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SUMMARY OF FINDINGS. In 2006, total manufacturers' shipments of refractories

amounted to \$2,121.7 million, an increase of 5.4 percent, from \$2,013.5 million in 2005.

Shipments of clay refractories increased 6.0 percent to \$912.8 million in 2006, from \$860.8 million in 2005. Clay refractories shipments accounted for 43.0 percent of total refractories shipments in 2006 and 42.8 percent in 2005.

Shipments of nonclay refractories increased 4.9 percent to \$1,209.0 million in 2006, from \$1,152.7 million in 2005. Nonclay refractories shipments accounted for 57.0 percent of the total refractories shipments in 2006 and 57.2 percent in 2005.

For general CIR information, explanation of general terms and historical note, see the appendix.

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U S C E N S U S B U R E A U

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U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU

Table 1. Value of Shipments of Refractories: 2001 to 2006
 [Value in thousands of dollars]

Year	Total	Clay	Nonclay
2006.....	2,121,743	912,793	1,208,950
2005.....	r/ 2,013,544	860,844	r/ 1,152,700
2004.....	1,979,225	780,551	1,198,674
2003.....	1,740,171	828,440	911,731
2002.....	1,811,903	818,959	992,944
2001.....	1,875,003	774,219	1,100,784

r/Revised by 5 percent or more from previously published data.

Table 2a. Quantity and Value of Shipments of Refractories by Type: 2006
 [Value in thousands of dollars]

Product code	Product description	No. of cos.	Quantity shipped (unit of measure)		M bricks (1,000 9-inch equivalent)	Value of shipments
			Short tons	Metric tons		
327124	Clay and nonclay refractories.....	(X)	(X)	(X)	(X)	2,121,743
3271240125	Clay refractories.....	(X)	(X)	(X)	(X)	912,793
3271240135	Fireclay, high alumina, and insulating brick shapes 1/.....	43	a/ 559,028	a/ 506,825	c/ 105,908	a/ 468,125
	Unshaped clay refractory bonding mortars, castable refractories, and gunning mixes 2/ 3/.....	39	a/ 942,919	a/ 854,868	(X)	a/ 411,808
	Other refractory raw materials and refractory materials sold in lump or ground form, either for direct use by customers as a finished refractory product or as exposed materials.....	(X)	144,217	130,750	(X)	32,749
3271240451	Clay and high alumina refractory raw materials 4/.....	10	98,866	89,634	(X)	8,103
3271240461	Clay and high alumina refractory materials 5/.....	9	c/ 45,351	c/ 41,116	(X)	b/ 24,646
3271240000	Clay refractories n.s.k. 6/.....	(X)	(X)	(X)	(X)	111
327125	Nonclay refractories.....	(X)	(X)	(X)	(X)	1,208,950
3271250125	Brick and shapes.....	(X)	433,840	393,328	67,166	745,659
	Magnesite-chrome, chrome-magnesite, including high fires, burned and unburned brick, and chrome brick.....	9	a/ 121,515	a/ 110,168	a/ 18,874	b/ 147,171
3271250135	All other brick and shapes, including dolomite, dolomite magnesite, forsterite, pyrophyllite-zircon, carbon and graphite crucibles, retorts, stopper heads, natural graphite refractories, and molten cast.....	29	312,325	283,160	48,292	598,488
3271250145	Unshaped nonclay refractories basic bonding mortars made predominately of magnesite or chrome ore, dolomite, and other nonclay mortars, made predominately of forsterite, zircon, and silica.....	35	a/ 338,002	a/ 306,439	(X)	a/ 244,091
	Other nonclay refractory materials sold in lump or ground form, including ground silica.....	(X)	364,327	330,306	(X)	216,336
3271250256	Domestic shipments for direct use by customers as a finished refractory and all exported material 5/.....	13	149,079	135,158	(X)	131,577
3271250261	All other domestic shipments of nonclay refractory materials sold in lump or ground form as refractory raw material 4/.....	9	215,248	195,148	(X)	84,759
3271250000	Nonclay refractories n.s.k. 6/.....	(X)	(X)	(X)	(X)	2,864

N.s.k. Not specified by kind. X Not applicable.

1/Includes high alumina pouring pit refractories (containing 50 percent alumina and over), sleeves, nozzles, runners, and ladle gate parts. Excludes data for mullite and extra-high alumina refractories. These products are included in the nonclay refractories section

2/Includes products referred to as plastic firebrick and the less plastic materials intended for ramming into place after the addition of water (when shipped in dry form).

3/Includes hydraulic setting castables designed for low thermal conductivity and having bulk densities as defined in ASTM classification C-401, not greater than 105 pounds/cubic foot.

4/Includes shipments to refractory producers for reprocessing in the manufacture of brick and other refractories

5/Includes shipments for direct use as finished refractory products by establishments classified in manufacturing industries and excludes shipments to refractory producers for reprocessing in the manufacture of brick and other refractories. Includes all exports.

6/Not specified by kind (n.s.k.) represents the value of shipments for establishments which did not report detailed information and establishments typically with less than five employees, which were not included on the MA327C mailing panel

Note: Percent of estimation of each item is indicated as follows: a/10 to 25 percent of this item is estimated. b/26 to 50 percent of this item is estimated c/Over 50 percent of this item is estimated.

Table 2b. Quantity and Value of Shipments of Refractories by Type: 2005
 [Value in thousands of dollars]

Product code	Product description	No. of cos.	Quantity shipped (unit of measure)		M bricks (1,000 9-inch equivalent)	Value of shipments
			Short tons	Metric tons		
	Clay and nonclay refractories.....	(X)	(X)	(X)	(X)	r/ 2,013,544
327124	Clay refractories.....	(X)	(X)	(X)	(X)	860,844
3271240125	Fireclay, high alumina, and insulating brick shapes 1/.....	48	a/r/ 639,001	a/r/ 579,330	b/r/ 122,795	a/ 404,595
3271240135	Unshaped clay refractory bonding mortars, castable refractories, and gunning mixes 2/ 3/.....	39	a/r/ 790,807	a/r/ 716,960	(X)	a/r/ 387,021
	Other refractory raw materials and refractory materials sold in lump or ground form, either for direct use by customers as a finished refractory product or as exposed materials.....	(X)	317,044	287,438	(X)	67,516
3271240451	Clay and high alumina refractory raw materials 4/.....	12	a/ 246,475	a/ 223,459	(X)	a/ 12,427
3271240461	Clay and high alumina refractory materials 5/.....	9	c/ 70,569	c/ 63,979	(X)	c/ 55,089
3271240000	Clay refractories n.s.k. 6/.....	(X)	(X)	(X)	(X)	r/ 1,712
327125	Nonclay refractories.....	(X)	(X)	(X)	(X)	r/ 1,152,700
3271250125	Brick and shapes.....	(X)	430,746	390,522	r/ 65,184	716,679
	Magnesite-chrome, chrome-magnesite, including high fires, burned and unburned brick, and chrome brick.....	9	a/ 116,104	a/ 105,262	a/ 18,898	b/ 143,489
3271250135	All other brick and shapes, including dolomite, dolomite magnesite, forsterite, pyrophyllite-zircon, carbon and graphite crucibles, retorts, stopper heads, natural graphite refractories, and molten cast.....	34	314,642	285,260	a/r/ 46,286	a/ 573,190
3271250145	Unshaped nonclay refractories basic bonding mortars made predominately of magnesite or chrome ore, dolomite, and other nonclay mortars, made predominately of forsterite, zircon, and silica.....	36	r/ 321,628	r/ 291,594	(X)	r/ 231,992
	Other nonclay refractory materials sold in lump or ground form, including ground silica.....	(X)	352,225	319,333	(X)	191,330
3271250256	Domestic shipments for direct use by customers as a finished refractory and all exported material 5/.....	13	a/ 109,676	a/ 99,434	(X)	94,328
3271250261	All other domestic shipments of nonclay refractory materials sold in lump or ground form as refractory raw material 4/.....	12	242,549	219,899	(X)	97,002
3271250000	Nonclay refractories n.s.k. 6/.....	(X)	(X)	(X)	(X)	r/ 12,699

N.s.k. Not specified by kind. r/Revised by 5 percent or more from previously published data. X Not applicable.

1/Includes high alumina pouring pit refractories (containing 50 percent alumina and over), sleeves, nozzles, runners, and ladle gate parts. Excludes data for mullite and extra-high alumina refractories. These products are included in the nonclay refractories section.

2/Includes products referred to as plastic firebrick and the less plastic materials intended for ramming into place after the addition of water (when shipped in dry form).

3/Includes hydraulic setting castables designed for low thermal conductivity and having bulk densities as defined in ASTM classification C-401, not greater than 105 pounds/cubic foot.

4/Includes shipments to refractory producers for reprocessing in the manufacture of brick and other refractories.

5/Includes shipments for direct use as finished refractory products by establishments classified in manufacturing industries and excludes shipments to refractory producers for reprocessing in the manufacture of brick and other refractories. Includes all exports.

6/Not specified by kind (n.s.k.) represents the value of shipments for establishments which did not report detailed information and establishments, typically with less than five employees, which were not included on the MA327C mailing panel.

Note: Percent of estimation of each item is indicated as follows: a/10 to 25 percent of this item is estimated. b/26 to 50 percent of this item is estimated. c/Over 50 percent of this item is estimated.

Table 3. Shipments, Exports, Imports, and Apparent Consumption of Refractories by Type: 2006 and 2005
 [Value in thousands of dollars]

Product code 1/	Product description	Manu- facturers' shipments	Exports of domestic merchan- dise 1/ 2/ (value at port)	Percent exports to manu- facturers' shipments	Imports for consump- tion 1/ 3/ (value at port) 4/	Apparent consump- tion 5/	Percent imports to apparent consump- tion
2006							
	Clay and nonclay refractories 6/.....	1,869,683	395,928	21.2	358,138	1,831,893	19.6
	Clay refractories.....	879,933	81,694	9.3	58,788	857,027	6.9
3271240125	Fireclay, high alumina, and insulating brick shapes.....	468,125	55,612	11.9	57,865	470,378	12.3
3271240135	Unshaped clay refractory bonding mortars, castable refractories, and gunning mixes.....	411,808	26,082	6.3	923	386,649	0.2
3271250125	Nonclay refractories.....	989,750	314,234	31.7	299,350	974,866	30.7
3271250125	Magnesite-chrome, chrome- magnesite, including high fires, burned and unburned brick, and chrome brick.....	147,171	56,181	38.2	146,874	237,864	61.7
3271250135	All other brick and shapes.....	598,488	130,371	21.8	125,633	593,750	21.2
3271250145	Unshaped refractories and gunning mixes.....	244,091	127,682	52.3	26,843	143,252	18.7
2005							
	Clay and nonclay refractories 6/.....	1,740,287	360,262	20.7	292,836	1,672,861	17.5
	Clay refractories.....	791,616	73,826	9.3	57,129	774,919	7.4
3271240125	Fireclay, high alumina, and insulating brick shapes.....	404,595	53,284	13.2	56,349	407,660	13.8
3271240135	Unshaped clay refractory bonding mortars, castable refractories, and gunning mixes.....	r/ 387,021	20,542	r/ 5.3	780	367,259	0.2
3271250125	Nonclay refractories.....	948,671	286,436	30.2	235,707	897,942	26.2
3271250125	Magnesite-chrome, chrome- magnesite, including high fires, burned and unburned brick, and chrome brick.....	143,489	64,729	45.1	121,407	200,167	60.7
3271250135	All other brick and shapes.....	573,190	102,293	17.8	89,958	560,855	16.0
3271250145	Unshaped refractories and gunning mixes.....	r/ 231,992	119,414	r/ 51.5	24,342	136,920	17.8

r/Revised by 5 percent or more from previously published data.

1/For comparison of North American Industry Classification System (NAICS)-based product codes with Schedule B export codes and HTSUSA import codes, see Table 4.

2/Source: Census Bureau report EM 545, U.S. Exports.

3/Source: Census Bureau report IM 146, U.S. Imports for Consumption and General Imports.

4/"Value at port" includes both import value and duty value.

5/Apparent consumption is derived by subtracting exports from the total of shipments plus imports (including duty).

6/The "Clay and nonclay refractories" total shown here excludes product codes 3271240451, 3271240461, 3271250256, 3271250261; therefore, they differ from the totals shown in Tables 1, 2a, and 2b.

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes and HTSUSA Import Codes: 2006

Product code	Product description	Export code 1/	Import code 2/
3271240125	Clay brick and shapes.....	6902.20.1010	6902.20.1010
		6902.20.5010	6902.20.5010
		6902.90.1010	6902.90.1010
		6902.90.5010	6902.90.5010
		6903.90.0010	6903.90.0010
3271240135	Unshaped clay refractories and gunning mixes.....	3816.00.0010	3816.00.0010
3271250125	Nonclay magnesite and magnesite-chrome brick and shapes, and chrome brick.....	6902.10.1000	6902.10.1000
		6902.10.5000	6902.10.5000
3271250135	All other nonclay brick and shapes.....	6902.20.5020	6902.20.5020
		6902.90.1020	6902.90.1020
		6902.90.5020	6902.90.5020
		6903.90.0050	6903.90.0050
3271250211	Unshaped nonclay refractories and gunning mixes.....	3816.00.0050	3816.00.0050

1/Source: 2006 edition, Harmonized System-based Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States.

2/Source: Harmonized Tariff Schedule of the United States, Annotated (2006).

Appendix.

General CIR Survey Information, Explanation of General Terms and Historical Note

GENERAL

The CIR program has been providing monthly, quarterly, and annual measures of industrial activity for many years. Since 1904, with its cotton and fats and oils surveys, the CIR program has formed an essential part of an integrated statistical system involving the quinquennial economic census, manufacturing sector, and the annual survey of manufactures. The CIR surveys, however, provide current statistics at a more detailed product level than either of the other two statistical programs.

The primary objective of the CIR program is to produce timely, accurate data on production and shipments of selected products. The data are used to satisfy economic policy needs and for market analysis, forecasting, and decision making in the private sector. The product-level data generated by these surveys are used extensively by individual firms, trade associations, and market analysts in planning or recommending marketing and legislative strategies, particularly if their industry is significantly affected by foreign trade. Although production and shipments information are the two most common data items collected, the CIR program collects other measures also such as inventories, orders, and consumption. These surveys measure manufacturing activity in important commodity areas such as textiles and apparel, chemicals, primary metals, computer and electronic components, industrial equipment, aerospace equipment, and consumer goods.

The CIR program uses a unified data collection, processing, and publication system. The U.S. Census Bureau updates the survey panels for most reports annually and reconciles the estimates to the results of the broader-based annual survey of manufactures and the economic census, manufacturing sector. The manufacturing sector provides a complete list of all producers of the products covered by the CIR program and serves as the primary source for CIR sampling. Where a small number of producers exist, CIR surveys cover all known producers of a product. However, when the number of producers is too large, cutoff and random sampling techniques are used. Surveys are continually reviewed and modified to provide the most up-to-date information on products produced. The CIR program includes a group of mandatory and voluntary surveys. Typically the monthly and quarterly surveys are conducted on a voluntary basis. Those companies that choose not to respond to the voluntary surveys are required to submit a mandatory annual counterpart corresponding to the more frequent survey.

NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS), 1997

The adoption of the North American Industry Classification System (NAICS) in the 1997 Economic Census has had a major impact on the comparability of current and historic data. Approximately half of the industries in the manufacturing sector of NAICS do not have comparable industries in the Standard Industrial Classification (SIC) system that was used in the past.

While most of the change affecting the manufacturing sector was change within the sector, some industries left manufacturing and others came into manufacturing. Prominent among those that left manufacturing are logging and portions of publishing. Prominent among the industries that came into the manufacturing sector are bakeries, candy stores where candy is made on the premises, custom tailors, makers of custom draperies, and tire retreading. The net effect of the classification changes are such that if the 1997 value of shipments data for all manufacturers were tabulated on an SIC basis, it would be approximately 3 percent higher.

Listed below are the NAICS sectors:

- 21 Mining
- 22 Utilities
- 23 Construction
- 31-33 Manufacturing
- 42 Wholesale Trade
- 44-45 Retail Trade
- 48-49 Transportation and Warehousing
- 51 Information
- 52 Finance and Insurance
- 53 Real Estate and Rental and Leasing
- 54 Professional, Scientific, and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support and Waste Management and Remediation Services
- 61 Educational Services
- 62 Health Care and Social Assistance
- 71 Arts, Entertainment, and Recreation
- 72 Accommodation and Food Services
- 81 Other Services (except Public Administration)

(Not listed above are the Agriculture, Forestry, Fishing, and Hunting sector (NAICS 11), partially covered by the census of agriculture conducted by the U.S. Department of Agriculture, and the Public Administration sector (NAICS 92), covered by the census of governments conducted by the Census Bureau.)

The 20 NAICS sectors are subdivided into 96 subsectors (three-digit codes), 313 industry groups (four-digit codes), and, as implemented in the United States, 1170 industries (five- and six-digit codes).

FUNDING

The Census Bureau funds most of the surveys. However, a number of surveys are paid for either fully or partially by other Federal Government agencies or private trade associations. A few surveys are mandated, but all are authorized by Title 13 of the United States Code.

RELIABILITY OF DATA

Survey error may result from several sources including the inability to obtain information about all cases in the survey, response errors, definitional difficulties, differences in the interpretation of questions, mistakes in recording or coding the reported data, and other errors of collection, response, coverage, and estimation. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to these nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is the imputing of data for nonrespondents, for late reporters, and for data that fail logic edits. Missing figures are imputed based on period-to-period movements shown by reporting firms. A figure is considered to be an impute if the value was not directly reported on the questionnaire, directly derived from other reported items, directly available from supplemental sources, or obtained from the respondent during the analytical review phase. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are suppressed or footnoted. The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

DATA REVISIONS

Statistics for previous years may be revised as the result of corrected figures from respondents, late reports for which imputations were originally made, or other corrections. Data that have been revised by more than 5 percent from previously published data are indicated by footnotes.

DISCLOSURE

The Census Bureau collects the CIR data under the authority of Title 13, United States Code, which specifies that the information can only be used for statistical purposes and cannot be published or released in any manner that would identify a person, household, or establishment. "D" indicates that data in the cell have been suppressed to avoid disclosure of information pertaining to individual companies.

EXPLANATION OF GENERAL TERMS

Capacity. The maximum quantity of a product that can be produced in a plant in 1 day if operating for 24 hours. Includes the capacity of idle plants until the plant is reported to be destroyed, dismantled, or abandoned.

Consumption. Materials used in producing or processing a product or otherwise removing the product from the inventory.

Exports. Includes all types of products shipped to foreign countries, or to agents or exporters for reshipment to foreign countries.

Gross shipments. The quantity or value of physical shipments from domestic establishments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale or use. Shipments of products purchased for resale are omitted. Shipments of products made under toll arrangements are included.

Interplant transfers. Shipments to other domestic plants within a company for further assembly, fabrication, or manufacture.

Inventories. The quantity or value of finished goods, work in progress, and materials on hand.

Machinery in place. The number of machines of a particular type in place as of a particular date whether the machinery was used for production, prototype, or sampling, or was idle. Machinery in place includes all machinery set up in operating positions.

Net receipts. Derived by subtracting the materials held at the end of the previous month from the sum of materials used during the current month.

Production. The total volume of products produced, including: products sold; products transferred or added to inventory after adjustments for breakage, shrinkage, and obsolescence, plus any other inventory adjustment; and products that undergo further manufacture at the same establishment.

Quantities produced and consumed. Quantities of each type of product produced by a company for internal consumption within that same company.

Quantity and value of new orders. The sales value of orders received during the current reporting period for products and services to be delivered immediately or at some future date. Also represents the net sales value of contract change documents that increase or decrease the sales value of the orders to which they are related, when the parties concerned are in substantial agreement as to the amount involved. Included as orders are only those that are supported by binding legal documents such as signed contracts or letter contracts.

Quantity and value of shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and

returns. Shipments to a company's own branches are assigned the same value as comparable appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

Stocks. Total quantity of ending finished inventory.

Unfilled orders (backlog). Calculated by adding net new orders and subtracting net sales from the backlog at the end of the preceding year.

HISTORICAL NOTE

Data on refractories have been collected by the Census Bureau since 1947. Historical data may be obtained from Current Industrial Reports (called Facts for Industry before 1959) available at your local Federal Depository Library.