and Mexico.

<b>Tariff:</b> Item	<b>Number</b>	<b>Normal Trade Relations 12–31–17</b>
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 2017 were 9% higher through August compared with that in the same time period during 2016, 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. Use in other major markets for wollastonite increased as well: plastics increased slightly and primary iron and steel products rose by 4%. Production of motor vehicles and parts, which contain wollastonite in friction products and plastic and rubber components, and rubber, remained the same.

Globally, ceramics, polymers (such as plastics and rubber), and paint accounted for most wollastonite sales. Lesser global uses for wollastonite included miscellaneous construction products, friction materials, metallurgical applications, and paper. In Western Europe and Asia, demand for wollastonite likely remained relatively unchanged owing to minimal growth in its use 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. This land became available for development as part of a land swap transaction approved by the State of New York in 2013. According to a company representative, the project was still in the development stage as of late 2017. 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.

**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 <sup>e</sup>		Reserves <sup>1</sup>
	<u>2016</u>	<u>2017</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	11,000	7,000	
China	500,000	500,000	
Finland	10,000	10,000	
India	180,000	170,000	
Mexico	64,000	79,000	
Other countries	<u>6,000</u>	<u>6,000</u>	
World total (rounded)	<u><sup>2</sup>770,000</u>	<u><sup>2</sup>770,000</u>	

**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.

<sup>e</sup>Estimated. W Withheld to avoid disclosing company proprietary data.

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

<sup>2</sup>Excludes U.S. production.