

## SAND AND GRAVEL (INDUSTRIAL)<sup>1</sup>

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** In 2017, industrial sand and gravel valued at about \$3.5 billion was produced by about 200 companies from 340 operations in 35 States. The value of production of industrial sand and gravel in 2017 increased by 32% compared to the previous year, owing primarily to increased activity in the oil and gas sector. Leading States were, in order of tonnage produced, Wisconsin, Texas, Illinois, Missouri, North Carolina, Oklahoma, Michigan, Minnesota, California, and Tennessee. Combined production from these States accounted for 87% of the domestic total. About 63% of the U.S. tonnage was used as hydraulic-fracturing sand and well-packing and cementing sand; 10% as other whole-grain silica; 10% as glassmaking sand; 6% as foundry sand; 3% as whole-grain fillers and building products; 2%, each, as other ground silica, and recreational sand; 1% as ground and unground sand for chemicals; and 3% for other uses.

<b>Salient Statistics—United States:</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017<sup>e</sup></b>
Production	62,100	110,000	102,000	77,700	105,000
Imports for consumption	161	245	289	281	310
Exports	2,960	4,470	3,910	2,780	5,200
Consumption, apparent <sup>2</sup>	59,300	106,000	98,400	75,200	100,000
Price, average value, dollars per ton	55.80	74.80	47.30	33.80	33.00
Employment, quarry and mill, number <sup>e</sup>	3,800	4,000	3,500	3,500	4,000
Net import reliance <sup>3</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Some foundry sand is recycled, and recycled cullet (pieces of glass) represents a significant proportion of reused silica. About 34% of glass containers are recycled.

**Import Sources (2013–16):** Canada, 88%; Mexico, 3%; and other, 9%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–17</b>
Sand containing 95% or more silica and not more than 0.6% iron oxide	2505.10.1000	Free.

**Depletion Allowance:** Industrial sand or pebbles, 14% (Domestic and foreign).

**Government Stockpile:** None.

**Events, Trends, and Issues:** U.S. apparent consumption of industrial sand and gravel was 100 million tons in 2017, a 33% increase from that of the previous year, owing primarily to increased activity in the oil and gas sector. Mine output was sufficient to accommodate many uses, which included abrasives, ceramics, chemicals, fillers (ground and whole grain), glassmaking sand, filtration sand for swimming pools, foundry sand, other ground silica, recreational sand, roofing granules and fillers, and sand for well packing and cementing. Increased oil and gas drilling in North America and completion activity triggered a corresponding increase in the production of hydraulic-fracturing sand in 2017 compared with that of the previous year. More efficient hydraulic-fracturing techniques, which require more silica sand use per well (mostly for secondary recovery at mature wells) also led to increased demand for hydraulic-fracturing sand. Imports of industrial sand and gravel in 2017 increased by 10% to about 310,000 tons from 281,000 tons in 2016. Imports of silica are generally of two types—small shipments of very high-purity silica or a few large shipments of lower grade silica shipped only under special circumstances (for example, very low freight rates). The United States remains a net exporter of industrial sand and gravel—exports of industrial sand and gravel increased by 87% in 2017 compared with those of 2016.

The United States was the world's leading producer and consumer of industrial sand and gravel based on estimated world production figures. It is difficult to collect definitive data on silica sand and gravel production in most nations because of the wide range of terminology and specifications found among different countries. The United States remained a major exporter of silica sand and gravel, shipping it to almost every region of the world. The high level of exports was attributed to the high quality and advanced processing techniques used in the United States for many grades of silica sand and gravel, meeting virtually every specification.

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The industrial sand and gravel industry continued to be concerned with safety and health regulations and environmental restrictions in 2017, especially those concerning crystalline silica exposure. The Occupational Safety and Health Administration finalized new regulations to further restrict exposure to crystalline silica at mine sites and other industries that use it. Phased implementation of the new regulations is scheduled to take effect from 2017 through 2021. Local shortages of industrial sand and gravel were expected to continue to increase owing to local zoning regulations and land development priorities, including ongoing development and permitting of operations producing hydraulic-fracturing sand. Natural gas and petroleum operations that use hydraulic fracturing may also undergo increased scrutiny. These factors may result in future sand and gravel operations being located farther from high-population centers.

### World Mine Production and Reserves:

	Mine production <sup>e</sup>		Reserves <sup>4</sup>
	2016	2017	
United States	77,700	105,000	Large. Industrial sand and gravel deposits are widespread.
Australia	3,000	3,000	
Canada	2,100	2,100	
France	8,800	8,800	
Germany	7,500	7,500	
India	8,000	8,000	
Italy	13,900	13,900	
Japan	2,900	2,900	
Malaysia	10,400	10,400	
Mexico	1,700	1,700	
Poland	2,700	2,700	
South Africa	1,900	1,900	
Spain	6,300	6,300	
Turkey	8,000	8,000	
United Kingdom	4,000	4,000	
Other countries	<u>20,000</u>	<u>20,000</u>	
World total (rounded)	180,000	210,000	

**World Resources:** Sand and gravel resources of the world are large. However, because of their geographic distribution, environmental restrictions, and quality requirements for some uses, extraction of these resources is sometimes uneconomic. Quartz-rich sand and sandstone, the main sources of industrial silica sand, occur throughout the world.

**Substitutes:** Alternative materials that can be used for glassmaking and for foundry and molding sands are chromite, olivine, staurolite, and zircon sands. Although more costly and mostly used in deeper wells, alternative materials that can be used as proppants are sintered bauxite and kaolin-based ceramic proppants.

<sup>e</sup>Estimated. E Net exporter.

<sup>1</sup>See also Sand and Gravel (Construction).

<sup>2</sup>Defined as production + imports – exports.

<sup>3</sup>Defined as imports – exports.

<sup>4</sup>See [Appendix C](#) for resource and reserve definitions and information concerning data sources.