UNITED STATES TARIFF COMMISSION

FLAT GLASS AND TEMPERED GLASS

Report to the President on
Investigation No. TEA-I-15 Under
Section 301(b)(1) of the
Trade Expansion Act of 1962

TC Publication 310
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UNITED STATES TARIFF COMMISSION

Address all communications to

United States Tariff Commission

Washington, D.C. 20436

C O N T E N T S

INFORMATION OBTAINED IN THIS INVESTIGATION

Note.--The whole of the Commission's report to the President may not be made public since it contains certain information that would result in the disclosure of the operations of individual concerns. This published report is the same as the report to the President, except that the above-mentioned information has been omitted. Such omissions are indicated by asterisks.

C O N T E N T S--Continued

C O N T E N T S--Continued

TABLES

TABLES--Continued

TABLES--Continued

TABLES--Continued

REPORT TO THE PRESIDENT

U.S. Tariff Commission,
December 29, 1969.

To the President:

In accordance with section 301(f)(1) of the Trade Expansion Act of 1962 (76 Stat. 885), the U.S. Tariff Commission herein reports the results of an investigation made under section 301(b) of that act relating to cast or rolled glass, sheet glass, plate and float glass (including polished wire glass), and toughened (specially tempered) glass.

INTRODUCTION

The investigation to which this report relates was undertaken to determine whether--

> glass of the kinds provided for in items 541.11-542.98, 543.11-.69, and 544.31-.32 of the Tariff Schedules of the United States

is, as a result in major part of concessions granted thereon under trade agreements, being imported into the United States in such increased quantities as to cause, or threaten to cause, serious injury to the domestic industry or industries producing like or directly competitive products.

The investigation was instituted on July 2, 1969 upon petition filed on June 27, 1969 by the principal domestic producers. 1/ Public

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1/ American Saint Gobain Corporation, the Libbey-Owens-Ford Company, the Mississippi Glass Company, and the PPG Industries, Inc.

notice of the investigation and of a public hearing to be held in connection therewith was given in the Federal Register of July 9, 1969 (34 F.R. 11396). The hearing was held October 16-21, 1969, and all interested parties were afforded opportunity to be present, to produce evidence, and to be heard. A transcript of the hearing and copies of formal briefs submitted by interested parties in connection with the investigation are attached. 1/

FINDINGS OF THE COMMISSION

On the basis of its investigation, the Commission finds (Chairman Sutton and Commissioner Moore dissenting) that glass of the kinds provided for in items 541.11-.31 (hereinafter referred to as rolled glass), 543.11-.69 (plate and float glass), and 544.31-.32 (tempered glass) of the Tariff Schedules of the United States (TSUS) are not, as a result in major part of concessions granted thereon under trade agreements, being imported into the United States in such increased quantities as to cause, or threaten to cause, serious injury to the domestic industry or industries producing like or directly competitive products.

With respect to glass of the kinds provided for in items 542.11-.98 (hereinafter referred to as sheet glass) of the TSUS, the Commission is divided into two equal groups. Chairman Sutton

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1/ The transcript and briefs were transmitted with the original report sent to the President.

and Commissioners Clubb and Moore find (1) that such glass is, as a result in major part of concessions granted thereon under trade agreements, being imported into the United States in such increased quantities as to cause serious injury to the domestic industry producing like or directly competitive articles; and (2) that an increase in the column numbered 1 rate of duty for each of the foregoing items of the TSUS to a rate of duty equal to that specified in column numbered 2 for each such item is necessary to remedy such injury. 1/ Commissioners Thunberg, Leonard, and Newsom find that such glass is not, as a result in major part of concessions granted thereon under trade agreements, being imported into the United States in such increased quantities as to cause, or threaten to cause, serious injury to the domestic industry producing like or directly competitive articles. In a situation of this kind, section 330 of the Tariff Act of 1930, as amended by section 201 of the Trade Agreements Extension Act of 1953, requires that the findings of each group of Commissioners shall be transmitted to the President, and provides that those of either group may be considered by the President as the findings of the Commission.

1/ For such rates see table 2, column headed "Statutory rate".

STATEMENTS OF THE COMMISSIONERS

Statement of Chairman Sutton and Commissioner Moore

Section 301(b)(1) directs the Tariff Commission--under specified circumstances--to determine whether, as a result in major part of concessions granted under trade agreements, an article is being imported into the United States in such increased quantities as to cause, or threaten to cause, serious injury to the domestic industry producing an article which is like or directly competitive with the imported article.

In the case at issue, the Commission has been called upon to make such determinations with respect to the various types of flat glass--sheet, plate, float, and rolled--and with respect to tempered glass. In varying degree, the various types of flat glass compete directly with one another. Plate and float glass have comparable physical properties, and they are used almost interchangeably throughout the full range of their joint commercial applications. They may thus properly be regarded, for the purposes of reaching our decision, as one article. Rolled glass rests almost at the opposite end of the competitive spectrum; it is rarely used interchangeably with other types of flat glass, and certainly is not directly competitive to any substantial degree with any of them. Some sheet glass competes directly with plate and float glass. Such direct competition currently is confined almost entirely to heavy sheet glass; window glass and thin sheet glass, which in 1968 together accounted for two-thirds of

total U.S. consumption of sheet glass, receive little direct competition from plate and float glass. The greater part of the sheet glass marketed thus is not subject to direct inter-product competition from other types of flat glass. In the light of these competitive conditions, then, we regard flat glass as three distinct articles--sheet glass, plate and float glass, and rolled glass. Tempered glass--a product further processed than flat glass--stands apart.

As indicated by findings given earlier, we have found that the domestic sheet glass industry is being seriously injured by reason of increased imports, and that an increase in the rates of duty on sheet glass to the statutory rates is necessary to remedy such injury. With respect to glass of the kinds provided for in items 541.11-31 (rolled glass), 543.11-.69 (plate and float glass), and 544.31-.32 (tempered glass) of the TSUS, we find (1) that such glass is, as a result in major part of concessions granted thereon under trade agreements, being imported into the United States in such increased quantities as to threaten serious injury to the domestic industries producing like or directly competitive articles; and (2) that an increase in the column numbered 1 rate of duty for each of the foregoing items to a rate of duty equal to that which was specified in column numbered 1 on August 31, 1963, is necessary to prevent such injury. For a listing of such rates, see the column headed "August 31, 1963 rate" in table 1.

Sheet glass

Sheet glass is being imported into the United States in increased quantities. Viewed from the short run, entries of sheet glass at most-favored-nation rates of duty have increased, amounting to 582 million pounds in 1968, compared with 445 million pounds in 1964 and 350 million pounds in 1961 (the year before escape-action rates were imposed). Entries were moderately smaller in the first half of 1969 (249 million pounds) than in the corresponding period of 1968 (276 million pounds), but markedly larger than in the corresponding period of 1967 (177 million pounds). Imports of sheet glass in the early months of 1969, however, were affected to an unknown degree by a strike at Atlantic and Gulf ports; moreover, part-year comparisons, simply because of the short periods involved, have not weighed heavily in our determinations. When viewed from the long run--which seems to us appropriate since U.S. trade-agreement concessions were granted in the more distant past--we conclude that sheet glass is being imported in very greatly increased quantities. Entires of sheet glass at most-favored-nation rates in 1968, for example, were nearly 11 times the volume of average annual imports in 1950-52.

Reduced rates of duty resulting from trade-agreement concessions made by the United States on sheet glass were placed in effect in 1948, 1951, and 1956-58. Subsequently in mid-1962, the President invoked the escape-clause of the GATT to modify temporarily the U.S. concessions to permit increased rates of duty to be imposed on sheet

glass. At the end of 1966, the President modified the escape action by reducing but not eliminating the increased rates on most window glass and by restoring the permanent concession rates on other sheet glass. In our view, the increased U.S. imports of sheet glass have resulted in major part from the aforementioned concessions.

In our statement in the Commission's recent report respecting sheet glass under section 351(d)(3) of the Trade Expansion Act of 1962, 1/ we emphasized that the domestic sheet glass industry was in difficult straits. We conclude here, in terms appropriate to section 301(b)(1), that the domestic industry is being seriously injured. Shipments of sheet glass by the domestic producers, and the employment afforded workers by the domestic industry, were both lower in 1967 than in any year since 1961. Shipments by domestic producers in 1968 (1,353 million pounds) were somewhat larger than in 1967 (1,248 million pounds), responding to a far larger increase in domestic consumption. The 1968 shipments, however, were materially smaller than in 1964 and 1965 (1,530 million pounds) when consumption was about the same as in 1968--evidencing a deteriorating position of the domestic industry in the U.S. market. Employment afforded workers by the domestic industry in 1968, moreover, was at its lowest level in many years. Man-hours worked in the production of sheet glass amounted to

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1/ United States Tariff Commission, Sheet Glass (Blown or Drawn Flat Glass), Report to the President on Investigation No. TEA-I-EX-6 under Section 351(d)(3) of the Trade Expansion Act of 1962, TC Pub. 306, Washington, D.C., Dec. 1969, pp. 4-8.

12.1 million hours in 1968, compared with 14.3 million in 1964; only 5,920 production and related workers are estimated to have been employed in the manufacture of sheet glass in 1968, while some 7,260 were so employed in 1964.

The domestic producers' aggregate net operating profits earned on their sheet-glass operations in 1967 and 1968, as well as the ratios of those profits to net sales, averaged only a third of those in 1964 (table 16). Aggregate profits in 1967 were the lowest since 1962, and those in 1968, although improved, were still materially below those of earlier years. The deteriorating economic health of the sheet-glass industry has also been reflected in corporate decisions to shut down production facilities. One domestic sheet glass plant that had employed 600 workers was put on a standby basis in 1968, reopened in 1969, and then placed on standby again in October 1969. Another producer announced that it would shut down a furnace at an Oklahoma plant on December 1, 1969, requiring layoffs of more than 200 workers. Indeed, altogether 4 sheet glass furnaces were dismantled between 1964 and 1968, and only 26 of the 30 furnaces available for production in mid-1969 were in operation.

The major cause of the serious injury is patently clear. One only need observe the increasing share of domestic consumption of sheet glass supplied by imports. The ratio of annual imports of sheet glass to consumption was equivalent to 22-24 percent in 1964 and 1965, 25-27 percent in 1966 and 1967, and 32 percent in 1968;

the corresponding ratio in the first half of 1969, influenced by the lengthy dock strike early in the year, was 27 percent. Since the mid-1960's, then, imports have increased appreciably the share of the market they supply. In recent years, moreover, price competition between imported and domestic sheet glass in the U.S. market has sharpened. The domestic producers increasingly have had to try to meet, in whole or in part, lower prices of imported glass in order to attempt to retain sales. The resultant harmful impact of the sharp price competition on the profits of the domestic producers has been described above.

Major increases in world capacity to produce sheet glass in recent years portend more intensive competition in both the U.S. and foreign markets. Countries that heretofore have been significant exporters of sheet glass (e.g., Belgium, France, and Germany) can be expected to intensify their sales efforts in the United States, particularly as various less-developed countries become increasingly self-sufficient. Italy, long a major importer of sheet glass, was the third largest source of U.S. imports in 1968. Israel, which completed its first sheet glass plant in 1965, was the seventh largest source of U.S. imports in 1968. Since 1967 factories have been completed in Sweden, Denmark, Colombia, and Canada. Additional plants are currently under construction or planned in Iran, Malaya, and Hungary. World developments in foreign sheet glass industries suggest no respite for the domestic industry.

We are cognizant that the domestic sheet glass industry faces market pressures from sources other than imported sheet glass. It has experienced increasing competition from float glass in part of its market. Nine new U.S. float glass plants have already gone into production; four more are under construction or projected. Eleven foreign countries have facilities to produce float glass, and the number of foreign production lines has been expanding rapidly. Canada, which completed a float glass plant in 1967, now is constructing a second plant. Plants have recently been completed or are nearing completion in Belgium, Japan, Czechoslovakia, and the U.S.S.R. It is likely that this expansion in world capacity to produce float glass will generate increased competitive pressures that will accelerate the rate at which such glass displaces heavy sheet glass. Accordingly, the encroachments of float glass will make the maintenance of profitable levels of operation by domestic producers increasingly difficult, and will make them increasingly vulnerable to aggressive incursions of imports of sheet glass.

The domestic sheet glass industry is of especial importance to communities and workers in Appalachia, where several plants are located. The depressed economic conditions in that area lend added urgency to the need for action that will provide relief to the industry.

We have found that imposition of rates the same as the statutory rates of duty (the column 2 rates) of the Tariff Schedules of the United States is necessary to remedy the serious injury being sustained by the domestic sheet glass industry. These rates are higher than the corresponding escape-action rates that were in effect on entries of sheet glass from mid-1962 to the end of 1966, and higher than the corresponding modified escape-action rates that have been in effect on most window glass since the beginning of 1967. In retrospect, it is clear that neither the original nor the modified escape-action rates afforded adequate relief to the domestic sheet glass industry. The share of the domestic sheet glass market supplied by the domestic producers slid significantly from 77 percent in 1961--the year preceding the initial escape action and a year in which the Commission earlier regarded the industry as being seriously injured--to 73 percent in 1967 and 68 percent in 1968. The profits of the domestic industry declined alarmingly in the 1964-68 period, and price competition afforded by imported glass increased sharply. The statutory rates, in our judgment, are necessary to remedy the serious injury.

Plate and float glass

Plate and float glass is being imported into the United States in increased quantities. U.S. imports of plate and float glass (including polished wire glass) at most-favored-nation rates of duty

in 1968 (188 million pounds) were nearly double those in 1964 (100 million pounds) and nearly 8 times the average annual imports in 1950-52 (23 million pounds).

Before the Kennedy Round, reduced rates of duty resulting from trade-agreement concessions on plate glass and polished wire glass (here included) were placed in effect in 1935 and 1948; further rate reductions were placed in effect on plate glass in 1956-58, and on polished wire glass in 1963-64. Two of the five stages of the Kennedy Round concessions on plate and float glass and polished wire glass are now in effect, and the third stage will be placed in effect at the beginning of 1970. In our view, the increased U.S. imports of plate and float glass, and polished wire glass, have resulted in major part from these concessions.

The domestic industry producing plate and float glass is not now being seriously injured. Combined shipments of plate and float glass (including polished wire glass) in 1968 (2,193 million pounds) were about a third larger than in 1964 (1,633 million pounds). The domestic producers have moved vigorously into the production of float glass, which is materially less costly to produce than plate glass. During recent years, profits have been stable; aggregate earnings of the domestic producers on sales of plate and float glass were equivalent to about 25 percent of net sales in both 1964 and 1968.

U.S. imports of plate and float glass, nevertheless, threaten the economic well-being of the domestic industry. Imported plate and

float glass is supplying a gradually increasing share of the U.S. market for those products; foreign plate and float glass entered at most-favored-nation rates accounted for 8 percent of apparent U.S. consumption in 1967 and 1968, compared with 6 percent in 1964 and 5 percent in 1965. Severe price competition from imported glass, while more fully developed in the other types of flat glass and in tempered glass, is becoming increasingly evident in plate and float glass. More and more, domestic producers have had to meet, at least partially, lower prices of imported glass in an effort to retain sales. The spread of such price competition--which in our opinion surely will occur under present rates of duty and market circumstances--cannot but fail to have a severely adverse impact upon the domestic plate and float glass industry. As we noted in the previous section relating to sheet glass, facilities for the production of float glass are being rapidly expanded abroad, both in neighboring Canada and across the oceans. Moreover, the remaining stages of the Kennedy Round concessions--which have already been proclaimed by the President--will speed the development of the present threat into actual injury.

We have found that imposition of the pre-Kennedy Round rates of duty on plate and float glass, including polished wire glass, is necessary to prevent serious injury to the domestic industry. These rates, generally some 20 to 30 percent higher than the 1969 rates, would, we believe, provide the necessary protection.

Rolled glass

Rolled glass is being imported into the United States in increased quantities. The volume of annual U.S. imports of such glass entering at most-favored-nation rates of duty has been on a plateau during the past decade. As indicated earlier in our statement, however, a longer-run view of import trends is appropriate when the principal U.S. trade-agreement concessions were made in the late 1940's and mid-1950's. Current imports are much larger than those in the early 1950's--the quantity of rolled glass imported in 1968 being nine times the average annual volume entered in 1950-52.

Before the Kennedy Round, reduced rates of duty resulting from trade-agreement concessions on rolled glass were placed in effect in 1948 and 1956-58. Two of the five stages of the Kennedy Round concessions are now in effect, and the third stage will be placed in effect at the beginning of 1970. We are persuaded that the increased level of imports in recent years has resulted in major part from these concessions.

The U.S. rolled glass industry faces a harsh economic climate. In recent years, the U.S. consumption of rolled glass has been either stagnant or declining. Imports have taken nearly a third of the market. Annual shipments of rolled glass have declined; they were 13 percent smaller in 1968 (136 million pounds) than in 1964 (156 million pounds). In mid-1969, only 7 of the 10 furnaces available for production were in operation. Employment afforded workers in the

manufacture of rolled glass has followed the downward trend of shipments; the annual number of man-hours worked in the production of rolled glass was 14 percent smaller in 1968 than in 1964. Aggregate annual profits of domestic producers on their sales of rolled glass declined almost steadily from 1964 to 1968, dropping by more than half; the ratio of aggregate net operating profit to net sales also decreased--from 18 percent in 1964 to 8 percent in 1967 and 1968.

The danger of serious injury to the domestic rolled glass industry is imminent, and requires prompt relief. Imports are gradually taking an increased share of the market. Price competition from imported rolled glass is becoming increasingly severe; it has recently forced price reductions on some types of domestic rolled glass (e.g., sizes for shower doors and tub enclosures), even though labor and other costs are rising. The decline in aggregate profits and in the ratio of those profits to net sales is of grave concern.

We have found that imposition of the pre-Kennedy Round rates of duty on rolled glass is necessary to prevent serious injury to the domestic industry. These rates, about 25 percent higher than the 1969 rates on ordinary rolled glass, would in our judgment provide the necessary protection.

Tempered glass

Tempered glass is being imported into the United States in increased quantities. Annual U.S. imports of such glass at most-favored-nation rates of duty rose from 1.1 million square feet in 1964

to 9.3 million square feet in 1968, while imports of such glass from Canada free-of-duty under the provisions of the Automotive Products Trade Act of 1965 (APTA) rose from nearly zero in 1965 to 7.7 million square feet in 1968. Data are not available on U.S. imports of tempered glass before 1964; imports are believed to have been small in earlier years, probably less than in 1964.

Before the Kennedy Round, reduced rates of duty resulting from trade-agreement (GATT) concessions affecting the tariff provisions under which tempered glass was dutiable were placed in effect in 1948, 1951, and 1956-58. Two of the five stages of the Kennedy Round concession on tempered glass are now in effect, and the third stage will be placed in effect within a few days. Free entry of tempered glass, the product of Canada, was proclaimed by the President, effective January 1965, to carry out a U.S. concession to Canada in the U.S.-Canadian automotive agreement. In our view, the increased U.S. imports of tempered glass at the most-favored-nation rate have resulted in major part from the U.S. concessions in the GATT, and the increased duty-free entries of tempered glass from Canada have resulted in major part from the U.S. concession in the U.S.-Canadian automotive agreement.

The tempered glass industry in the United States currently exhibits economic symptoms of both health and illness. The U.S. market for tempered glass is booming; apparent U.S. consumption of such glass increased from 216 million square feet in 1964 to 356 million square feet in 1968. In response to that increase, shipments

of tempered glass by the U.S. producers rose from 217 million square feet in 1964 to 348 million square feet in 1968. Aggregate net profits earned by the domestic producers on the sale of tempered glass, however, have been trivial in most recent years, and an aggregate net loss of substantial size was incurred in 1965. Despite the growing domestic shipments, moreover, the domestic producers have been unable to maintain their position in the domestic market. The share of U.S. consumption supplied by imports rose steadily from a half of one percent in 1964 to 5 percent in 1968, and the increase shows no sign of abating. Although imported glass does not yet account for a large share of the market, the impact of its sales on market prices has been highly adverse. Price patterns of tempered glass have been mixed, and the prices of many types of nonautomotive glass were lower in 1969 than in 1964. In an effort to save markets, the domestic producers in recent months have been forced to make price concessions on as much as a third of their sales of nonautomotive tempered glass, discounting prices on the average by about 8 percent. These factors--the steadily expanding share of the market gained by imports and the untoward impact of imports on prices--clearly foretell the prospects of serious damage to the domestic tempered glass industry if current import restrictions are not modified. Moreover, the remaining Kennedy Round stages--which have already been proclaimed by the President--will speed the advent of such injury.

We have found that imposition of the pre-Kennedy Round rate of duty on tempered glass, including that imported free of duty from Canada under the APTA, is necessary to prevent serious injury to the domestic industry. This rate--about 25 percent higher than the 1969 most-favored-nation rate--would provide the necessary protection.

Statement of Commissioner Thunberg

Although I concur in most of what Commissioners Newson and Leonard say about these products in isolation and with their finding of no injury, I cannot agree with their segmentation of the industry into four parts. The degree of substitutability among the various classes of flat glass is sufficiently great, both from the viewpoint of users and from that of producers, to require their being categorized as parts of the same industry, the flat glass industry. 1/ The flat glass industry shows no evidence of injury or threat of injury. On the contrary, it displays the characteristics of a thriving, dynamic, healthy sector of the economy.

In almost every case users of flat glass are indifferent concerning the method by which glass is produced, provided that it has the characteristics of transparency, opacity, translucency, strength, clarity, safety and such which are necessary for their

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1/ The statistical problems involved in consolidating data for the flat glass industry were not completely solvable within the statutory time limit. These problems are primarily concerned with intra-industry and intra-company transfers and therefore with the danger of double counting. Data relating to sheet, plate, float, and rolled glass entail no double counting and therefore can be aggregated. Because significant amounts of plate, float, and sheet are used in the tempering operation, tempered glass production cannot be combined with the other categories without adjustments which could not be completed within the allotted time.

purpose. Given the buyer's requirements, his choice is made almost solely on the basis of price. It is the fact of this high degree of substitutability in use principally among sheet, plate, and float which has made possible the relatively easy implementation of recent technological advances. Technological change has been able to effect sizable shifts in the relative importance of each process because the products are so readily substitutable in use. Within 4 years, for example from 1964 to 1968, sheet glass has dropped from 45 percent to 37 percent of the combined output of sheet, plate, float, and rolled glass as float and plate glass have replaced sheet in automobiles and construction. Rolled glass declined from 5 percent to 4 percent of the total; plate and float together rose from one-half to nearly three-fifths of the total. Float glass rose from 6 percent of the aggregate of plate and float output in 1964 to 51 percent in 1968. Temperers have meanwhile substituted float for plate and sheet in their processing operation. In addition, a recently announced technological development suggests that sheet may be substituted for plate and float in certain uses in the future.

The tempering sector of this industry stands somewhat apart in that it depends on the other sectors (sheet, plate, and float, and rolled) for its raw material and produces a product that cannot be

altered by cutting or shaping. As indicated above, temperers have substituted float for plate and sheet in their inputs, and with their output are currently invading markets that had previously been supplied by unprocessed sheet, plate, and float. Although there are more than a score of companies producing tempered glass, nearly 80 percent of the unprocessed glass used in tempering is obtained by intra-company transfer; less than 10 percent is purchased from outside the domestic industry.

Producers, reacting to technological advances, have brought about these shifts by closing sheet and plate facilities and either converting them or replacing them with float plants. Similarly workers have shifted from the obsolescent processes to the more advanced, with total employment in flat glass operations remaining about the same. The number of production and related workers employed in flat glass operation expanded by about 4 percent between 1964 and 1966 while man-hours worked remained at virtually the same level (table B-1).

These shifts, wrought by the dynamics of technology, have not been accomplished without friction and hardship. The new facilities have not all been constructed in the same localities as those being closed. The friction was intensified by the decline in

demand in 1966 and 1967 resulting from declines in automobile production and construction, the two main consuming industries. It was in these years of sagging demand that competition from imports became more intense. Imports rose both relatively and absolutely from 1965 through 1968 (table B-2). In the first half of 1969, however, the share of imports in the apparent consumption of flat glass receded to its 1964 level (14.8 percent for flat glass including tempered glass). Because of the imminence of a dock strike in 1968 and the fact of a dock strike in early 1969, the significance of import changes in those years is clouded; nonetheless, it is not at all clear that the statutory requirement of increasing imports is met.

More than 90 percent of the output of sheet, plate, float and rolled glass is accounted for by four large companies. Ford, PPG Industries, Libby-Owens-Ford (LOF) and American Saint Gobain (ASG) together produce 87 percent of sheet glass output, nearly 99 percent of plate, 100 percent of float and one-half of rolled glass output. These four similarly account for nearly 80 percent of tempered glass production. This concentration of decision-making authority in the flat glass industry has facilitated the shift from the obsolescent to the technologically advanced processes in the industry.

It is of course to be expected that the technologically obsolescent parts of the industry would yield a smaller rate of return than the more advanced, rapidly expanding sectors. This appears not to be true for the tempering sector, which exhibits the lowest rate of return. Upon examination of this sector, however, two factors explain the low profitability: (1) more than * * * of the sales of the two major producers, whose combined production accounts for 80 percent of domestic output, are to the automotive industry at rigorously negotiated contract prices, and (2) these same producers provide from within their own organizations at "computed market value" all the plate and float glass they temper. Insofar as the computed value might be overly generous (or niggardly), profits are shifted from (or to) the tempering operation to (or from) the plate and float operation. The plate and float sector has been the most profitable sector of this industry, with an annual average ratio of net operating profits to net sales of nearly 25 percent. It should be noted that 70 percent of the plate and float glass produced is further processed within the producer's organization, and that 45 percent of such glass is tempered. The two major tempered glass producers are among the most profitable plate and float producers, but among the least profitable tempered glass producers. Excluding tempered

glass, the sheet glass sector is the least profitable operation in this industry, and has been for the last 5 years. Unlike the plate and float sector, less than one-fifth of the sheet glass produced is further processed within the producing organization.

Table B-3 shows the net operating profit of the flat glass industry (excluding tempered glass for reasons of statistical difficulties) in dollars and in relation to sales and intra-company transfers. Profits and sales declined between 1965 and 1967, both absolutely and as a percent of sales. Both recovered in 1968 although not to their 1964 level. Insofar as the profits of the tempering operations are understated, these data in table B-3 are overstated. Nonetheless, comparing these data with the financial reports of four large producers (which account for 85% of flat glass production) for the operations of their glass divisions (table B-4), the general level and direction of the data in table B-3 are confirmed.

The ratio of profits to sales after taxes (as well as before taxes) is shown in table B-4 for the four largest companies for which such data were made available to the Commission.

Table B-4 relates to total company operations with the exception of PPG Industries and as such includes some products for LOF and PPG which are outside of the scope of this case 1/ (e.g., laminated auto glass, multiple glazed insulating units and specialty glass products). A comparison of the average operating profits after taxes as a ratio to net sales for these four companies with similar ratios for other industries follows:

Industry	Ratio of net operating profit (after taxes) to net sales				
	1964	1965	1966	1967	1968
	Percent				
Durable goods	5.2	5.6	5.6	5.0	5.1
Motor vehicles and equipment	5.1	5.7	5.6	4.8	4.9
Lumber and wood products	3.9	4.0	3.8	3.4	5.3
Stone, clay, and glass	5.6	5.9	5.6	4.8	5.2
Four flat glass producers	9.3	9.5	8.0	7.6	8.3

1/ The Commission estimates that about two-thirds of the operations of these four companies was accounted for by the products subject to this investigation for the years 1964-67. In 1968 the relative importance of the flat glass products declined to somewhat more than half as a result of the consolidation in the LOF figures of certain subsidiaries.

The average profit rate of the four flat glass producers which together account for 85 percent of flat glass output is significantly above that for producers of durable goods, of motor vehicles and equipment, of lumber and wood products, and also above the average for the grouping in which they are included, stone, clay, and glass production.

Statement of Commissioner Clubb

Two points which are not treated elsewhere deserve discussion. 1/ The first relates to the interpretation of the statutory term "serious injury," and the second, to the remedies which the Trade Expansion Act permits in this case.

Serious injury

The sheet glass industry presents one of those unusual situations where domestic production and sales have not decreased substantially, but, nonetheless, the industry has been seriously injured within the

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1/ The facts of this case are well analyzed in the statements of my colleagues, and will not be further discussed here. The conclusions reached can be summarized as follows. First, I agree with Chairman Sutton and Commissioners Leonard, Newsom, and Moore that flat glass producers must be divided into four separate industries--rolled, plate and float, tempered, and sheet glass. Accordingly, separate determinations must be made with respect to each of these industries. Second, I agree with Commissioner Newsom, for the reasons stated in his opinion that--

1) rolled glass is not being imported in increased quantities within the meaning of the Trade Expansion Act;

2) the plate and float glass industry is not being seriously injured, or threatened with serious injury;

3) the tempered glass industry is not being seriously injured, or threatened with serious injury.

Finally, I agree with Chairman Sutton and Commissioner Moore that concession generated increased imports are causing serious injury to the domestic sheet glass industry, and that, if the injury is to be remedied by increasing the tariff on imported sheet glass, a duty of the amounts found by them would be required.

meaning of the Trade Expansion Act 1/ because it is unable "to operate at a level of reasonable profit." In effect, sales of domestic firms have been maintained in the face of increased price competition from imports only because the domestic producers have reduced their prices to such levels that, while some firms are doing well, profits for the industry as a whole have all but disappeared. If this trend continues, many existing domestic sheet glass plants probably will not be able to continue operations over the long term.

Both the Commission and the Congress have indicated that in such situations the serious injury standard of the statute is met. In the Commission's 1948 report to the Ways and Means Committee entitled "Procedure and Criteria with Respect to the Administration of the Escape Clause," the Commission said:

> It is particularly important to note that an increase in imports may cause or threaten serious injury notwithstanding the fact that production and employment in the competing domestic industry may remain undiminished. Production and employment may have been maintained only at the expense of cuts in wages or in profits, or both, sufficient to keep prices competitive with those of imports. Employers or employees, or both, may thus have suffered loss in income involving real injury.

1/ In the recent Piano report Commissioner Moore and I observed that--

> "serious injury for purposes of the Trade Expansion Act is an important, crippling, or mortal injury; one having permanent or lasting consequences. Such injuries are distinguished from the less important and temporary injuries which domestic concerns are expected to absorb without governmental assistance." Pianos, Inv. No. TEA-I-14 (Dec. 1969).

This point was underscored by Congress in the Trade Expansion Act of 1962. The bill as passed the House provided that, in determining whether a firm or industry had been seriously injured, the Commission was to take into consideration all economic factors, including "inability to operate at a profit." In the Senate this phrase was broadened to read "inability to operate at a reasonable profit level." 1/ This change suggests that Congress intended the Commission to find serious injury if the domestic industry is unable to realize sufficient profit to justify continuing in business on a long-range basis. Accordingly, it is incumbent upon the Commission to make a finding of serious injury in this case despite the fact that the domestic sheet glass industry has suffered only a modest decline in sales and production because the sharply downward trend of profits in the past few years makes it clear that a substantial portion of the industry cannot survive in the long run under present conditions.

Remedies

The Trade Expansion Act authorizes the President to provide two possible remedies for an industry seriously injured by imports. On the one hand, he can increase import restrictions, and on the other, he can grant trade adjustment assistance in the form of loans and tax relief to firms in the industry, and unemployment compensation,

1/ See the Conference Report on the Trade Expansion Act, H.Rept. No. 2518, 87th Cong., 2d Sess. (1962), p. 9.

retraining, and relocations allowances to the workers. 1/ It is important to note in this connection that, although the Act requires the Commission to determine the level of import restrictions which would be necessary to remedy the injury, 2/ this determination does not constitute a recommendation by the Commission that import restrictions, rather than trade adjustment assistance should be given the industry involved. On the contrary, in this case there appear to be several considerations which may indicate that adjustment assistance, rather than increased import restrictions should be used.

The first consideration is that one of the side effects of greater import restrictions on sheet glass would be an increase in

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1/ Section 302(a) provides,

> (a) After receiving a report from the Tariff Commission containing an affirmative finding under section 301(b) with respect to any industry, the President may--
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> (1) provide tariff adjustment for such industry pursuant to section 351 or 352,
> (2) provide, with respect to such industry, that its firms may request the Secretary of Commerce for certifications of eligibility to apply for adjustment assistance under chapter 2,
> (3) provide, with respect to such industry, that its workers may request the Secretary of Labor for certifications of eligibility to apply for adjustment assistance under chapter 3, or
> (4) take any combination of such actions.

2/ Section 301(e) provides,

> (e) Should the Tariff Commission find with respect to any article, as a result of its investigation, the serious injury or threat thereof described in subsection (b), it shall find the amount of the increase in, or imposition of, any duty or other import restriction on such article which is necessary to prevent or remedy such injury and shall include such finding in its report to the President.

the cost of housing in the United States. Higher tariffs on imported sheet glass would undoubtedly raise the price of both imported and domestic sheet glass. (Indeed, if they would not, it is questionable whether the higher tariffs would help the domestic sheet glass industry.) If the price were raised by the full amount of the tariff increase found necessary by the Commission, it would cost U.S. sheet glass consumers about $14 million annually. Since the greatest volume of sheet glass is consumed by the U.S. construction industry--and a large part is used in residential construction--import restrictions on sheet glass must ultimately be reflected in an increased cost of housing.

Second, the firms, workers, and communities which have suffered most from import injury, would likely gain less from higher tariffs than those who have remained healthy. Although the sheet glass industry as a whole has been seriously injured, this injury has been unevenly felt within the industry. Certain aggressive firms with modern plants are very healthy and need no assistance to compete effectively; others are continuing to show losses; still others have reduced production or have closed marginal plants. If a general increase in demand for domestic sheet glass were brought about by higher tariffs, the domestic firms and plants likely to benefit most would be those which are already healthy. At the very least such firms would benefit as much as their less healthy competitors. In contrast, adjustment assistance could be selectively used to benefit most those who have been injured most.

Finally, adjustment assistance could be granted over a relatively short time period, while there is a tendency for import restrictions to go on and on. In this connection it might be observed that this industry has already had the benefit of some form of escape clause protection since 1962, and still it is being seriously injured by imports. Adjustment assistance might well be able to solve the problem better in a quicker, less expensive manner.

Statement of Commissioner Leonard

Under section 301(b)(1) of the Trade Expansion Act of 1962, an affirmative finding by the Tariff Commission in a case must rest on affirmative determinations respecting each of 4 requisites:

1. Whether the article in question is being imported in increased quantities;

2. Whether the increased imports are a result in major part of concessions granted under trade agreements;

3. Whether the domestic industry producing an article which is like or directly competitive with the imported article is being seriously injured or threatened with serious injury; and

4. Whether the increased imports have been the major factor in causing or threatening to cause serious injury.

In the instant investigation, I have concluded that the case with respect to sheet glass fails to meet the fourth requirement set forth above, and the case with respect to plate and float glass, rolled glass, and tempered glass fails to meet the third requirement. Having so found, it is unnecessary for me to reach conclusions respecting the other statutory requirements.

The principal reasons for my finding with respect to sheet glass are set forth below. With respect to plate and float glass, rolled glass, and tempered glass, I agree with the reasons relating to the lack of serious injury given by Commissioner Newsom in his statement.

Sheet glass

U.S. demand for sheet glass is highly inelastic--derived predominantly from activity in the building construction and motor vehicle industries. Operations in the domestic sheet glass industry, in turn, are closely tied to the level of activity in the industries from which the demand for sheet glass is derived. The decline in U.S. shipments of sheet glass from 1964 to 1967, for example, was attributable primarily to a downturn in residential construction and automobile production in those years. An index (1957-59=100) of residential construction declined from 111 in 1964 to 92 in 1967, while that of automobile production, after rising from 151 in 1964 to 183 in 1965, declined to 146 in 1967 (see table 8); a corresponding index of shipments of sheet glass by domestic producers decreased from 116 in 1964 to 95 in 1967. In conjunction with the declining level of operations, the profits of the domestic sheet glass industry decreased appreciably. Aggregate annual profits declined from $18 million in 1964 to * * * in 1967; the ratio of such profit to net sales also dropped, from 13 percent in 1964 to * * * in 1967. Employment opportunities for U.S. workers in the manufacture of sheet glass were adversely affected; annual man-hours worked by production and related workers in sheet glass operations declined from 14 million hours in 1964 to 12 million hours in 1967.

In 1968 residential construction and automobile output in the United States reversed their trends, rising substantially. In 1968 residential construction was 15 percent greater (an index of 106), and automobile output, 20 percent greater (an index of 175), than in

1967. During the early months of 1969, residential construction was 6 percent higher than in the corresponding period of 1968, and automobile production was not far below the 1968 rate. In response, shipments of sheet glass by the U.S. producers rose moderately in 1968 and markedly in the first half of 1969. Aggregate operating profits of sheet-glass establishments in 1968 were double those in 1967. The employment provided production workers in sheet-glass plants was nearly the same in 1968 as in 1967; production and average output per man-hour, however, were higher.

Like domestic shipments, U.S. imports of sheet glass respond to changes in U.S. demand for the product, and thus are influenced by up- and down-turns in residential construction and automobile production. Annual imports of sheet glass at MFN rates declined from 445 million pounds in 1964 to 416 million pounds in 1967, following the lessening activity in the construction and automobile industries. Then, with the sharp increase in demand in 1968, imports at MFN rates rose to 582 million pounds in that year. Although demand continued to increase in the first half of 1969, imports, affected by a dock strike early in the year, were smaller than in the corresponding period of 1968.

Besides the generally adverse effect of changes in U.S. demand for sheet glass in recent years, the domestic sheet glass industry has been affected by the increasing competition of float glass in some of its major markets, particularly the automotive market. U.S. production of float glass has grown greatly since it was first manufactured domestically in 1964; shipments of float glass by domestic producers increased

from 72 million pounds in 1964 to 1,064 million pounds in 1968. Float glass has encroached materially on sales of heavy sheet glass and likely will continue to do so.

In the light of the circumstances described above, i.e., the changes in U.S. demand for sheet glass and the increasing competition from float glass, I have concluded that the increased imports have not been the major factor in causing or threatening to cause serious injury to the sheet glass industry.

Conclusion

To summarize then, my findings in this investigation are negative because in the case of sheet glass increased imports have not been the major factor in causing or threatening to cause serious injury, and in the case of plate and float glass, rolled glass, and tempered glass the domestic industry producing an article which is like or directly competitive with the imported article is not being seriously injured or threatened with serious injury.

Statement of Commissioner Newsom

The statutory provisions which the Tariff Commission must observe in reaching its findings in cases under section 301(b)(1) of the Trade Expansion Act of 1962 have been set forth frequently in earlier cases. Briefly, the law instructs the Commission to determine:

> 1. Whether the article in question is being imported in increased quantities;
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> 2. Whether the increased imports are a result in major part of concessions granted under trade agreements; and
>
> 3. Whether the increased imports have been the major factor in causing, or threatening to cause, serious injury to the domestic industry producing an article which is like or directly competitive with the imported article.

An affirmative finding in an investigation must rest on affirmative determinations respecting each of these requisites.

The statutory requisites thus are clear. The law is intended to afford the domestic producers relief from severe damage resulting in major part from the trade agreements program. It is not intended to provide shelter from all the vicissitudes of the economy and the market place. It is not intended to protect domestic interests from the ravages of inflation, the adverse impact of declining markets, or the cost of higher wages resulting from labor-management negotiations. In

reaching its findings, therefore, the Commission must weigh not only the consequences of trade agreement concessions, but also the effects of developments in the U. S. economy, changes in the specific market concerned, and actions by the domestic producers themselves.

The case at hand pertains to the major types of flat glass--sheet, plate, float, and rolled glass--and to tempered glass. Based on all of the data available to me, I have concluded that such increased imports of the products concerned as have occurred have not resulted in major part from U. S. tariff concessions and that the domestic industries involved are neither seriously injured nor threatened with serious injury.

The cause of increased imports

Most--not all--of the glass products involved in this case are being imported into the United States in increased quantities. Annual imports of sheet glass, plate and float glass, 1/ and tempered glass were all substantially larger in 1968 than in 1964. Entries of sheet glass at trade-agreement rates of duty amounted to 583 million pounds in 1968, compared with 445 million pounds in 1964; imports of plate and float glass were 178 million pounds in 1968, compared with 94 million pounds

1/ Although the circumstances relating to polished wire glass are not separately discussed in the body of my statement, the conclusions I have reached apply equally to that product.

in the earlier year, and those of tempered glass, 17 million square feet, compared with 1 million square feet. Imports of sheet glass and those of plate and float glass were somewhat smaller in the first half of 1969 than in the corresponding period of 1968; entries in 1969, however, were affected by a lengthy dock strike early in the year, and the short-term decline was not of such significance as to overturn the conclusion that the articles were being imported in increased quantities. Entries of tempered glass in the first 6 months of 1969 were larger than in the first half of 1968. In contrast to the above, annual U. S. imports of rolled glass, though fluctuating from year to year, did not increase during the 5-year period 1964-68. Entries of such glass in 1968 (61 million pounds) were a trifle smaller than in 1964 (62 million pounds); they were, moreover, some 20 percent smaller in the first half of 1969 than in the corresponding period of 1968. Even recognizing that annual imports of rolled glass in recent years have been far greater in quantity than those two decades earlier, the data do not support a finding that rolled glass is being imported in increased quantities, as required by the statute.

Although most of the products in question thus are being imported in increased quantities, such increases are not a result in major part of the trade agreement concessions that have been granted on those

products. Indeed, the major causes are to be found in the rise of prices and in the growth of demand in the U. S. market.

Like those of most products, the prices of flat glass have risen markedly during the period of the trade agreements program. Currently, the BLS wholesale price index of window glass is more than double that in 1947, and the index of plate glass is nearly 50 percent higher than in 1947. Indeed, in the recent years 1964-68, the U. S. wholesale prices of most types of flat glass rose as much as, or more than, the wholesale price index of all industrial commodities. The BLS price index of window glass, for example, was about 20 percent higher in 1968 than in 1964, while the index of all industrial commodities was only about 8 percent higher.

The increase in prices of the glass products here concerned in the U. S. market has had a dual effect. First, it has eroded materially the protective effect of U. S. import duties. Except for tempered glass and heavy plate and float glass, the applicable U. S. import duties are of the specific or compound type. Hence, as prices of glass have risen, the amount of duty collected--x cents per square foot or per pound--has become smaller and smaller relative to the export value of the imported glass products, as well as to the price at which they were sold in the

U. S. market. The accompanying decline in the restrictiveness of the U. S. import duties was unrelated to the trade agreements program and to U. S. tariff concessions. Second, the rising price levels have made the U. S. market attractive to foreign suppliers. As domestic producers have raised prices, often in an understandable attempt to cover increased wages and other costs, foreign producers have been encouraged to sell their products in the United States. This effect likely was particularly strong for those products whose growth in price has surpassed the average; the BLS price index (1957-59=100) of window glass, for example, was 138 in mid-1969, while the corresponding price index of all industrial products was 112.

Another factor unrelated to trade agreement concessions that has greatly influenced U. S. imports of flat glass and tempered glass has been the U. S. demand for those products. U. S. demand appears to be highly inelastic--derived predominantly from building construction and motor vehicle production. Long-run growth in demand has stimulated imports (as well as domestic output)--particularly of plate and float glass and tempered glass. In the 5-years 1964-68 alone, apparent annual U. S. consumption of plate and float glass combined rose by a half, and that of tempered glass by two-thirds. Such booming market conditions

served as a major stimulus to imports of those glass products.

The lack of serious injury

Flat glass is produced in the United States primarily by 6 companies; one is a large motor vehicle manufacturer and 3 others are large multi-product corporations. Tempered glass is produced by most of those firms, as well as a number of other companies. In section 301 investigations, however, the Commission--in determining whether the domestic industry is seriously injured, or threatened therewith--must concern itself with the economic well-being of the establishments in which the products concerned are produced. 1/

In the case at hand, my conclusion with respect to each of the glass products involved is negative.

Sheet glass.--After being hampered for several years by the declining consumption of sheet glass in the United States, the operations of the domestic sheet glass industry distinctly improved in 1968 and 1969. Shipments of sheet glass by the U. S. producers rose moderately in 1968 and pronouncedly in the first half of 1969. The strong market

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1/ See U. S. Congress, Trade Expansion Act of 1962: Report of the Committee on Ways and Means, House of Representatives, to Accompany H. R. 11970, House Report No. 1818 (87th Cong., 2d Sess.), 1962, p. 23, and U. S. Senate, Committee on Finance, Trade Expansion Act of 1962: Report Together with Individual Views [To accompany H. R. 11970], Report No. 2059 (87th Cong., 2d Sess.), 1962, p. 11.

demand in that period permitted prices to be increased sharply; the BLS wholesale index of window glass prices was 138 in the summer of 1969, much higher than the average index of 120 in 1967. The employment provided production workers in sheet-glass plants was slightly smaller in 1968 than in 1967, but production was higher, resulting in a 10-percent growth in average output per man-hour. Aggregate operating profits of sheet-glass establishments in 1968 were double those in 1967. The ratio of profits to sales were lower in 1967 and 1968 than in some previous years--evidencing the effect of high wage rates and other costs on the net income of the domestic producers, but not indicating the existence of serious injury, or threat of injury.

Plate and float glass. --Plate and float glass are directly and highly competitive with one another; they are used interchangeably in those thicknesses in which both are produced, and are priced alike in the market. Since float glass was first produced in the United States in 1964, its output has grown until it now accounts for more than half of the combined production of plate and float glass in the U. S. Although produced by different methods, plate and float glass should be regarded as a single article for purposes of this investigation.

Combined annual shipments of plate and float glass by U. S.

producers were at record levels in 1968. Shipments aggregated nearly 2.2 billion pounds in that year, the first time they had exceeded the 2 billion mark; they were some 40 percent greater in 1968 than in 1964. U. S. imports of plate and float glass have supplied only 5 - 8 percent of U. S. market in recent years, and their share of the market was declining in the latter part of 1968 and the first half of 1969. Prices generally rose in 1968 and 1969; they averaged about 8 percent higher in mid-1969 than at the close of 1967. In response to these favorable circumstances, the domestic plate/float glass industry recorded consistently high annual profits in the 5 years 1964-68; the ratio of profits to sales of plate and float glass ranged from 22 percent to 29 percent in those years. There is no evidence here of injury, or threat of injury, serious or otherwise.

On one score--employment--the trend was downward; that trend, however, only serves to highlight the competitive advantages of float glass. The annual number of man-hours worked by production and related workers in the manufacture of plate and float glass was about 7 percent smaller in 1968 than in 1964, although U. S. output of those products was about 40 percent larger. Hence, combined U. S. output per man-hour of plate and float glass was sharply higher during those

years. This shift, highly advantageous to the domestic producers, resulted from the increasing share of the combined output that consisted of float glass; the average U. S. output per man-hour of float glass in 1968 was nearly 3 times that of plate glass.

Rolled glass.--The domestic rolled glass industry has faced declining markets for its products in recent years. Apparent U. S. consumption of rolled glass amounted to 191 million pounds in 1968, compared with 221 million pounds in 1964. In these circumstances U. S. shipments of rolled glass have eased; they totaled 136 million pounds in 1968, compared with 156 million pounds in 1964. The domestic producers, then, have borne most of the market decline, and the decreased sales have had a moderately adverse effect on the profitability of their operations and the employment afforded workers. The aggregate profits earned by domestic producers on their sales of rolled glass were equivalent to 8 percent of net sales in 1968, while the corresponding ratio had been 18 percent in 1964; the profits earned on the total operations of the establishments in which rolled glass was produced, however, were consistently greater relative to sales than profits earned on rolled-glass sales, and annual profits of those establishments on all operations showed no inclination to decline during the 5 years 1964-68. Employment afforded

workers in the manufacture of rolled glass was about 15 percent lower in 1968 than in 1964, reflecting reduced production and slightly increased output per man-hour. The rolled glass industry is recovering from the effects of the 1964-67 decline in U. S. consumption. Shipments of rolled glass were materially larger in 1968 than in 1967, and the upward trend continued into 1969. Profits on domestic rolled glass operations also turned upward in 1968, both in aggregate amount and relation to net sales. The U. S. rolled glass industry, thus, has operated with mixed results in recent years, but the record does not warrant a conclusion that it has been seriously damaged; nor is there threat of such injury "as a result in major part of concessions granted under trade agreements".

Tempered glass. --The market for tempered glass is expanding rapidly in the United States, and it probably will continue to do so. A substantial part of the domestic demand--that for tempered glass for automobiles--is tied closely to motor vehicle production; this part of the market is largely assured to domestic producers (except for imports from Canada that may enter free-of-duty under the Automotive Products Trade Act of 1965), because of the need of the motor vehicle producers for an assured steady flow of components into the assembly plants. Another major part of domestic demand--that for residences

and other buildings--has been stimulated by the growing number of state laws requiring the use of safety glazing materials in specified locations.

In response to the increased demand of recent years, annual shipments of tempered glass by domestic producers have expanded markedly. In 1968, the producers shipped nearly 350 million square feet--about half again the volume they had shipped in 1964. Although gross imports have increased, they supplied only 5 percent of the U. S. market in 1968. Prices generally have been stable or increased moderately in recent years. Employment provided workers in the production of tempered glass has risen considerably--approaching 12 million man-hours in 1968, compared with 8 million in 1964. The profits of the domestic tempered glass industry have not been robust in recent years. However, after aggregate losses equivalent to 3.5 percent of sales in 1966, the profit picture has distinctly improved; aggregate profits on sales of tempered glass by U. S. producers were nearly $4 million in 1968, or 2.3 percent of net sales. The independent temperers--those that do not produce flat glass--have generally had good profit records. Profits earned by independent temperers on tempering operations, rose from 4.5 percent of net sales in 1964, to 7.5 percent in 1968. The profit-and-loss experience of the U. S. establishments in which tempered glass is produced

on their total operations, moreover, has been distinctly superior to the earnings on tempered glass alone. These data reflect expanding operations by a viable industry; one not being seriously injured, nor threatened with such injury.

INFORMATION OBTAINED IN THIS INVESTIGATION

Description of Products

The imported products covered by this report are cast or rolled glass and drawn or blown (sheet) glass, in rectangles, weighing over 4 ounces per square foot; ground or polished (plate and float) glass, in rectangles; and toughened (specially tempered) glass made of flat glass. 1/ Rolled, sheet, plate, and float glass collectively will be referred to hereafter as flat glass, and toughened (specially tempered) glass, as tempered glass.

Rolled glass

Cast or rolled glass is flat glass that has surface irregularities impressed by the rollers used to form it. These irregularities, which make rolled glass translucent, may form either patterns or simply a rough surface texture; they may be impressed on both sides of the glass, or only on one side, the other having a smooth surface. The bulk of the rolled glass produced in the United States has a surface pattern or rough texture on only one side. A variety of patterns are impressed on rolled glass; the most common are those which have a mottled, ribbed, hammered, or fabric design.

1/ Tempered glass can be made not only from the flat glass covered by this investigation but also from flat glass that has been cut to non-rectangular shapes or that has been subject to bending, curving, beveling, edging, notching, drilling, chipping, sanding, embossing, engraving, etching, coating, staining, enamelling, painting, decorating, or any combination thereof.

The purpose of the surface irregularities is to diffuse light and reduce glare. Rolled glass is used for decorative as well as utilitarian purposes; it is generally employed where transparency is unnecessary or objectionable but where light is needed, as in skylights, factory windows, office partitions, lavatories, and corridors. It is also used in lighting fixtures, jalousies, bath and shower enclosures, and sliding doors for closets and partitions.

Some rolled glass is produced with wire netting embedded in it. The wire mesh adds strength to the glass and makes it more resistant to shock. When wire glass is broken, the mesh holds the pieces of glass together, thereby preventing injuries to persons. This type of glass is widely used where there is danger of fire or explosion; it is commonly used in terminals, power plants, factories, and subways. Wire glass is available in most of the common patterns in which plain rolled glass is furnished. The wire may be in the form of a twisted chicken wire or a welded diamond or square-shaped mesh.

Rolled glass may be corrugated. In such form it is used in skylights and interior and exterior partitions. The corrugated glass used for roofs and skylights is usually wired.

Colored rolled glass is known in the trade as cathedral, opalescent, opal, or ornamental glass; heat-absorbing rolled glass is also produced. The first group is produced in a great variety

of colors and surface textures; it is used principally in decorative or church windows and in light fixtures. Heat-absorbing glass filters out a part of the sun's heat by reradiation, thus providing cooler interiors; it transmits that portion of the color spectrum most restful to the eyes--blue, green, and yellow.

Rolled glass varies in thickness from 1/8 inch to 3/8 inch; it is regularly offered for sale in thicknesses of 1/8, 7/32, 1/4, and 3/8 inch. Wire glass is usually made 7/32-, 1/4-, and 3/8-inch thick; corrugated glass is usually 3/8-inch thick; and colored glass is usually available in thicknesses of 1/8 or 1/4 inch.

A rough-surfaced flat glass--rough plate glass blanks, produced by plate glass manufacturers as an intermediate stage in the production of plate glass (except in the twin-grind method)--is sold as rolled glass without further processing. The blanks are generally used where rolled glass is customarily installed chiefly in exterior or interior partitions. The blanks are produced by a method similar to that used to produce rolled glass; the blanks, however, are available in much larger sheets than rolled glass.

Sheet glass

Sheet (drawn or blown) [1/] glass is a transparent flat glass. It may be either clear or colored. Its fire polished surfaces are

1/ Blown glass, which is made by hand production methods, is now virtually obsolete.

smooth, which distinguishes it from rolled glass, and are not ground and polished, which distinguishes it from plate glass. Sheet glass has discernible distortion or waves, which distinguishes it from both plate glass and float glass.

The great variety of uses for sheet glass require many thicknesses and sizes. Thicknesses range from 0.03 inch to 1/2 inch, while sizes (surface area) range from less than a square inch to many square feet.

For the purpose of this report, sheet glass is divided into three thickness (weight) categories:

(1) Glass weighing over 4 ounces but not over 16 ounces per square foot, hereinafter referred to as thin sheet glass. It is used for picture glass, microscope-slide glass, photographic dry plates, and small mirrors. It is also used to a limited extent in small-size and/or low-quality storm windows.

(2) Glass weighing over 16 ounces but not over 28 ounces per square foot, hereinafter referred to as window glass. It is used chiefly for glazing windows, doors, and storm sash in residential construction. Window glass for such uses is subdivided chiefly into single strength glass weighing 18 or 19 ounces per square foot and double strength glass weighing 24 or 26 ounces per square foot; the two weights in each strength (e.g., 18 or 19 ounce glass) are used interchangeably. Window

glass is also used in making non-automotive laminated glass (safety glass consisting of sheet glass with a plastic interlayer), pinball machine covers, and double-glazed insulating glass.

(3) Glass weighing over 28 ounces per square foot, hereinafter referred to as heavy sheet glass. It is used to glaze large openings such as glass patio doors and the glass panels frequently found adjacent to them. Heavy sheet glass is often tempered (specially toughened) and, in that form, is used extensively in the side and rear windows of many automobiles.

Plate and float glass

Plate glass is rolled glass that has been ground and polished to make the glass transparent and render its surfaces virtually plane and parallel, thereby eliminating most of the distortion found, in various degrees, in sheet glass. Float glass is transparent flat glass having plane and parallel surfaces virtually comparable to those of plate glass. The parallel surfaces of float glass are obtained by floating a layer of molten glass on molten metal rather than by grinding and polishing.

Plate and float glass, which are generally interchangeable, are used principally to make laminated windshields and tempered side and rear windows of motor vehicles, to glaze large openings such as store display windows and so-called curtain walls, and to make high quality mirrors.

To meet its many uses, plate glass is made in many thicknesses ranging from 1/8 inch to 1-1/4 inches. The principal thicknesses available are 1/8, 3/16, 1/4, 3/8, 1/2, 5/8, 3/4, and 7/8 inch. Also available, but not from all sources, are 1 inch and 1-1/4 inch thicknesses. At the present time float glass is produced principally in 1/4 inch thickness, although some 1/8 inch and 3/16 inch float glass is made.

Plate glass containing wire netting is usually referred to as polished wire glass. This glass is comparable to rolled wire glass, except that it is transparent. Polished wire glass is available in 1/4 inch thickness. Float glass containing wire netting is not produced.

Tempered glass

Tempered glass is a type of safety glass made by specially processing flat glass to increase its strength. When broken, tempered glass disintegrates into small round-edged pieces, minimizing the danger of serious injury.

Tempered glass cannot be cut or drilled as it will shatter when its surface is penetrated, nor can it be bent or otherwise altered in form without losing its temper. All tempered glass products must be sized and formed before tempering.

Tempered glass is used principally for glazing motor vehicle windows other than windshields. It is used extensively in homes for

interior and exterior doors, shower enclosures and large fixed glass panels. Tempered glass is also used in miscellaneous industrial applications requiring glass with high thermal resistance, such as in molds used in making plexiglass (an acrylic resin product).

Production Processes

Except for some rolled glass, flat glass is made today on continuous production lines. Once production is started, it continues around the clock until interrupted by breakdown or shutdown. Flat glass production lines cannot be shifted from one type of flat glass to another; 1/ a sheet glass line, for example, cannot be used to produce plate, float, or rolled glass.

Essentially, a flat glass producing line consists of a melting furnace or tank, drawing, rolling, or floating equipment, and cutting equipment. In all flat glass production lines, the molten glass is made by fusing a mixture of silica sand and other materials at high temperatures; the proportions of these materials used in the "batches" or mixtures vary according to the type of glass produced. In most U.S. plants the batch is emptied into the melting end of a "continuous" or tank furnace. These furnaces are large refractory-lined tanks that are usually divided into three compartments: (1) the melting compartment, in which fusion of the raw materials occurs; (2) the refining

1/ An exception is that rolled glass in the form of rough plate glass blanks are produced on a plate glass line.

compartment, in which at higher temperatures, the impurities in the molten glass are removed; and (3) the working compartment, in which the molten glass is kept at the proper temperature for rolling or drawing.

Rolled glass

In the continuous process of making rolled glass, the molten glass flowing from the furnace in the form of an endless ribbon is made to pass between two rollers. One or both sides of the glass are impressed with the desired pattern. The ribbon of glass continues on through an annealing lehr; it is then inspected and cut to the desired size.

A few U.S. companies produce small quantities of colored rolled glass by an intermittent process. Molten glass is withdrawn from a furnace by means of large iron ladles and poured on a flat cast-iron table. Immediately a massive iron roller passes over the plastic glass, rolling it into sheets or slabs of the desired thickness. The design is impressed into the glass, usually by configurations on the surface of the table rather than on the roller. The slab then passes through an annealing lehr, after which the glass is inspected and cut into stock sheets or cut sizes.

Sheet glass

Three processes, fundamentally the same, are used to draw sheet glass. In the Colburn process, a ribbon of glass from 7 to 9 feet

wide is pulled upward from the working end of the tank, bent 90° over a bending roll, and then drawn horizontally over a series of rollers through a long lehr. In the lehr, the glass is gradually annealed so that the internal stresses formed when the glass was first cooled are largely removed. At the end of the lehr, the glass is cut into desired sizes.

In the Fourcault process, a ribbon of glass is drawn upward through a slot in a refractory block, or débiteuse, which floats on the molten glass in the working end of the tank. The glass is pulled upward between a series of asbestos-covered rollers placed in pairs above the drawing block. The rollers are enclosed in a boxlike structure which retains the heat and thus serves as an annealing lehr. These rollers extend upward for about 20 feet to a platform where the glass is cut.

The third method--the Pittsburgh Plate process--differs only slightly from the Fourcault process. A draw bar, instead of a débiteuse, is used for drawing the glass. The draw bar, submerged below the surface of the molten glass in the working end of the tank, forces the glass to flow evenly over its surface as the ribbon of glass is pulled upward by knurled rollers that engage both edges of the sheet. The series of rollers extend upward to a height somewhat greater than that in the Fourcault process, carrying the glass through an annealing lehr. In June 1969 a domestic sheet glass

manufacturer (PPG Industries) announced that by modifying the glass drawing process it is able to produce sheet glass 1/8 inch and less in thickness that is competitive in quality and cost with float glass.

Plate glass

Most plate glass, including polished wire glass, is currently produced by a continuous horizontal rolling process. Molten glass passes over a weir or through a refractory slot which gives it a preliminary shape, and then passes between a pair of water-cooled rollers which gives it the proper thickness and width. 1/ After passing through a continuous roller lehr for annealing and cooling to room temperature, the ribbon of glass is ready for grinding and polishing.

Two methods of grinding and polishing plate glass are currently in use--the single side and the twin processes. In the twin process, the uncut ribbon of glass moves via conveyor belt to a twin grinding area where both sides of the ribbon are ground simultaneously, then to the polishing area where both sides are polished simultaneously. In the single-side method, the ribbon of glass is cut into standard lengths (rough blanks) as it leaves the annealing lehr. The rough blanks are set in plaster on the grinding table, moved through the grinding machines, and on to the polishing machines. The rough blanks are cleaned, turned over, and replaced on the grinding table for a repeat process on the second side.

1/ Wire glass is made by feeding the wire netting between the rollers simultaneously with the plastic glass as it flows from the melting furnace.

Float glass

In the float process, molten glass from the melting furnace is floated on a bath of molten metal in a controlled atmosphere chamber. The bath and atmosphere are maintained at a sufficiently high temperature to melt out surface irregularities and restore a fire finish to the surface of the glass. The ribbon moves from the bath to an annealing lehr and then to the cutting area where it is cut into desired sizes.

Tempered glass

Two basic processes are used for tempering glass--thermal and chemical. In the thermal process the glass is heated to just below its softening point--it must be rigid enough to avoid serious deformation yet fluid enough to relax internal stresses rather quickly--then rapidly quenched by jets of air. As the glass cools the core remains in tension, while the outer surfaces are in compression. The resulting product is 3 to 5 times stronger than ordinary glass of the same thickness. In chemical tempering, surface compression is brought about by making chemical changes in the glass surface. Chemical tempering can produce stronger and more flexible glass than thermal tempering, but is more expensive.

Presently, four different methods are used in forming thermally tempered glass:

(1) The conventional vertical furnace, used for tempering flat pieces of glass.

(2) The horizontal gravity mold furnace, used primarily for tempering curved back windows for automobiles.

(3) The press form process, used primarily for curved side windows of automobiles; and

(4) The gas hearth process, used for tempering flat pieces of glass, and curved side windows for automobiles.

Extent of Competition between Types of Flat Glass

Consumers of flat glass generally are unable to distinguish between plate and float glass, and these types of flat glass are interchangeable when available in the same thickness and surface area. Currently each of the major sources of flat glass quotes identical prices for plate and float glass of comparable specification. For some purposes (e.g., automobile side and rear windows, mirrors, table and desk covers) plate, float, and heavy sheet glass are all used. The selection of one type of flat glass over another is based on both quality and price considerations; price is the predominant factor in many cases, particularly where small surface areas are involved.

In recent years tempered glass has replaced laminated glass in automobile side and rear windows. The substitution of tempered glass for laminated glass, however, has not altered the aggregate demand for flat glass, but has changed the demand for certain thicknesses and types of flat glass. Laminated automobile side windows are made

from two pieces of glass, one usually single strength and the other double strength window glass; tempered automobile side windows are made from a single piece of glass weighing over 28 ounces per square foot.

U.S. Customs Treatment

Current rates of duty

The current U.S. most-favored-nation (MFN) rates of duty 1/ applicable to imports of flat glass other than sheet glass and to tempered glass are the second stage rates negotiated in the recent Kennedy Round trade conference. These rates were placed in effect on January 1, 1969. The current rates applicable to sheet glass except that weighing over 16 ounces but not over 28 ounces per square foot (window glass) and measuring not over 100 united inches 2/ are trade-agreement rates restored by the President on January 11, 1967. Sheet glass weighing over 16 ounces but not over 28 ounces per square foot and measuring not over 100 united inches (which generally accounts for more than half of the U.S. consumption of sheet glass) is dutiable at modified escape-action rates proclaimed by the President on January 11, 1967. 3/ These modified escape-action rates will

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1/ Glass imported from countries or areas designated as Communist dominated or controlled is subject to higher rates of duty (shown in the "statutory rate" column of tables 1 and 2) than glass imported from countries eligible for MFN tariff treatment.

2/ The number of "united inches" is the sum of the length and width of a rectangle of sheet glass.

3/ In this report the term modified escape-action rates will be used to describe the currently applicable rates of duty on window glass measuring not over 100 united inches, which were proclaimed by the President on Jan. 11, 1967.

terminate on December 31, 1969, unless the President acts, pursuant to Section 351(c)(2), to extend them (see the later section on trade-agreement concessions).

Rolled glass.--Ordinary rolled glass is dutiable at 0.5 cents per pound; colored or special rolled glass, except opaque and measuring over 15/64 inch in thickness, is subject to the same specific duty plus 2 percent ad valorem (table 1). Based on imports in 1968, the average ad valorem equivalent of the rate on ordinary rolled glass was 7.9 percent, and the equivalent of the rate on the colored or special glass was 6.1 percent. Opaque rolled glass measuring over 15/64 inch in thickness is dutiable at 0.95 cent per pound; the average ad valorem equivalent of this rate was 8.6 percent.

Sheet glass.--The rates of duty currently applicable to ordinary sheet glass imported from countries eligible to receive MFN tariff treatment are specific rates that range from 0.7 cent to 1.5 cents per pound. The average ad valorem equivalents of the individual rates, based on imports in 1968, range from 2.6 to 25.5 percent. Imports of colored or special sheet glass weighing over 16 ounces per square foot, which have constituted a minor part of U.S. imports of sheet glass in recent years, are subject to the same specific rates as ordinary sheet glass plus a duty of 2.5 percent ad valorem. 1/ The average ad valorem equivalents of the modified escape-action rates

1/ Colored or special sheet glass weighing not over 16 ounces per square foot is subject to a higher specific rate of duty than ordinary sheet glass of comparable thickness; it is not subject to any additional ad valorem rate.

applicable to ordinary sheet glass weighing over 16 ounces but not over 28 ounces per square foot and measuring not over 100 united inches range from 18.6 to 25.5 percent; the average ad valorem equivalents of the modified escape-action rates applicable to colored or special glass of the same weights and surface areas ranged from 4.2 to 8.4 percent.

Plate and float glass.--Ordinary plate and float glass containing wire netting (polished wire glass) is dutiable at 5 cents per square foot. The average ad valorem equivalent of this rate, based on imports in 1968, is 6.4 percent. Ordinary plate and float glass not containing wire netting and measuring not over 15/32 inch in thickness is dutiable at one of three specific rates, 2.8 cents, 4 cents, or 4.4 cents per square foot, depending on the surface area (table 1). The average ad valorem equivalents of the individual rates, based on imports in 1968, range from 8.8 percent to 12.0 percent. Imports of colored or special glass measuring not over 15/32 inch in thickness (including glass containing wire netting) are subject to the same rates as ordinary glass plus 2 percent ad valorem. Plate and float glass measuring over 15/32 inch in thickness is dutiable at 16.5 percent ad valorem for ordinary glass (excluding that containing wire netting), and 18.5 percent ad valorem for colored or special glass.

Tempered glass.--Imports of tempered glass, except Canadian articles that are original motor-vehicle equipment, are dutiable at 17.5 percent ad valorem (table 1). Imports of Canadian tempered glass

for use as original equipment in the manufacture of motor vehicles are duty free pursuant to the provisions of the Automotive Products Trade Act of 1965.

Trade-agreement concessions

Pre-TSUS concessions.--The rates of duty applicable to flat glass and tempered glass were subject to several tariff concessions prior to August 31, 1963, the effective date of the TSUS.

Rolled glass.--The 1930 statutory rate of 1.5 cents per pound on ordinary rolled glass was reduced by 50 percent to 0.75 cents per pound, effective January 1, 1948 under the General Agreement on Tariffs and Trade (GATT). Later this rate was further reduced by 15 percent to 0.625 cent per pound in three annual stages; the final stage became effective on June 30, 1958. Colored or special opaque rolled glass measuring over 15/64 inch in thickness was dutiable at the rates applicable to plate glass.

Sheet glass.--The statutory rates established by the Tariff Act of 1930 ranged from 1-7/8 cents per pound to 3-3/4 cents per pound depending on the surface area of the piece of glass. In 1932 these rates were reduced by 25 percent by Presidential proclamation pursuant to section 336 of that act. The section 336 rates were in turn reduced by approximately 30 percent from April 16, 1938 to April 21, 1939 pursuant to a trade agreement with Czechoslovakia. Under the GATT, effective January 1, 1948, the rates established under the Czechoslovakian agreement (with minor exceptions) were reestablished. The

rates were reduced by an average of about 24 percent effective June 6, 1951, and by an average of 13 percent in three annual stages, the final stage becoming effective June 30, 1958.

In June 1962, pursuant to escape-clause procedure, the President increased the rates of duty on imported sheet glass. The percentage increase varied from 71 to 150 percent depending on the thickness and surface area, but on the average the rates were approximately doubled. In January 1967 the President restored the concession rates of duty on thin sheet glass, heavy sheet glass, and window glass measuring over 100 united inches. The rates of duty on window glass measuring not over 100 united inches were reduced an average of 16 percent, but the escape-action increases were not completely eliminated. The modified escape-action rates will terminate on December 31, 1969 unless the President acts to extend them. The elimination of these rates would result in a reduction of approximately 33 percent in the rates of duty applicable to window glass measuring not over 100 united inches (table 3).

Plate and float glass. 1/--The 1930 statutory rates on ordinary plate glass containing wire netting ranged from 15 cents to 23 cents per square foot. These rates were first reduced by approximately 33 percent in the trade agreement with Belgium, effective May 1, 1935. They were further reduced under the GATT by 50 percent, effective January 1, 1948, and by 20 percent in two stages during

1/ Prior to Aug. 31, 1963, the effective date of the TSUS, float glass was classified as sheet glass for tariff purposes; it is classified with plate glass under the TSUS. Float glass first became an article of commerce in 1960.

1963-64 (the final stage becoming effective January 1, 1964). Ordinary plate glass not containing wire netting was originally dutiable under the Tariff Act of 1930 at various specific rates depending on surface area ranging from 12-1/2 cents to 19-3/4 cents per square foot; such glass measuring 1/2 inch or more in thickness was also subject to a minimum rate of 50 percent ad valorem. The specific rates were reduced by approximately 33 percent in the 1935 trade agreement with Belgium, and by 50 percent, effective January 1, 1948 under GATT. In 1956-58 these rates were reduced by 15 percent in three annual stages; the final stage became effective June 30, 1958. The minimum ad valorem rate applicable to plate glass 1/2 inch or more in thickness was reduced from 50 percent to 25 percent ad valorem, effective January 1, 1948, and was further reduced in three stages during 1956-58 to 21 percent, the final stage becoming effective June 30, 1958.

Colored or special flat glass, except rolled opaque glass measuring over 15/64 inch in thickness, was originally subject to an additional duty of 5 percent ad valorem under the Tariff Act of 1930; this duty was reduced to 2-1/2 percent ad valorem effective June 6, 1951.

Tempered glass.--Tempered glass was not specifically provided for in the U.S. tariff prior to the establishment of the TSUS; however, tariff concessions were granted on the provisions under which tempered glass was classified. Ordinary tempered glass was

originally dutiable at 50 percent ad valorem under the Tariff Act of 1930; the rate was reduced to 40 percent ad valorem in 1948, to 25 percent in 1951, and in three annual stages to 21 percent, effective June 30, 1958. Colored or special tempered glass was reduced to 30 percent from the 1930 statutory rate of 60 percent, effective April 21, 1948 for such glass valued over $1.66-2/3 each and September 10, 1955 for such glass valued not over $1.66-2/3 each. The two rates were consolidated into one rate under the TSUS--22 percent ad valorem, effective August 31, 1963.

Kennedy-Round concessions.--During the Kennedy-Round trade conference, tariff concessions were granted on the rates of duty applicable to the products covered by this investigation other than sheet glass. The specific rates applicable to ordinary rolled glass and plate and float glass were each reduced by 50 percent (table 1). The specific part of the compound rates applicable to colored or special rolled, plate, and float glass were also reduced by 50 percent; the ad valorem part of these rates was reduced from 2.5 percent to 1 percent. The rate of duty applicable to tempered glass was reduced from 22 percent to 11 percent ad valorem. All of these reductions are being put into effect in five annual stages. The second stage was placed in effect on January 1, 1969; the final stage is scheduled to become effective on January 1, 1972.

Automotive Products Trade Act of 1965 (APTA).--Tempered glass is the only type of glass covered by this investigation that comes within the scope of the Automotive Products Trade Act of 1965. Since January 19, 1965 Canadian tempered glass that is a fabricated component intended for use as original equipment in the manufacture in the United States of a motor vehicle has been granted duty-free entry.

U.S. Producers

Flat glass and tempered glass, combined, are produced in the United States by 29 companies. U.S. production of these products is highly concentrated. Only 8 of the 29 companies operate glass melting furnaces of substantial size with which to produce raw glass. The combined production of 4 of these companies accounts for over 87 percent of the U.S. output of sheet glass, nearly 100 percent of the plate glass, and over 50 percent of the rolled glass. Three of the 4 companies account for the total production of float glass. Tempered glass is produced by 21 of the 29 companies. Three producers of flat glass, however, account for over 78 percent of the total U.S. output of tempered glass.

The share of the U.S. shipments (including intracompany transfers) in 1968 of the various types of flat glass and of tempered glass accounted for by each company is shown in the following tabulation:

* * * * * * *

Overall, three firms largely dominate U.S. production of flat glass. Two--PPG Industries, Inc., and Libbey-Owens-Ford Company--are large multiproduct firms producing both a wide range of flat glass products (sheet, plate, float, and rolled glass, and tempered glass), and products other than glass. These two concerns participate in foreign production of flat glass through arrangements ranging from process licensing agreements to co-ownership with foreign companies of plants that produce flat glass. The third firm--Ford Motor Company--produces float, sheet, and tempered glass primarily for use in its production of automotive vehicles, but secondarily for sale to the trade.

Three smaller firms--American Saint Gobain Corp. (ASG), Rolland Glass Co., and Harding Glass Co. (the latter two operating as Fourco Glass Co.)--produce substantial quantities of flat glass. One (ASG) produced plate, sheet, and rolled glass, as well as tempered glass. The other two firms produce sheet glass; one also produces tempered glass on a very limited scale.

Six of the remaining 23 firms are essentially producers of rolled glass. One of these firms-- * * * --accounts for about one-third of the U.S. production of rolled glass and over one-half of the U.S. production of polished wire glass; it has recently commenced production of tempered glass. Four of the other five firms produce colored rolled glass for use in decorative windows; the fifth firm began production of rolled glass in 1967.

The remaining 17 firms which do not produce flat glass produce the tempered glass covered in this investigation. One of these firms is a motor vehicle manufacturer (Chrysler Corp.) producing tempered glass almost exclusively for its own use. Three other firms produce tempered glass primarily for the automobile industry while the remainder produce tempered glass for uses other than automotive. Many of these firms also produce non-tempered products fabricated from flat glass, in addition to products not composed of glass.

A few firms not mentioned above produce very small quantities of flat glass for their own use. A few others purchase small quantities of rough flat glass and process it, usually by grinding and polishing.

On June 30, 1969, U.S. producers were operating 12 plants producing sheet glass, 3 plants producing plate glass, 3 plants that produce float glass, 4 plants producing both plate and float glass, and 1 plant producing float and sheet glass. Rolled glass was being produced in 8 plants, 5 of which account for the great bulk of the production of such glass. Small quantities of rolled glass (rough plate glass blanks) were also being produced in some of the plate glass plants.

Since 1964, 8 plate glass lines and 1 sheet glass line have been dismantled in the United States. Nine new float glass lines have been built; 3 have been constructed in the same locations as former plate glass lines, and 1 in the same location as a sheet glass line. Four float glass lines are currently under construction; three are being

built by flat glass producers, and the fourth by a non-flat glass producer (Guardian Industries, Inc.). In 1967 a new rolled glass plant was established by a non-glass producing firm.

On June 30, 1969 tempered flat glass was produced in 40 plants in the United States. Fifteen of these plants, which accounted for about 80 percent of annual production, were owned by U.S. flat glass producers. Flat glass was produced in 12 of the 15 plants. The remaining 25 plants were owned by non-flat glass producing firms. Several firms have announced plans for expanding existing production facilities or building completely new plants.

The location of flat glass producing plants is determined by a number of factors. Some of the plants are located adjacent to the principal manufacturing industries they serve, while others are located to serve advantageously a particular geographical area. Considerations such as local wage rates, fuel costs, access to transportation facilities, and availability of raw materials help determine actual plant sites within an area.

The following tabulation shows the number and distribution of flat glass and tempered glass production facilities in the United States on June 30, 1969.

State	Flat glass					Tempered glass
	Sheet	Plate	Float	Rolled	Total	
Arkansas	1	-	-	-	1	1
California	1	-	1	1	3	11
Colorado	-	-	-	-	-	1
Florida	-	-	-	-	-	3
Georgia	-	-	-	-	-	1
Illinois	1	1	1/	-	2	4
Indiana	-	-	-	1	1	1
Louisiana	1	-	-	-	1	-
Maryland	-	1	1	-	2/ 1	-
Michigan	-	-	1	-	1	4
Missouri	-	1	1	1	2/ 2	1
New Jersey	-	-	-	-	-	1
Ohio	1	2	2	1	2/ 4	3
Oklahoma	2	-	-	-	2	-
Pennsylvania	1	1	1	1	4	4
Tennessee	1	1	1	2	3/ 4	2
Texas	-	-	-	-	-	1
Virginia	-	-	-	-	-	1
West Virginia	4	-	-	1	5	1
Total	13	7	8	8	31	40

1/ One under construction.
2/ Plate and float glass produced in the same plant.
3/ Sheet and float glass produced in the same plant.

Capacity

The theoretical aggregate annual capacity 1/ of the U.S. producers to manufacture flat glass was about an eighth larger in 1968 than in 1964. The current U.S. furnace capacity to produce sheet glass and rolled glass, and the combined capacity to produce plate and float glass, is larger than in 1964. Although statistical data are not available, the annual U.S. capacity to produce tempered glass, based on the number of

1/ Theoretical annual capacity is that quantity of glass that can be produced by operating the plant 24 hours a day for 365 days.

tempering furnaces, is known to be materially larger in 1969 than in 1964. Theoretical plant capacity, U.S. production, and apparent U.S. consumption of the types of glass subject to this investigation in 1964 and 1968 are shown in the following tabulation.

Item	1964	1968 1/
Sheet glass industry:		
Capacity----------1,000 short tons--	1,393	1,545
Production----------do--------	777	681
Apparent consumption----------do--------	1,001	973
Plate glass:		
Capacity----------1,000 short tons--	1,980	1,114
Production----------do--------	790	544
Apparent consumption----------do--------	2/	2/
Float glass:		
Capacity----------1,000 short tons--	118	1,303
Production----------do--------	39	542
Apparent consumption----------do--------	2/	2/
Plate and float glass:		
Capacity----------1,000 short tons--	2,098	2,417
Production----------do--------	829	1,076
Apparent consumption----------do--------	832	1,154
Rolled glass:		
Capacity 3/----------1,000 short tons--	269	280
Production 4/----------do--------	101	5/ 89
Apparent consumption 4/----------do--------	134	117
Tempered glass:		
Capacity----------No. of furnaces--	115	142
Production----------1,000 sq. ft.--	218,386	349,129
Apparent consumption----------do--------	215,885	356,070

1/ Capacity shown is for facilities existing on June 30, 1969.
2/ Not available.
3/ Furnaces primarily producing rolled glass.
4/ Includes rolled glass, rough plate glass blanks, and polished wire glass.
5/ Estimated. Data from one large producer not available.

Theoretical annual capacity is not an exact measure of the quantity of flat glass the U.S. industry could actually produce in a year. U.S. output cannot attain theoretical capacity because of regularly occurring furnace shut-downs for rebuilding, repairs, or modification, as well as limitations resulting from the deterioration of furnaces as they become older.

Theoretical annual capacity of U.S. plants to produce sheet glass increased from 1.4 million short tons in 1964 to 1.5 million short tons in 1969. The establishment of a new plant in California accounted for the major share of the increase in capacity; however, modifications to existing facilities to improve product quality and productivity also resulted in an increase in capacity. Regularly occurring furnace shut downs for rebuilding, repairs, and mofifications were equivalent to 5 percent of plant capacity in 1964 and 10 percent in 1968.

Thirty sheet glass furnaces were available for production on June 30, 1969; 26 were being used to produce glass for sale and one was operated for research purposes. The three remaining furnaces, although shut down, were available for production should circumstances warrant. Between 1964 and 1968, 4 sheet glass furnaces were dismantled. 1/

The annual U.S. capacity to produce plate and float glass has undergone marked changes since 1964. Plate glass capacity declined from 2.0 million tons a year in 1964 to 1.1 million tons in 1969. This

1/ One of these furnaces was converted to the production of float glass.

decline was accompanied by an increase in float glass capacity from 0.1 million tons in 1964 to 1.3 million tons in 1969. In the aggregate, annual U.S. capacity to produce both plate and float glass increased from 2.1 million tons in 1964 to 2.4 million tons a year in 1969. Regularly occurring furnace shut downs for rebuilding, repair, or modification were equivalent to 13 percent of annual capacity in 1964 and 9 percent in 1968. Nearly all of these shut downs occurred in furnaces producing plate glass.

Plate glass furnaces no longer needed have generally been converted to float glass furnaces or dismantled, rather than placed in standby. In 1969 there were no idle plate glass or float glass furnaces. One plate glass furnace, however, has been operating on an intermittent basis in recent years.

Annual U.S. plant capacity to produce rolled glass cannot be accurately determined because most furnaces producing plate glass can also produce rolled glass. The annual theoretical capacity of those plants which principally produce rolled glass, however, increased from 269,000 tons a year in 1964 to 280,000 tons a year in 1969, principally because a new rolled glass plant began production during this period. Ten furnaces were available for production in 1969; 7 were in production. Data on shut downs for repairs or modifications are not available.

The capacity of a tempering furnace is extremely difficult to calculate because of the varied shapes and sizes of glass that are tempered in an individual furnace. One indication of the industry's ability to produce tempered glass is the number of furnaces available to produce such glass. The number of tempering furnaces in operation in 1969 was 143, 28 more than in 1964.

Capital Investments

U.S. glass producers have expended $230 million since the end of 1963 on capital investments in flat glass and tempered glass facilities. Expenditures for new production facilities (largely float glass plants) accounted for 63 percent of the total; the remainder was spent to improve existing production facilities. Of the total expenditures, 64 percent was devoted to float glass facilities, 16 percent to tempered glass facilities, 14 percent to sheet glass facilities, 5 percent to plate glass facilities, and 1 percent to rolled glass facilities. The aggregate value of new investment by the U.S. producers of flat glass and tempered glass in the period January 1964 through June 1969 is shown in the following tabulation:

(In thousands of dollars)

Item	Flat glass				Tempered glass	Total
	Sheet	Plate	Float	Rolled		
Modification of existing facilities	12,691	11,308	31,260	2,656	28,408	86,323
New facilities	19,272	929	116,296	200	7,305	144,002
Total	31,963	12,237	147,556	2,856	35,713	230,325

The building of float glass production facilities built during this period incorporated the most important technological change in the U.S. flat glass industry in recent years. During 1964-68, $116 million was expended to build new float glass lines and $31 million to modify these facilities. Major sums were also expended to build a sheet glass plant, a rolled glass plant, and 12 tempered glass plants.

Distribution channels

The marketing of flat and tempered glass in the United States, like that of many products, is characterized by the use of multiple distribution channels. The main channels through which flat glass, both domestic and imported, is distributed are as follows--listed in the approximate order of their importance:

1. Directly from domestic or foreign producers to manufacturers, fabricators, processors, and glazing contractors.

2. Through independent glass distributors who, in turn, serve manufacturers, fabricators, processors, glazing contractors, jobbers, and retailers. One domestic producer operates a

> merchandising system which markets at all distribution levels, from that of the independent glass distributor to that of the retailer.

Tempered glass is distributed through each of the main channels listed above. However, tempered automotive glass for original equipment, which accounts for a major share of the tempered glass market, is sold directly to motor vehicle manufacturers at negotiated prices. Some tempered automotive replacement glass is distributed by some of the major motor vehicle manufacturers through their systems of franchised new car dealers. Part of the U.S. output of flat and tempered glass is captive. Each of the major domestic producers of flat glass fabricates or processes some of the flat glass it produces into other products; the great bulk of the flat glass produced by the Ford Motor Company is fabricated into automotive glass for use as original equipment or replacement in motor vehicles manufactured by that company.

The U.S. producers of flat glass sell glass to so-called recognized factory buyers--independent glass distributors, fabricators (such as sash and door and jalousie manufacturers), processors (such as temperers, laminators, and mirror manufacturers), and glazing contractors. The recognized factory buyers, selected according to the judgment of the individual producers, are the only concerns that can buy flat glass directly from the factory. Other concerns desiring to purchase flat glass, even in carload lots, must order their glass,

at correspondingly higher prices, from distributors who are recognized factory buyers. PPG Industries, Inc., besides selling to recognized factory buyers, distributes a substantial part of the flat glass it produces through its own merchandising outlets. The outlets comprise an integrated system of distribution centers (warehouses) and service branches, located throughout the United States. The outlets serve buyers at all distribution levels, and thus are in direct competition with the entire independent distribution system. The centers also service the factory sales accounts of the direct factory buyers.

Most of the importers of flat and tempered glass are distributors, jobbers, manufacturers, fabricators, and contractors--predominantly firms that are also recognized factory buyers of domestic glass. The importers place their orders for foreign glass with U.S. sales agents of the foreign glass manufacturers, who in turn forward the orders to the foreign manufacturers; some sales agents also import glass for their own account for resale, thereby acting as distributors. Distributors who import flat and tempered glass resell it through customary distribution channels, i.e., to jobbers, manufacturers, fabricators, contractors, and retailers. Manufacturers, fabricators, and contractors who import glass use it themselves in glazing or manufacturing.

Under the existing distribution system, various domestic users of flat and tempered glass may have access to supplies of domestic glass only at different levels of distribution. One user may qualify

as a direct factory buyer, while another may not. The former thus can purchase glass at factory prices, while the latter will have to purchase at the next level at higher prices, i.e., from an independent glass distributor or PPG distribution center. Nonfactory buyers who are competing in end markets with factory buyers are under competitive pressure to find sources of lower priced glass; some have done so by importing flat and tempered glass. Nevertheless, as noted above, most concerns importing flat and tempered glass also are recognized factory buyers who can purchase directly from U.S. producers of such glass. Firms which cannot purchase directly from domestic factories are believed to account for only a small share of the flat and tempered glass imported into the United States.

Depending on circumstances, the distribution chain in the United States for flat and tempered glass may have as few as two links, or it may have five links or more. Window glass, for example, may be distributed from producer to door manufacturer; it might also be distributed from producer to independent glass distributor, to jobber, to retailer, and finally to home owner. Tempered replacement automotive glass might be distributed from motor vehicle manufacturer (who produced the glass) to new car dealer (who installed it); it might be marketed from producer to independent glass distributor, to auto-glass jobber, and then to auto repair shop (who installs it).

SHEET GLASS

U.S. Consumption

The apparent annual U.S. consumption of sheet glass declined steadily from 2,003 million pounds in 1964 to 1,698 million pounds in 1967. In the latter year, annual consumption was about 12 percent smaller than average annual consumption in 1964-66, and at the lowest level since 1961. In 1968 consumption increased to nearly the 1964 level--1,975 million pounds. U.S. consumption during the first 6 months of 1969 (1,002 million pounds) was 10 percent higher than in the corresponding period of 1968 (table 4).

Changes in the annual U.S. consumption of sheet glass generally follow closely changes in activity in the industries from which the demand for sheet glass is derived. New building construction has been principal consuming industry (accounting for some 60 percent of consumption); the automobile industry has been a smaller, but significant, user of sheet glass, principally heavy sheet glass. The decline in U.S. consumption of sheet glass from 1964 to 1967 was attributable primarily to a downturn in residential construction and automobile production during most of those years (table 8). The increase in consumption in 1968 reflected large increases that occurred concurrently in residential construction and automobile output. New housing starts were 17 percent greater, and automobile production was 20 percent greater, in 1968 than in 1967. During the first 6 months of 1969, private housing starts were 7 percent higher in number than in corresponding period of 1968, and automobile production was not far below the 1968 rate. Housing starts during the second half of 1969, however, are expected to be substantially

lower than during the first half of the year; consumption of sheet glass in the last half of 1969, therefore, will likely decline from the 1968 level.

Thin sheet glass

The annual U.S. consumption of thin sheet glass in 1968 was less than half that in 1964 and 1965. Apparent consumption amounted to about 82 million pounds in 1964 and 1965, but only * * * pounds in 1968. Consumption continued to decline in 1969, * * *

. In 1964, consumption of thin sheet glass accounted for about 4 percent of the total U.S. consumption of sheet glass, but only about 2 percent, in 1968. The sharp decline in annual consumption of thin sheet glass occurred mostly between 1966 and 1967. Many domestic producers of storm windows shifted from the use of 16-ounce glass (thin sheet glass) to the use of window glass because of a narrowing in the price differential between the two types of glass; a reverse of this shift had occurred early in the 1960's, resulting in sharply increased U.S. consumption of thin sheet glass.

Window glass

The annual U.S. consumption of window glass declined moderately in 1964-67, decreasing from 1,163 million pounds in 1964 to * * * pounds in 1967. Consumption increased, however, in 1968; it amounted to * * * pounds--about 13 percent higher than the average annual consumption in 1964-67. The upturn apparently continued into 1969;

apparent consumption in the first half of that year was nearly 8 percent higher than in the corresponding period in 1968 (table 6). Window glass accounted, on the average, for 60 percent by weight of the annual U.S. consumption of sheet glass during 1964-68.

Heavy sheet glass

Annual U.S. consumption of heavy sheet glass declined by about a fourth in the 4-year period 1964-67--from 758 million pounds to * * * ; it then increased to * * * in 1968. During the first half of 1969, apparent consumption of heavy sheet glass * * * was about 17 percent higher than in the corresponding period of 1968 (table 7). In 1964, the consumption of heavy sheet glass in the United States accounted for about 38 percent of total sheet glass consumption; the share in 1968 was 34 percent.

Competition from other products

In recent years direct competition between the various types of flat glass has occurred in several uses. Plate, float, and sheet glass have all been used in making automobile side and rear windows, mirrors, and table and desk covers. The selection of one type of flat glass instead of another is based both on quality and price considerations; price is the predominant factor in many instances, particularly where small surface areas are involved. Most of the competition of plate and float glass with sheet glass has affected heavy sheet glass, rather than thin sheet glass or window glass. Although 1/8 inch plate and float glass are comparable in weight to double strength window glass, the substitution

of such plate or float glass for double strength window glass has been negligible. In June 1969 a domestic sheet glass manufacturer (PPG Industries) announced that by modifying the glass drawing process it is able to produce sheet glass 1/8 inch and less in thickness that is competitive in quality and cost with float glass. The impact of this new development remains to be observed.

U.S. Producers' Shipments, Production, and Inventories

Shipments of sheet glass by U.S. producers in 1968 (1,353 million pounds) were about 8 percent higher than in 1967 (1,248 million pounds), but lower than in any other year since 1961. The increase in shipments in 1968 resulted from a sharp rise in domestic demand for sheet glass. The domestic consumption of sheet glass, however, rose considerably more in 1968 than shipments by domestic producers, and the share of the market supplied by the domestic producers declined. During January-June 1969, domestic shipments of sheet glass--738 million pounds--were about 19 percent higher than those in the corresponding period of the preceding year; the increase in shipments was somewhat larger than the increase in domestic consumption. The share of the U.S. sheet glass market supplied by domestic shipments declined from an average of 77 percent in 1964-65 to 68 percent in 1968 (the lowest on record). In the first 6 months of 1969, domestic shipments supplied 73 percent of U.S. consumption, a ratio comparable to that in 1967. The value of the U.S. producers' shipments of sheet glass 1/ declined annually from $143.9 million in 1964

1/ Does not include data on the value of shipments (consisting preponderantly of intracompany transfers) of sheet glass by the Ford Motor Co.

to * * * in 1967, then increased to * * * in 1968;

* * *

Variations in the shipments of sheet glass by U.S. producers (including intracompany transfers) have generally corresponded closely with changes in U.S. production. Yearend inventories, nevertheless, increased from 132 million pounds in December 31, 1963, to 180 million pounds on December 31, 1965, then declined to 128 million pounds on December 31, 1967. Inventories on December 31, 1968, amounted to 131 million pounds. During each of the years, yearend inventories were equivalent to approximately 10 percent of annual shipments of sheet glass.

Thin sheet glass.--Domestic shipments of thin sheet glass declined drastically from 30 million pounds in 1964 to * * * pounds annually in 1967 and 1968. As indicated before, the narrowing of the price differential between thin sheet glass and window glass resulted in the latter's regaining the part of the storm window market lost earlier in the decade to thin glass. During 1967 and 1968, domestic shipments accounted for about half of the annual U.S. consumption of thin sheet glass, compared with 29 to 37 percent during 1964-66. Domestic shipments of thin sheet glass were about 3 percent smaller during the first half of 1969 than during the corresponding period in 1968.

* * * * * * *

Window glass.--U.S. producers' shipments of window glass in 1968 * * * --5 percent greater than the * * * shipped during 1967, but virtually the same as average annual shipments during 1964-66 (table 6). The rise in shipments in 1968 resulted from an increased domestic demand for window glass. The share of apparent consumption of window glass supplied by domestic producers, however, declined from 76 percent in 1967 to 69 percent in 1968. Shipments of window glass during January-June 1969 * * * were 18 percent higher than those during the corresponding period of 1968; domestic producers supplied 76 percent of domestic consumption in the first half of 1969, a share equivalent to that of 1967.

* * * * * * *

Heavy sheet glass.--Annual domestic shipments of heavy sheet glass in 1968 * * * were 17 percent greater than those in 1967, but about 12 percent smaller than average annual shipments in 1964-67. Domestic shipments have closely followed the trend of automobile production in each recent year except 1968, when shipments of heavy sheet glass declined by 3 percent and automobile production increased by 20 percent. During 1965-67, shipments of heavy sheet glass declined 35 percent, but automobile production declined by only 20 percent, indicating that other types of flat glass were being substituted for heavy sheet glass in automobiles. The share of domestic consumption supplied by domestic shipments declined from about 80 percent in 1965 to

67 percent in 1968. Domestic shipments, which were 24 percent larger in January-June 1969 than in the corresponding period in 1968, supplied nearly 70 percent of domestic consumption in the 1969 period.

* * * * * * *

U.S. Imports

Annual U.S. imports of sheet glass fluctuated irregularly during 1964-67, ranging from 425 million pounds in 1965 to 477 million pounds in 1964; they averaged 456 million pounds in those years. In 1968, imports rose sharply both in quantity and relative to domestic consumption, amounting to 629 million pounds and supplying 32 percent of apparent U.S. consumption. In the first half of 1969, U.S. imports of sheet glass were 10 percent smaller than in the corresponding period of 1968, but about 35 percent larger than in the first half of 1967. The share of apparent U.S. consumption supplied by imports in the first half of 1969 was equivalent to or larger than the annual share supplied during 1964-67. Belgium, West Germany, Italy, Japan, and the United Kingdom were the principal sources during the five-year period; the Republic of China (Taiwan) became a significant source after 1967.

Imports at MFN rates

Annual U.S. imports of sheet glass at MFN rates, which had fluctuated within a narrow (13 percent) range in 1964-67, increased substantially in 1968 (table 10). MFN imports of sheet glass in that year

(582 million pounds) were about 40 percent larger than average annual imports at MFN rates in 1964-67 (417 million pounds). In the first half of 1969, U.S. imports of sheet glass at MFN rates were about 10 percent smaller than in the corresponding period of 1968, but considerably larger (39 percent) than in the first half of 1967. U.S. imports of sheet glass at MFN rates were equivalent to 30 percent of apparent U.S. consumption in 1968, compared with 20 percent to 25 percent annually in the years 1964-67; the corresponding ratio in the first half of 1969 was 25 percent.

Annual U.S. imports of sheet glass, as well as annual U.S. production of such glass, generally vary directly with changes in U.S. consumption. As indicated in an earlier section, apparent U.S. consumption of sheet glass, influenced by marked increases in residential construction and motor vehicle production, increased strikingly in 1968. U.S. imports of sheet glass at MFN rates, and shipments by U.S. producers of these products, also increased. The increase in annual imports, however, accounted for two-thirds of the increase in sheet glass consumption. In the first half of 1969, apparent U.S. consumption of sheet glass was materially larger than in the corresponding period of 1968; MFN imports, however, were smaller, and shipments by U.S. producers were much larger, in January-June 1969 than in January-June 1968. U.S. imports of sheet glass were affected by a lengthy dock strike at Atlantic and Gulf ports early in 1969. 1/

1/ Imports had been affected by a dock strike in 1965, while domestic production was affected by major strikes in 1963 and 1966.

U.S. imports of sheet glass at MFN rates originate chiefly in West European countries, Japan, and Taiwan (table 10). In recent years Belgium has been the principal supplying country. West Germany, Japan, and the United Kingdom ranked as major suppliers in each of the years 1964-68. Annual U.S. imports from Italy and Taiwan increased greatly in 1964-68, both countries being major suppliers of sheet glass in 1968.

Thin sheet glass.--Imports at MFN rates supplied the major share (more than 60 percent) of thin sheet glass consumed each year from 1964 through 1966. Imports reached a peak of 57 million pounds in 1965, and then declined markedly absolutely, as well as relative to consumption thereafter (table 5). As indicated earlier, the market for thin sheet declined substantially because of the narrowing of the price differential between thin sheet glass and window glass.

Window glass.--Annual imports of window glass at MFN rates, although slightly more volatile than those of sheet glass, have varied similarly to imports of sheet glass at MFN rates (table 6). MFN imports of window glass in 1968 (349 million pounds) were about 50 percent larger than in 1967 and about 66 percent larger than average annual imports in 1964-66. Indeed, the increase in annual imports of window glass at MFN rates accounted for the bulk (more than 70 percent) of the increase in the MFN imports of sheet glass. In the first half of 1969, imports of window glass at MFN rates were 18 percent smaller than in the corresponding period of 1968, but still considerably larger than in the first half of 1967. U.S. imports at MFN rates were equivalent to 28 percent of apparent U.S. consumption of window glass in 1968, compared with 21 percent in 1967 and 19 percent in 1964-66. The corresponding ratio in the first half of 1969 was 22 percent.

Heavy sheet glass.--Annual imports of heavy sheet glass at MFN rates during 1964-67 amounted to about 166 million pounds annually, except in 1965 when they amounted to 140 million pounds (table 7). Such imports accounted for an increasing share of apparent domestic consumption (from 22 percent in 1964 to 30 percent in 1967) in each year, except 1965. Imports of heavy sheet glass at MFN rates in 1968 (216 million pounds) were 30 percent larger than in 1967, and were equivalent to 32 percent of apparent consumption. In the first half of 1969, imports of heavy sheet glass were 4 percent larger than in the corresponding period of 1968, and were equivalent to 30 percent of apparent U.S. consumption of heavy sheet glass.

Colored or special sheet glass.--Annual imports of colored or special sheet glass increased more than 9 times during the period 1964-68; however, such glass constitutes a very small part (less than 5 percent in 1968) of total imports of sheet glass at MFN rates. Imports of heavy sheet glass accounted for the major share of the increase.

Imports at full rates

Annual U.S. imports of sheet glass from Communist dominated countries, which enter at full rates of duty, were about 50 percent larger in 1968 than in 1964 and accounted for about 7 percent of total U.S. imports of sheet glass. In recent years annual imports of sheet glass at full rates of duty have been equivalent to 2 to 3 percent of U.S. consumption. The U.S.S.R., Czechoslovakia, and Rumania have been the chief supplying countries.

U.S. Exports

Annual U.S. exports of sheet glass, principally window glass, represent less than 1 percent of annual U.S. shipments. Exports of sheet glass increased annually from 4.2 million pounds in 1964 to 10.7 million pounds in 1967, but declined to 6.7 million pounds in 1968 (table 11). Canada, Mexico, Australia, and Venezuela were the principal markets.

Employment in U.S. Establishments Producing Sheet Glass

Sheet glass is produced in the United States in plants that are devoted predominantly to the production of such glass; 10 of the 14 establishments in which sheet glass is produced produce only that product. The number of workers employed in establishments producing sheet glass and the annual number of man-hours worked in the production of sheet glass declined in the 5-year period 1964-68, reflecting the lower level of annual output of sheet glass in 1966-68 than in 1964-65. In 1968 about 9,700 workers were employed in the establishments producing sheet glass, compared with 10,900 in 1964; the man-hours expended by production and related workers in the production of sheet glass in those establishments aggregated 12.2 million in 1968, compared with 14.3 million in 1964 (table 12).

Indexes of annual U.S. production of sheet glass, man-hours worked in the production of sheet glass, and output per man-hour, 1964-68 are shown in the following tabulation (1957-59=100):

Year	Production	Man-hours	Output per man-hour
1964---------	117	102	115
1965---------	117	103	114
1966---------	104	92	113
1967---------	96	89	109
1968---------	103	87	118

Changes in man-hours worked in the production of sheet glass in 1964-68 reflected largely changes in output of such glass. The proportionate decline in output per man-hour from 1964 through 1967 was considerably less than the decline in production. In 1968 the moderately higher annual output was accompanied by a slight decline in man-hours worked. The increase in output per man-hour in the production of sheet glass in the decade from the late 1950's to the late 1960's (about 15 percent) was only half that in the private nonfarm sector of the economy (30 percent) and less than half that in manufacturing (35 percent).

The output of sheet glass per man-hour worked among the establishments in which such glass is produced varies widely. In recent years, among plants not affected by shutdowns during a major part of the year, the highest plant output per man-hour was more than double the lowest. The plant output per man-hour of a number of establishments has clustered near the low end of the range, while that of others have generally been scattered throughout the range (table 13).

Products other than sheet glass were produced in 4 of the 14 establishments that manufactured window glass in 1968. The man-hours worked in the production of sheet glass in each of 3 of these establishments accounted for more than nine-tenths of the annual man-hours worked; in

the fourth establishment, sheet glass accounted for a minor part of the annual man-hours worked.

Prices

Terms of sale

The U.S. producers publish prices of sheet glass in terms of common specifications long used in the industry. The published prices vary directly with the thickness and the area of the light (piece) of glass. They also vary with the quality of the glass (the better the quality, the higher the price), and the type of packing (the larger the quantity in a given pack, the lower the price). The prices for thin sheet glass and window glass are quoted in terms of boxes of either 50 square feet or 100 square feet or both (whether packed in boxes or in pallets); those for heavy sheet glass are stated in terms of square feet. Some domestic producers publish list prices that are subject to both trade and terms-of-payment (cash) discounts; others quote "net" prices subject only to cash discounts.

Since 1960 the prices of sheet glass quoted by the U.S. producers have, in effect, been on a delivered price basis. 1/ The terms of the price quotations have been f.o.b. plant, but the producers have absorbed freight charges to destinations in the continental United States. From 1960 through 1966 the maximum freight absorption on westbound shipments was limited to an amount equal to the freight rate from the producer's

1/ Before 1960 the U.S. producers equalized freight charges on shipments of sheet glass with those from the domestic plant nearest to the consumer.

plant to Denver, Colorado; this limitation was abolished in January 1967, when one of the domestic producers opened a sheet glass plant in California. Since January 1967, the published prices quoted by domestic producers have been the same throughout the United States; earlier, published prices applicable west of Denver were about 6 percent higher than those applicable in the East.

The U.S. sales agents of foreign manufacturers base their published prices on the same format of specifications as the domestic producers. Like those of domestic glass, the published prices of imported glass vary directly with the thickness and area of the light; they also vary with the quality of the glass and the type of packing. From the fall of 1960 to 1962, the agents employed a delivered price system; prices were quoted for sheet glass delivered to the customer's warehouse with duty, transportation, and all charges paid. In 1962, after the President proclaimed increased rates of duty subsequent to the first "escape-clause" investigation of sheet glass, the agents changed to a duty-paid ex-dock basis, which was comparable to that used by them before 1960. Four years later, in mid-1966, the agents for the principal foreign producers returned to a delivered price system; they have used this system since. Under the delivered price system, the delivered cost of imported sheet glass is the same to inland buyers as to seaboard buyers, while, under the ex-dock basis, the delivered cost was higher to inland buyers than to seaboard buyers.

Recent price history

During the 1960's the prices of sheet glass in the United States have been altered frequently by U.S. producers and agents of foreign producers. Through 1963 the prices of sheet glass in all important thickness (thin, window, and heavy) were usually affected about proportionately when prices were changed; some changes since then have affected only a segment of the sheet glass marketed. Price changes have been effected chiefly by two means--(1) by changing published prices, pricing practices, and terms of sale, and (2) by granting unpublished price concessions.

The published prices of sheet glass in the United States have moved upward in recent years, sporadically and irregularly. The extent of the increase has differed materially between the various types and packs of sheet glass. At one extreme, the published prices of domestic window glass packed in standard pallets were about 10 percent higher on May 1, 1969, than on the corresponding date in 1964; at the other, the published prices of thin sheet glass packed in boxes were 30 percent higher. In the middle ground, the prices of thin sheet glass in standard pallets, window glass in boxes, and heavy sheet glass whether in boxes or standard pallets were each about 20 percent higher on May 1, 1969, than in 1964 (table 14). The domestic producers instituted increases in published prices of sheet glass, usually across-the-board, in each of the 4 years 1966-69; they effected small across-the-board decreases in published prices in 1965 and late in 1968. 1/ Individual price changes during

1/ PPG Industries, Inc., granted announced discounts from its published prices of sheet glass on sales in California, Oregon, and Washington amounting to 15 percent in June-September 1968 and 5 percent since January 1969. Fourco Glass Co., but not the other domestic producers, has followed suit.

the 1964-69 period, however, depended upon the quantities purchased, the location of the customer, and the type of pack. Several changes in terms of sale and pricing practices, whose effect cannot be quantified, afforded reduced prices to customers under specified circumstances of sale; these changes included the offering of discounts for glass in extra large and/or modified containers, discounts for extra large volume orders, discounts for "tank-run" glass sold in a few dimensions economical to produce, and increases in freight absorption. These pricing practices, which were published with the price schedules, generally were followed by both domestic and foreign suppliers of glass to the U.S. market.

The published prices of sheet glass quoted by most of the domestic producers customarily are identical, 1/ while, in like fashion, the published prices quoted by agents of the major foreign suppliers are virtually identical. In recent years the prices of sheet glass published by the U.S. agents of the major foreign suppliers have consistently been below those of the domestic producers. The margins between such published prices have varied from time to time, as well as between types of sheet glass. The margins between the published prices of window glass, for example, have narrowed appreciably since 1964. In 1964, the agents of most foreign producers offered 18-ounce single-strength window glass at published prices about 9 percent, and 19-ounce single-

1/ Price changes instituted by one manufacturer usually are followed shortly by the other producers. One domestic company regularly quotes published prices that are about 4 percent below those of the other domestic producers.

strength window glass at prices about 6 percent, below the published prices of 19-ounce domestic window glass; such margins currently are about 5 percent and 2 percent, respectively. 1/ The narrowing margins have reflected a more rapid rise in the prices of domestic glass than in the prices of foreign glass. In contract to the price history respecting window glass, the margins between the prices of domestic and foreign thin and heavy sheet glass widened during the 1964-69 period (table 15). On May 1, 1969 the prices published by the agents of major foreign suppliers ranged, depending on the type of sheet glass, from about 2 percent to 7 percent below the corresponding prices published by domestic producers.

A comparison of the published prices of U.S. producers with those of agents of foreign producers presents only a partial picture of price relationships between the two. Some domestic and some imported sheet glass has been sold in recent years at prices below the published prices. Beginning in 1967 the domestic producers of sheet glass began to sell below their published prices. According to the producers, when they have received adequate documentation of price offers by others lower than their published prices, they have at times met, or partially met, such prices. The producers state that they have made such price concessions to meet the lower prices of imported sheet glass in the U.S. markets. Since the institution of this practice, the domestic producers have expanded the breadth and depth of such price concessions, as follows (data in percent): 2/

1/ The bulk of the single-strength window glass imported in recent years has consisted of 18-ounce glass; such glass accounted for about three-fourths of U.S. imports of single-strength window glass in 1968.

2/ Computed by the Tariff Commission from data supplied by the domestic producers.

	1967	1968	Jan.-June 1969
Share of total shipments marketed below published prices:			
Thin sheet glass	0.3	1.0	6.5
Window glass	1.9	5.2	13.5
Heavy sheet glass	2.6	5.8	10.0
All sheet glass	2.1	5.3	12.4
Average discount below published prices:			
Thin sheet glass	5.8	10.4	12.5
Window glass	4.4	8.0	10.9
Heavy sheet glass	4.5	4.6	9.4
All sheet glass	4.4	7.0	10.6

The average discount in January-June 1969 was roughly equivalent to the price increase since 1964 on window glass, and about half the price increases on thin sheet glass and heavy sheet glass.

Statistical data on the extent and character of price discounting by agents of foreign firms--i.e., the share of the imports of sheet glass that has been sold below published prices and the degree to which the published prices have been discounted--are not available. Nevertheless, extensive evidence indicates that foreign glass has been offered and sold in the U.S. market at discounted prices. Agents for some foreign factories (i.e., Taiwan) have offered regular discounts; agents for some factories have negotiated price concessions of various sizes and kinds with individual purchasers. The selling practices of some agents have also apparently contributed to the price disparity between imported and domestic glass; some agents of foreign glass, for example, have sold directly to small secondary users

(ordinarily served by distributors), at prices somewhat higher than those the agents normally charged the distributors, but lower than those the users would have been charged by the distributors.

Profit-and-Loss Experience of Domestic Producers

The data reported in this section represent the financial experience of domestic producers on sales accounting for more than 90 percent of the domestic shipments of sheet glass in each of the years shown and virtually all of the domestic shipments of window glass. The data shown for the years 1965-68 aggregate the profit-and-loss data of five firms; the data for 1964 include the financial results of the operations of those five firms, plus that of a sixth firm which subsequently closed. 1/

The aggregate value of net sales (including intracompany transfers) 2/ of sheet glass by the firms reporting data to the Commission declined from 1964 to 1967, but then increased in 1968.

1/ The only firm producing significant quantities of sheet glass for which profit-and-loss data were not available was the Ford Motor Co. Ford's production of sheet glass, which is predominantly captive, amounted to less than * * * (based on weight) of the domestic industry's aggregate output in 1968. The data for 1964 include the financial experience of the Blackford Window Glass Co. Although the company did not cease operations until 1966, no data are available for the years 1965-66. The net sales of the company, however, were less than 2 percent of the aggregate net sales of the industry in 1965 and were insignificant in 1966.

2/ In 1968 intracompany transfers accounted for about 20 percent of aggregate net sales. * * *

Aggregate sales declined from $143.8 million in 1964 to * * * in 1967, and then rose to * * * in 1968 (table 16). The changes in aggregate net operating profits and in the ratios of profits to net sales for the companies concerned followed the same pattern. Net profits declined from $18.1 million in 1964 to * * * in 1967, but then increased to * * * in 1968. Net profits were equivalent to 12.6 percent of net sales in 1964; the ratio of net profit to net sales dropped to * * * in 1967, and then rose to * * * in 1968. Three firms (accounting for 8 percent of total value of sales) sustained losses in 1964. Two firms had losses in each of the years 1965-67; * * * One firm * * * sustained a loss in 1968.

PLATE AND FLOAT GLASS

U.S. Consumption

The annual consumption of plate and float glass in the United States increased substantially in the 5 years 1964-68 (table 17). Apparent U.S. consumption of such glass in 1968 (2,284 million pounds) was 39 percent larger than in 1964 (1,642 million pounds). In the first half of 1969, apparent consumption amounted to 1,154 million pounds, some 6 percent larger than it had been in the corresponding period of 1968 (1,086 million pounds). The respective roles of plate and float glass in supplying U.S. uses for such glass have altered strikingly since the mid-1960's. In 1964, the year in which float glass was first produced in the United States, plate glass probably accounted for 95 percent of the aggregate consumption of plate and float glass in the United States; it is likely that the respective shares of U.S. consumption approached 50-50 in 1968, and that more float glass than plate glass was consumed in the United States in 1969.

Changes in the combined annual consumption of plate and float glass in the United States are tied closely to changes in motor vehicle production. Both annual consumption of plate and float glass and annual motor vehicle production rose substantially from 1964 to 1966, declined in 1967, and then increased sharply in 1968 (table 18). Over the 5-year period, however, the U.S. consumption of plate and

float glass grew more than would be indicated by changes in the output of motor vehicles; an index (1964=100) of automobile production was 116 in 1968, while a corresponding index of U.S. consumption of plate and float glass was 139. The extra growth of consumption of plate and float glass probably resulted from the substitution of float glass for heavy sheet glass in automobile windows and the increased use of these types of glass an an architectural medium. In the first half of 1969 U.S. consumption of plate and float glass was sustained by high levels of automobile output and nonresidential building construction.

The annual U.S. consumption of polished wire glass was stable in 1964-66, but then rose moderately in 1967 and 1968 (table 19). Consumption in 1968 (34 million pounds) was nearly 30 percent larger than average annual consumption in 1964-66 (27 million pounds). In the first half of 1969 consumption of polished wire glass was 4 percent lower than in the corresponding period of 1968.

U.S. Producers' Shipments, Production and Inventories

The combined annual shipments of plate and float glass by U.S. producers have followed closely changes in U.S. consumption since 1964 (table 17). Shipments totaled 2,169 million pounds in 1968--34 percent larger than in 1964 (1,613 million pounds). In the first half of 1969 shipments of such glass by U.S. producers (1,111 million pounds)

were 8 percent larger than those in the corresponding period of 1968 (1,024 million pounds). During the period since the mid-1960's, annual shipments of plate glass by U.S. producers have decreased substantially, while annual shipments of float glass have increased greatly, in absolute terms and as a share of aggregate plate and float glass shipments. Float glass accounted for about 4 percent of the aggregate shipments of plate and float glass in 1964, 49 percent in 1968, and 57 percent in the first half of 1969.

Nearly all of the plate and float glass shipped by U.S. producers has consisted of glass ranging in thickness from 1/8 inch to 1/4 inch inclusive. Plate and float glass thinner than 1/8 inch is not produced in the United States; shipments of plate and float glass thicker than 1/4 inch accounted for less than 1 percent of all plate and float glass shipped. In terms of square feet, considerably more than half of both the plate glass and the float glass shipped by U.S. producers in 1968 was 1/8-inch glass.

In recent years about two-thirds of the shipments of plate and float glass by U.S. producers have consisted of intra-company transfers. The bulk of the plate and float glass so transferred has been used to produce laminated and tempered glass. In terms of total shipments, intracompany and to others, more than two-thirds of the plate and float glass shipped by U.S. producers was laminated or tempered; probably the very great bulk of the glass so processed was used by

the automotive industry. U.S. producers' shipments (including intracompany transfers) of plate and float glass combined, by class of customer, in 1964 and 1968 were as follows: 1/

Customer classification	Percent of total value of shipments and transfers 1/	
	1964	1968
Distributors, jobbers, wholesalers, and contractors	15.9	16.6
Laminators	42.4	37.8
Temperers	25.8	32.1
Mirror manufacturers	8.8	7.1
Others 2/	7.1	6.4
Total	100.0	100.0

1/ Intracompany transfers are classified according to the purpose for which the glass was transferred (e.g., for distribution to others, tempering, laminating). The value of intracompany transfers was about two-thirds of the value of shipments and transfers combined in both of the years shown.

2/ Includes manufacturers of sash and doors, multiple-glazed-insulating units, and jalousies.

The production of plate and float glass in the United States has been kept closely in step with shipments thereof by the U.S. producers. With one exception, yearend inventories of such glass in relation to shipments varied little during the 5 years, 1964-68. In those years, the amount of glass inventories (in thousands of pounds) and the ratio of inventories to shipments (in percent) were as follows: 1/

1/ Data supplied to the U.S. Tariff Commission by the U.S. producers.

Year	Yearend inventories	Ratios, inventories to annual shipments
1964----------	95,702	5.9
1965----------	74,344	3.8
1966----------	101,171	5.2
1967----------	145,265	8.3
1968----------	132,254	6.1

Annual U.S. shipments of polished wire glass, after being stable during 1964-67, rose by about 20 percent in 1968. Shipments in 1968 totaled 24 million pounds, compared with average annual shipments of 20 million pounds in 1964-67. Shipments in the first half of 1969 were virtually the same volume as those in the corresponding period of 1968. Nearly all of the polished wire glass sold to others by the U.S. manufacturers is distributed through independent distributors. Yearend inventories of polished wire glass declined irregularly during the period 1964-68; they were equivalent to 17 percent of shipments in 1968, compared with 32 percent in 1964.

U.S. Imports

Annual U.S. imports of plate and float glass increased steadily during the 5-year period 1964-68 (table 17). Imports of such glass in 1968 (178 million pounds) were nearly double those in 1964 (94 million pounds). In January-June 1969, U.S. imports of plate and float glass were about 10 percent smaller than in the corresponding period of 1968; entries in the 1969 period, however, were affected to an

unknown degree by a lengthy dock strike at Atlantic and Gulf Coast ports early in the year. In 1967 and 1968 imports of plate and float glass were equivalent to about 8 percent of U.S. consumption of such glass, compared with about 6 percent in 1964; the corresponding ratio in the first half of 1969 was 7 percent.

The bulk of the U.S. imports of plate and float glass consists of glass that is 1/4 inch in thickness. About three-fourths of recent annual imports have been clear glass, and one-fourth colored.

All of the U.S. imports of plate and float glass in 1964-68 entered the United States at MFN rates. In the first half of 1969, a trivial volume of such glass, equal to about one-tenth of 1 percent of total imports, was entered at full rates of duty from East Germany. Japan and Belgium were the chief foreign sources of plate and float glass in 1968; substantial quantities also were imported from Italy, Canada, France, and West Germany (table 20).

Annual U.S. imports of polished wire glass were stable in 1964-66 and then rose moderately in 1967 and 1968. Imports in 1968 amounted to 10 million pounds, a quantity some 50 percent greater than that imported on the average in 1964-66. In 1968 imports supplied 29 percent of apparent U.S. consumption, compared with about 25 percent in 1964-66. U.S. imports of polished wire glass in 1968 came chiefly from Japan and the United Kingdom.

U.S. Exports

Annual U.S. exports of plate and float glass ranged from about 60 million to 100 million pounds in the period 1964-68. They were generally equivalent to 3 percent to 5 percent of U.S. shipments in those years; they were equivalent in quantity to 70 percent or more of annual imports of plate and float glass in 1964-66, but to 35 percent in 1968. Canada was by far the major market in the period 1964-68.

Employment in U.S. Establishments Producing Plate and Float Glass

During the period 1964-68, about 7,000 to 8,000 workers were employed in the United States in the manufacture of plate and float glass. The annual number of man-hours worked by production and related workers in the manufacture of these two types of flat glass increased from 14.9 million man-hours in 1964 to 16.7 million in 1966, but then declined to 13.9 million in 1968. With the wide substitution of float glass for plate glass during those years, the annual man-hours worked in the production of plate glass declined, while those worked in the output of float glass increased (table 21).

Plate glass

The number of man-hours worked annually by production and related workers in the manufacture of plate glass in the United States declined

from 14.0 million in 1964 to 10.3 million in 1968. The decline was shared by three of the four producing companies; it was generally counterbalanced in each of the three companies, however, by increased employment in the manufacture of float glass--although sometimes at a different plant.

In the period 1964-68, the annual U.S. production of plate glass, the number of man-hours worked in the manufacture of such glass, and the average annual output per man-hour were as follows:

Year	Production (million pounds)	Man-hours (million hours)	Output per man-hour (pounds)
1964----	1,581	14	113
1965----	1,716	15	116
1966----	1,482	14	103
1967----	1,094	11	98
1968----	1,089	10	106

The output of plate glass per man-hour varied widely among the various producing companies, e.g., ranging from a low of 67 pounds to a high of 204 pounds in 1968. The highest output per man-hour was attained by a company making a single thickness, a circumstance amenable to high-level output.

Float glass

As the U.S. output of float glass expanded markedly in the 5-year period 1964-68, the annual number of man-hours worked in the manufacture of such glass more than quadrupled, increasing from 0.8 million in 1964 to 3.6 million in 1968. The increased annual output of float glass was

also accompanied by a steadily growing average annual output per man-hour. In the period 1964-68, the annual U.S. production of float glass, the number of man-hours worked in the manufacture of such glass, and the average annual output per man-hour were as follows:

Year	Production (million pounds)	Man-hours (million hours)	Output per man-hour (pounds)
1964----	77.3	0.8	92
1965----	242.0	1.5	156
1966----	487.3	2.3	215
1967----	717.9	3.0	236
1968----	1,063.6	3.6	298

As in the case of plate glass, the annual output of float glass per man-hour has varied widely from one company to another. In 1968, for example, company output per man-hour ranged from 139 pounds to 568 pounds (table 23). A large part of the difference reflects the effect of new production lines coming on stream.

Polished wire glass

Annual employment in the production of polished wire glass, as well as average annual output per man-hour, was generally stable during 1964-68. About 400,000 man-hours were expended annually on the manufacture of polished wire glass. The annual output per man-hour--which was heavily weighted by the experience of the dominant producer--stood at about 71 pounds. The output per man-hour recorded by both of the two smaller producers was considerably higher than the average.

In the period 1964-68, the annual U.S. production of polished wire glass, the number of man-hours worked in the manufacture of such glass, and the average annual output per man-hour were as follows:

Year	Production (1,000 pounds)	Man-hours (1,000 hours)	Output per man-hour (pounds)
1964	28,144	406	69
1965	28,196	399	70
1966	23,048	315	73
1967	28,260	382	74
1968	29,460	416	71

Prices

Terms of sale

The U.S. producers generally publish "list" prices for plate and float glass, from which they offer trade and payment (cash) discounts; changes in published prices are effected by changing the discounts offered, while the "list" prices remain unchanged. The published prices of some plate glass and of polished wire glass, however, are quoted on the basis of "net" prices per square foot, subject only to cash discounts. The prices of plate and float glass of comparable specifications are identical. The net prices per square foot vary directly with the thickness of the glass and size of the light; cut sizes are higher in price per square foot than specified standard sizes and stock sheets. Published prices of clear plate and float glass are uniform throughout the United States; a price differential

which had resulted in higher prices west of Denver was terminated early in 1967. Published prices of tinted plate glass and polished wire glass, however, are higher west of Denver than east thereof. The U.S. producers absorb all freight on shipments of plate glass of 2,000 pounds and more (virtually all shipments) to destinations in continental United States; they equalize freight with that of the nearest domestic producer to the buyer on shipments of polished wire glass.

The U.S. agents for foreign producers publish prices for plate and float glass generally based on the same specifications that are used by domestic producers. For most plate and float glass, the agents quote prices per square foot and apply an adjustment factor, so that the derived net prices per square foot vary with the thickness of the glass and size of the light in about the same proportion as do those of domestic glass. The published prices of some plate glass and those of polished wire glass are quoted on the basis of "net" prices per square foot, subject only to cash discounts. The agent's prices are for glass delivered to the customer's warehouse; a freight allowance (based on published tariffs) is granted to the buyer if he provides inland U.S. transportation with his own trucks.

Recent price history

Since the mid-1960's, the prices of plate and float glass in the United States have been increased, on the average, by about a fifth

by both U.S. producers and agents of foreign producers. Price changes have been effected chiefly by two means--(1) by changing published prices, pricing practices, and terms of sale and (2) by granting unpublished price concessions.

In mid-1969 the published prices of domestic plate and float glass were, on the average, about 17 percent higher than they were in 1964 (table 26). The extent of the increase, however, varied widely among various types of such glass. For example, the published prices of 1/8-inch clear plate and float glass were only 3 percent higher, while those of 1/4-inch grey plate were 30 percent higher, in mid-1969 than in 1964. The published prices of polished wire glass rose somewhat more than the combined index of plate and float glass prices--being 22 percent higher in mid-1969 than in 1964.

Changes in terms of sale and pricing practices that affected manufacturers' prices of plate and float glass have not been extensive. Cash discounts were increased by 1 percent late in 1964. As noted earlier, a price differential resulting in higher prices west of Denver was ended in 1967, by reducing prices in the West to equal those then being charged in the East. A price differential in the published prices of tinted plate glass and polished wire glass, ranging from 4 percent to 10 percent, depending on the product, was still in effect in 1969.

The published prices of plate and float glass quoted by the U.S. producers customarily are identical, 1/ as are the published prices quoted by agents of the major foreign suppliers. In recent years the prices published by the U.S. agents of the major foreign suppliers have consistently been slightly below those of the domestic producers. During nearly all of the period 1964-69, the agents of most foreign producers offered 1/4-inch, clear, glazing quality plate glass, and comparable float glass as it became available, at published prices about 3 percent below those of the U.S. producers for comparable glass (table 27). Margins between the published prices of the domestic and foreign producers for other types of plate and float glass appear to have been comparable.

A comparison of the published prices of U.S. producers with those of agents of foreign producers presents only a partial picture of price relationships between the two. Some domestic and some imported plate and float glass has been sold in recent years at prices below the published prices. Beginning in 1967 the domestic producers of such glass began to sell below their published prices. According to the producers, when they have received adequate documentation of price offers by others lower than their published prices, they have at times met, or partially met, such prices. The producers state that they have made such price concessions to meet the lower prices of imported

1/ Price changes instituted by one manufacturer usually are followed shortly by the other producers.

plate and float glass in the U.S. market. Such price reductions have been made by domestic producers, however, on only a very small share of shipments including intracompany transfers of plate and float glass. Since the institution of this practice, the breadth and depth of the price concessions made by domestic producers have been as follows (data in percent): 1/

	1967	1968	January-June 1969
Share of total plate and float shipments marketed below published prices	0.4	0.8	0.9
Average discount below published prices	20.1	12.8	14.1

The average discount in January-June 1969 was slightly smaller than the increase that had occurred in published prices since 1964.

Statistical data on the extent and character of price discounting by agents of foreign firms--i.e., the share of the U.S. imports of plate and float glass that has been sold below published prices and the degree to which the published prices have been discounted--are not available.

1/ Computed by the Tariff Commission from data supplied by the domestic producers.

Profit-and-Loss Experience of Domestic Producers of Plate and Float Glass

The data reported in this section represent the financial experience of four domestic producers of plate and float glass who accounted for about 55 percent of the total quantity of float glass and about 92 percent of the total quantity of plate glass shipped by domestic producers in 1968. 1/

All products

The aggregate value of net sales (including intracompany transfers) of all products produced in establishments in which plate and float glass were produced increased from $270.2 million in 1964 to $325.3 million in 1966, declined to $276.2 million in 1967, and increased to $324.7 million in 1968 (table 28). The changes in aggregate net operating profits and in the ratios of profits to net sales followed the same pattern. Aggregate net operating profits (before income taxes) increased from $51.9 million in 1964 to $68.7 million in 1965, declined to $43.8 million in 1966, and increased thereafter to $59.5 million in 1968. As a percent of sales, the aggregate profits averaged 19.2 percent in 1966, 21.1 percent in 1965, 14.9 percent in 1966, 16.8 percent in 1967, and 18.3 percent in 1968.

Plate and float glass

Sales of plate and float glass account for a substantial share of the total sales value of all products made in the establishments in which

1/ Ford Motor Co., the only other significant producer of plate and float glass, did not submit profit-and-loss data.

such glass is produced. The aggregate net sales (including intracompany transfers) of plate and float glass for the four producers increased from $204.9 million in 1964 to $245.4 million in 1965, declined to $211.8 million in 1967 and increased to $241.1 million in 1968 (table 28). The changes in aggregate net operating profits and profit ratios followed the same pattern. Aggregate net operating profits increased from $52.6 million in 1964 to $70.8 million in 1965, decreased to $47.7 million in 1966, and then increased to $60.7 million in 1968. As a percent of sales, the aggregate profit averaged 25.7 percent in 1964, 28.9 percent in 1965, 22.2 percent in 1966, 22.5 percent in 1967, and 25.2 percent in 1968.

For two producers, Libbey-Owens-Ford Co. and PPG Industries, Inc., intracompany transfers accounted for a substantial share of their reported net sales value of plate and float glass in each of the years 1964-68. 1/ According to company officials, the intracompany transfers were valued at the prevailing market value less adjustment for expenses (freight, selling expenses, etc.) not actually incurred by selling on the open market.

1/ * * * * * * *

ROLLED GLASS

U.S. Consumption

In the last two decades, apparent annual U.S. consumption of rolled glass has shown a general upward trend, characterized by sharp rises and declines every few years. Fluctuations in annual consumption have closely followed changes in new building construction in the United States.

Apparent U.S. consumption of rolled glass amounted to 221 million pounds in 1964--a record level. It declined thereafter to 173 million pounds in 1967. The downward movement was reversed in 1968 when consumption rose to 191 million pounds; consumption in that year was, however, still below that in each of the years 1964-66 (table 29). Apparent consumption of rolled glass in the first half of 1969 was 12 percent more than in the corresponding period of 1968.

U.S. Shipments, Production, and Producers' Inventories

U.S. producers' annual shipments of rolled glass declined from 156 million pounds in 1964 to 123 million pounds in 1967, and then rose to 136 million pounds in 1968. Such shipments in the first half of 1969 were about 27 percent greater than those for the corresponding period in 1968.

The share of apparent annual U.S. consumption of rolled glass supplied by U.S. producers' shipments was relatively stable during 1964-68--ranging from 68 to 72 percent. The U.S. producers' share in the first half of 1969 amounted to 77 percent compared with 67 percent in the first half of 1968.

U.S. producers' shipments consist of standard rolled glass, and small quantities of rough plate glass blanks, and colored (cathedral) glass used in churches and light fixtures. U.S. producers' annual shipments of standard rolled glass declined sharply, 1964-67, whereas those of rough plate glass blanks declined slightly, and those of cathedral glass increased slightly.

U.S. producers' shipments (including intracompany transfers) of rolled, by type of customer, in 1964 and 1968 were as follows:

Customer classification 1/	Percent of total value of shipments and transfers	
	1964	1968
Shipments (including intracompany transfers) to: 2/		
Distributors, jobbers, wholesalers, and contractors	70.6	61.9
Sash and door manufacturers	13.6	14.2
Other accounts 3/	15.8	23.9
Total	100.0	100.0

1/ Classified according to principal function.
2/ Intracompany transfers consisted entirely of rough plate glass blanks for tempering or other processing, and accounted for less than 0.1 percent of annual shipments.
3/ Includes manufacturers of partitions and art glass studios.

U.S. production of rolled glass declined steadily from 174 million pounds in 1964 to 146 million pounds in 1967, and then rose to 150 million pounds in 1968. The increased output continued into the first half of 1969; U.S. production in that period was 24 percent greater than in the corresponding period of 1968. Production usually exceeds shipments; the differences are accounted for by losses in cutting and changes in inventory.

U.S. producers' inventories declined from 52 million pounds in 1964 to 42 million pounds in 1966, rose to 49 million pounds in 1967, and then declined again to 42 million pounds in 1968. In most of these years, yearend inventories amounted to about 30 percent of annual shipments.

U.S. Imports

Annual U.S. imports of rolled glass, which were negligible in the years before 1950, rose to 68 million pounds in 1964. Since 1964, the trend in annual imports has been irregularly downward; imports in 1968 totaled 61 million pounds. Imports of rolled glass in the first half of 1969 were 21 percent below those of the corresponding period of 1968 (table 30).

The share of annual U.S. consumption supplied by imports increased steadily during the 1950's. In 1964-68, however, the share ranged from 28 percent to 32 percent. In the first half of 1969, the share of consumption supplied by imports dropped, amounting to 23 percent compared with 33 percent in the first half of 1968.

Annual variations in imports of rolled glass in recent years have generally corresponded with changes in annual U.S. consumption of such glass. The increase in U.S. consumption from 1961 to 1964 was accompanied by rising imports and a rising U.S. market penetration by imports. The decrease in U.S. consumption from 1964 to 1967 was accompanied by decreased imports but the share of the market supplied by imports changed little during that time. In 1968, consumption and imports increased, but

import penetration of the U.S. market was about the same as in the two previous years.

The principal sources of imported rolled glass in recent years were Belgium, Japan, Poland, West Germany, the United Kingdom, and the Republic of China (Taiwan) (table 30). Approximately 80 percent of imports from all sources consisted of clear rolled glass; the remainder was colored and special rolled glass. Rolled glass is imported in a greater variety of thicknesses and patterns than is produced in the United States.

The preponderant share of rolled glass imported in recent years has been dutiable at MFN rates. Imports from Communist-dominated countries at full rates of duty normally have amounted to less than 5 percent of annual U.S. imports of rolled glass. U.S. imports of rolled glass at full rates of duty, which reached a peak of 8.4 million pounds in 1960, declined sharply from 5.2 million pounds in 1964 to 0.5 million pounds in 1968. Imports of such glass in the first half of 1969 were 5 percent below those in the first half of 1968.

U.S. Exports

Annual U.S. exports of rolled glass averaged 4.3 million pounds in 1964-68, compared with an annual average of 2.9 million pounds in the preceding five years. Exports of rolled glass in recent years accounted for about 3 percent of U.S. shipments of such glass. Exports in the first half of 1969 were 9 percent below those of the corresponding period in 1968. The principal countries receiving U.S. exports of rolled glass have been Canada, the Netherlands, and Australia.

Employment in U.S. Establishments Producing Rolled Glass

The employment of production and related workers in U.S. establishments in which rolled glass is manufactured decreased from 926 in 1964 to 881 in 1968 (table 31). Aggregate annual man-hours worked in the manufacture of rolled glass declined from 1.7 million in 1964 to 1.5 million in 1968. The drop in employment and man-hours was accounted for almost wholly by changes that occurred in the operation of the two large producers. Most other producers reported small increases in the number of production and related workers and little or no decline in man-hours worked on rolled glass.

Annual U.S. production of rolled glass, man-hours worked in such production, and output per man-hour are shown in the following tabulation:

Year	Production (million pounds)	Man-hours (thousand hours)	Output per man-hour (pounds)
1964	174	1,738	100
1965	161	1,536	105
1966	148	1,471	101
1967	146	1,460	100
1968	150	1,488	101

The average annual output per man-hour for the industry remained substantially unchanged in 1964-68 at approximately 100 pounds. Productivity, however, varied considerably from plant to plant from year to year (table 32). The major producers, using a continuous production process, reported roughly comparable productivity at a level somewhat higher than for the industry as a whole; the small producers, using an

intermittent production process, reported considerably lower levels of productivity than those of the large producers. Rough plate glass blanks, reported statistically as rolled glass, are special products for which productivity data are not comparable with those of ordinary rolled glass.

Prices

Terms of sale

The U.S. producers generally quote prices of rolled glass in terms of net prices per square foot, subject to a cash discount. The patterns of rolled glass that are offered are usually grouped, and prices quoted for each group. Prices vary not only between groups of patterns, but also with the thickness of the glass and according to whether it is plain, wired, heat absorbing, colored, or surface treated. Some producers quote prices separately for limited patterns available in sizes suitable for louvres and shower doors and tub enclosures. Prices are lower (10 percent) on glass shipped to Denver or east thereof than on that shipped west of Denver. The producers generally equalize freight with that from the nearest domestic plant to the customer.

Most U.S. agents for foreign producers of rolled glass quote net prices, c.i.f. dock; the import duty, customs and forwarding charges, and inland freight are all for the account of the buyer. Some agents (e.g., those for Japanese producers) quote prices for glass delivered to the buyer.

Because of the terms of sale, the price competitiveness of domestic and imported rolled glass generally varies substantially depending on the location of the buyer. Imported glass will be most competitive

in areas near the ports of entry; domestic glass will be most competitive in areas near the manufacturing plants (Floreffe, Pa.; Rossford, Ohio; Kingsport, Tenn.; St. Louis, Mo.; and Fullerton, Calif.).

Recent price history

Since the mid-1960's, the published prices of domestic rolled glass in the United States have generally increased moderately. Such prices were stable during 1964, 1965, and much of 1966; they were generally increased late in 1966 and in the early part of 1968 and 1969. An index of prices of stock sheets of rolled glass (May 1, 1964=100) was 115 on May 1, 1969 (table 33). The published prices of some domestic rolled glass declined in 1969, however, as a result of sharp price competition that resulted in lower prices for both domestic and imported glass. The price of rolled glass offered in special sizes for shower door and tub enclosures by some domestic producers, for example, was about 15 percent lower on May 1, 1969, than on November 1, 1968, (i.e., the price index dropped from 108 to 93).

As indicated above, most domestically produced rolled glass is sold f.o.b. plant 1/ (freight for the account of the buyer), while some imported rolled glass is sold c.i.f. port (import duty, customs clearing charges, and freight for the account of the buyer) and some imported glass is sold delivered to the buyer. Since the delivered cost of the glass therefor varies depending on the location of the buyer, exact price comparisons between domestic and imported glass representative

1/ Freight is equalized with that from the nearest domestic plant.

of circumstances facing all buyers cannot be made. The published prices of imported rolled glass at the port, however, have generally been substantially below those of comparable domestic glass (table 34).

Unpublished price concessions on rolled glass have been offered in recent years by both U.S. producers and U.S. agents of foreign producers. Beginning in 1967 the domestic producers began to sell below their published prices. According to the producers, when they have received adequate documentation of price offers by others lower than their published prices, they have at times met, or partially met, such prices. The producers state that they have made such price concessions to meet the lower prices of imported rolled glass in the U.S. market. The U.S. producers, however, have granted unpublished price discounts on only a very small share of their shipments of rolled glass. The breadth and depth of the price concessions made by domestic producers have been as follows (data in percent): 1/

	1967	1968	Jan.-June 1969
Share of shipments of rolled glass marketed below published prices	2.6	1.2	2.4
Average discount below published prices	21.3	23.0	7.9

Statistical data on the extent and character of unpublished price concessions by agents of foreign firms--i.e., the share of the U.S. imports of rolled glass that has been sold below published prices and the degree to which those prices have been discounted--are not available.

1/ Calculated from data obtained by the Tariff Commission from U.S. producers.

Profit-and-Loss Experience of Domestic Producers

The data reported in this section represent the financial experience of domestic producers whose sales of rolled flass accounted for approximately 90 percent of the total sales of rolled glass by U.S. producers in 1968.

All products

The aggregate value of all net sales of the establishments in which rolled glass was produced increased from 1964 to 1965, declined in 1966 and 1967, and increased in 1968. Net sales increased from $180.6 million in 1964 to $218.4 million in 1965, declined to $178.4 million in 1967 and increased to $219.4 million in 1968 (table 35). The net profits earned on all operations increased from $38.0 million in 1964 to $43.2 million in 1965, declined to $30.6 million in 1966, and increased to $42.3 million in 1968. Net profits were equivalent to 21.0 percent of net sales in 1964, dropped to 16.0 percent in 1966 and then rose to 19.3 percent in 1968.

Rolled glass

The aggregate value of net sales of rolled glass by U.S. producers declined from 1964 to 1967 and increased slightly in 1968. Net sales declined from $16.7 million in 1964 to $15.3 million in 1967 and increased to $16.0 million in 1968. The changes in aggregate net operating profits and in ratios of profits to net sales of rolled glass followed the same pattern. Net profits declined from $3.1 million in 1964 to $1.1 million in 1967 and increased to $1.3 million in 1968. Net profits were equivalent to 18.4 percent of net sales in 1964, 7.5 percent in 1967 and 8.3 percent in 1968.

One company 1/ sustained net operating losses from their rolled glass operations during the four years, 1964-67, but realized a net operating profit on rolled glass in 1968. * * *

A second firm 2/ reported net operating losses from their sales of rolled glass in each of the three years, * * *

1/ * * *

2/ * * *

TEMPERED GLASS

U.S. Consumption

Apparent annual U.S. consumption of tempered glass increased irregularly from 216 million square feet in 1964 to 356 million square feet in 1968 (table 36). In the middle years 1965-67, annual U.S. consumption was stable averaging about 279 million square feet; consumption in 1964 was 29 percent below this average and in 1968, 28 percent above it. Apparent U.S. consumption in the first half of 1969 was 10 percent higher than that of the corresponding period in 1968.

U.S. consumption of tempered glass is dependent primarily on automobile production; annual variations in output by that industry are reflected in corresponding changes in annual consumption of tempered glass. The lower level of apparent U.S. consumption of tempered glass in 1964 may be attributed primarily to a low level of automobile production. In a similar manner, the increased consumption in 1968 resulted primarily from increased automobile production in that year. Since 1966, more tempered glass has been used per automobile. Such changes accounted largely for the static level of consumption in 1967, although automobile production in that year was well below that of 1966.

The annual quantities of tempered glass used in nonautomotive applications nearly tripled from 1964 to 1968; they accounted in 1968 for about 18 percent of apparent U.S. consumption of all tempered glass, as compared with about 11 percent in 1964. The consumption of tempered glass in nonautomotive uses should continue to expand as more and more building codes are altered to require the use of safety glass.

U.S. Production, Shipments, and Inventories

Annual U.S. shipments of tempered glass correspond very closely to annual U.S. production of such glass, as most of the glass is supplied directly to the automobile industry. Production and shipment schedules of tempered glass, therefore, are geared to automobile production schedules.

Annual U.S. shipments of tempered glass, which followed changes in U.S. automobile production, rose from 217 million square feet in 1964 to 287 million square feet in 1965, then declined to 273 million square feet in 1966. Shipments in 1967 remained at the 1966 level even though automobile production declined considerably in 1967. A change to larger tempered side and rear windows by U.S. automobile manufacturers in 1967 largely offset the decreased requirements from lower automobile production in that year. U.S. shipments of tempered glass rose in 1968 to 348 million square feet. In the first half of 1969, shipments were 10 percent larger than those in the corresponding period of 1968.

The share of the U.S. market for tempered glass supplied by U.S. producers' shipments declined from 99 percent in 1964 to 95 percent in 1968. This downward trend continued in the first half of 1969, when the share amounted to 94 percent compared with 95 percent in the first half of 1968.

The relative shares of the three types of flat glass (plate, float, and sheet) used to manufacture tempered automobile windows have changed considerably in recent years. In 1964, 68 percent of U.S. shipments of

tempered automobile glass was made from plate glass; 25 percent, from sheet glass; and 7 percent, from float glass. By 1968, the share held by plate glass declined to 21 percent, that of sheet glass, to 24 percent (21 percent in 1966 and 1967) whereas that for float glass had increased to 55 percent.

U.S. shipments of tempered glass for nonautomotive uses consist principally of sheet glass and lesser quantities of plate, float, and rolled glass. Tempered sheet glass accounted for about 60 percent and tempered rolled glass for about 8 percent of annual U.S. shipments in 1964-68. Shipments of tempered plate glass were equivalent to 28 percent of U.S. shipments in 1964 and 15 percent in 1968. Shipments of tempered float glass amounted to 6 percent in 1964 and 16 percent in 1968, of U.S. shipments of tempered glass for nonautomotive uses.

U.S. producers 1/ shipments of tempered glass, including intracompany transfers, by type of customer are tabulated below:

Customer classification	Percent of total value of shipments and transfers 1/	
	1964	1968
Distributors, jobbers, wholesalers, and contractors	5.5	10.0
Sash and door manufacturers	1.6	4.2
Automobile manufacturers	79.0	71.9
Warehousing	4.2	3.8
Others 2/	9.6	10.0

1/ Intracompany transfers are classified according to the purpose for which the glass was transferred. The value of intracompany transfers was about 16 percent of the value of shipments and transfers combined in both of the years shown.

2/ Includes boat builders, fireplace equipment, appliance, and lighting fixture manufacturers.

1/ Does not include Ford Motor Co.

As indicated earlier, annual U.S. production of tempered glass corresponded very closely with annual shipments of that products by U.S. producers. Annual production rose from 218 million square feet in 1964 to 290 million square feet in 1965, and then declined to 268 million square feet in 1967. Production then rose to 349 million square feet in 1968. In the first half of 1969, output was 13 percent greater than that in the first half of 1968.

U.S. producers' yearend inventories of tempered glass ranged from 23 million square feet in 1964 to 34 million square feet in 1968. Although yearend inventories varied during this period, they were usually about 10 percent of annual U.S. shipments of tempered glass.

U.S. Imports

Annual U.S. imports of tempered glass increased sharply from 1 million square feet in 1964 to 17 million square feet in 1968 (table 37). In the first half of 1969, such imports were 38 percent higher than those in the first half of 1968. The share of the U.S. market for tempered glass supplied by imports increased from 0.5 percent in 1964 to 4.8 percent in 1968. In the first half of 1969, the share was 5.8 percent compared with 4.7 percent in the corresponding period of 1968.

Imports of tempered glass fall into three general categories--(1) component parts of original automotive equipment imported from Canada duty-free under the provisions of the Automotive Products Trade Act of 1965 (APTA); (2) replacement glass (windows) for imported automobiles,

and (3) nonautomotive tempered glass for use in residential and commercial construction.

Imports under the provisions of the APTA increased from 40,000 square feet in 1965, to 7.7 million square feet in 1968. In the first half of 1969, they exceeded those in the first half of 1968 by 59 percent (table 36). Under the provisions of the APTA, Canada is the sole source of these imports. The share of the total U.S. market for tempered glass supplied by these imports increased from about 1 percent in 1966 to 3 percent during the first half of 1969.

Imports of automotive replacement tempered glass are not reported separately from those of nonautomotive tempered glass. Combined imports of these forms of tempered glass increased from 1.1 million square feet in 1964 to 9.3 million square feet in 1968. Imports in the first half of 1969 (5.4 million square feet) were 21 percent larger than in the corresponding period of 1968. The share of the total U.S. market for tempered glass supplied by imports of these forms increased annually from 0.5 percent in 1964 to 2.8 percent in the first half of 1969. Based on a partial analysis of imports during 1966-68, imports of nonautomotive tempered glass accounted for from 70 to 90 percent of annual imports of the two forms of tempered glass. Belgium, Poland, and West Germany were the principal suppliers in most years. More recently Japan (1967) and the Republic of China (Taiwan)(1968) have become important sources.

U.S. Exports

Annual U.S. exports 1/ of tempered glass increased steadily from 2.5 million square feet in 1964 to 9.3 million square feet in 1968 (table 36). In the first half of 1969 exports were 35 percent greater than those in the first half of 1968. Annual U.S. exports, as a share of annual U.S. shipments, increased from 1 percent in 1964 to 3 percent in 1968.

About 90 percent of the tempered glass exported in recent years was shipped to Canada by two U.S. automobile manufacturers; the remainder consisted of automotive glass and small quantities of nonautomotive glass also shipped to Canada.

Employment in U.S. Establishments Producing Tempered Glass

The number of production and related workers employed in establishments making tempered glass in 1964-68 ranged from 13,228 in 1964 to 15,474 in 1968 (table 38). The man-hours expended on the production of tempered glass by production and related workers rose from 8.3 million in 1964 to 10.6 million in 1965 then declined to 9.0 million in 1967. Man-hours so expended in 1968 amounted to 11.5 million, a 28 percent increase over the 1967 level. Annual variations in the number of production and related workers and the man-hours expended in the production of tempered glass correspond closely to annual variations in the output of automobiles in the United States.

1/ Reported by U.S. producers of tempered glass.

Annual U.S. production of tempered glass, man-hours worked in such production, and output per man-hour, 1964-68, are shown in the following tabulation:

Year	Production (million square feet)	Man-hours (thousand hours)	Output per man-hour (square feet)
1964	218.4	8,345	26.1
1965	289.9	10,554	27.5
1966	275.4	10,017	27.5
1967	268.2	9,026	29.7
1968	349.1	11,465	30.4

Productivity, as measured by the number of square feet produced per man-hour in the industry, increased slowly from 26.1 square feet in 1964 to 30.4 square feet in 1968. Much of the increase in productivity is attributable to the use of larger automobile side and rear windows that began in 1967. Those companies producing large quantities of automotive tempered glass generally show higher levels of productivity than those producing nonautomotive tempered glass (table 39).

Prices

Terms of sale

The U.S. producers quote prices of nonautomotive tempered glass on a per-square-foot basis; quantity discounts are offered on sales of certain tempered glass, and cash discounts, on sales of such glass. The published prices vary directly with the thickness and the area of the light of glass; they also vary depending on the type of flat glass tempered (i.e., whether sheet, rolled, or plate and float glass). The U.S. producers generally equalize freight with that of the nearest domestic

plant to the buyer on shipments to destinations in continental United States; however, no freight is absorbed on some products, and freight is fully absorbed on others. The prices of tempered glass for use in the assembly of motor vehicles, which use currently takes about four-fifths of the tempered glass produced in the United States, are not published, but established by negotiation between the producers and the motor vehicle manufacturers; 1/ the prices of tempered glass for replacement in motor vehicles are in part negotiated and in part established by the temperer.

The U.S. agents of foreign producers price nonautomotive tempered glass in part on a delivered price basis and in part on an ex-dock, duty-paid basis. The prices of automotive tempered glass entered free of duty under the U.S.-Canadian automotive agreement are fixed by negotiation between the temperer and the motor vehicle manufacturer. 2/

Recent price history

The published prices of nonautomotive tempered glass quoted by the U.S. producers dropped sharply early in 1965, but have since risen slowly. An index of such prices fell from 100 in 1964 to about 85 in 1965, and then rose to 97 in May 1969 (table 40). The prices of most types of nonautomotive tempered glass followed the direction of changes in the index. The published prices of standard sizes of tempered glass

1/ The motor vehicle manufacturers produce a substantial share of the tempered glass used by them.

2/ * * *

for patio doors, however, declined irregularly throughout the 1964-69 period, from an index of 100 in 1964 to 95 in 1969. Tempered glass for patio doors is one of the types in which there has been extensive competition between imported and domestic products. Early in 1969, one major manufacturer withdrew its published prices of tempered glass for patio doors, and invited customers to contact sales offices for prices and terms; other manufacturers as well as agents of foreign producers continued to publish prices for such glass.

Unpublished price concessions on nonautomotive tempered glass appear to have been offered increasingly in recent years by both U.S. producers and U.S. agents of foreign producers. Beginning in 1968 the domestic producers of tempered glass began to sell below their published prices. According to the producers, when they have received adequate documentation of price offers by others lower than their published prices, they have at times met, or partially met, such prices. The producers state that they have made such price concessions to meet the lower prices of imported tempered glass in the U.S. market. In 1968 and the first half of 1969, unpublished price discounts were granted by domestic producers on about a third of their shipments of nonautomotive tempered glass; the shipments at discounted prices, however, were equivalent to only 4 percent of total domestic shipments of tempered glass (automotive and nonautomotive). The breadth and depth of the price concessions made by domestic producers have been as follows (data in percent): 1/

1/ Calculated from data obtained by the Tariff Commission from U.S. producers. The data are based on the experience of companies that produce both tempered glass and flat glass; those companies accounted for four-fifths of U.S. shipments of tempered glass in 1968.

	1968	Jan.-June 1969
Share of tempered glass shipments marketed below published prices:		
Total	3.7	4.5
Nonautomotive tempered glass	31.3	34.9
Average discount below published prices	7.0	7.9

Published prices for domestic tempered glass on the average were slightly lower in 1969 than in 1964, but about 15 percent higher than those in 1965-66; recent price discounts, as shown above, have been about 8 percent.

Statistical data on the extent and character of unpublished price concessions by agents of foreign firms--i.e., the share of the U.S. imports of tempered glass that has been sold below published prices and the degree to which the published prices have been discounted--are not available.

Profit-and-Loss Experience of Domestic Producers of Tempered (Specially Hardened) Glass

The data reported in this section represents the financial experience of 11 domestic producers of tempered glass who accounted for about 90 percent of total shipments of tempered glass by domestic producers. 1/ Nine of the concerns furnished data for all five years; one concern, which was not in operation in 1964, supplied data for the years 1965-68, and another concern, which was sold in 1969, supplied data for the four years 1964-67.

Four of the 11 concerns produced other glass products along with tempered glass, whereas seven produced nothing but tempered glass. Eight of them purchased both domestically produced glass and imported glass to be used for tempering. The other three, PPG Industries, Libbey-Owens-Ford, and Fourco, used only glass manufactured in their own plants.

All products

The 11 concerns reported net sales of all products of the establishments in which tempered glass was produced amounting to $187 million in 1964; $235 million in 1965; $227 million in 1966; $218 million in 1967; and $306 million in 1968 (table 41). The ratio of net operating profit (profit before income taxes) to net sales declined from 10.7 percent in 1964 to 7.3 percent in 1966, and then increased to 15.0 percent in 1968. Three concerns reported net operating losses in 1964, two in 1965, one in 1966, two in 1967; all concerns reported an operating profit in 1968.

1/ Ford Motor Co., the only other significant producer of tempered glass, did not submit profit-and-loss data.

Tempered glass

The annual sales of tempered glass by the reporting concerns rose from $111 million in 1964 to $137 million in 1965, then remained fairly stable until 1968 when they increased to $162 million (table 41).

During the five years 1964-68, the reporting concerns either earned small net profits or incurred small losses. In 1964 and 1965 combined net operating profits were equivalent to two-tenths of one percent or less of net sales. In 1966 a combined net loss was equivalent to 3.5 percent of net sales. Small profits were earned in 1967 and 1968 -- equivalent to three-tenths of one percent of net sales in 1967 and 2.3 percent in 1968.

Of the ten concerns reporting in 1964 four showed losses; three of 11 showed losses in 1965, and two of 11 in 1966, three of 11 in 1967; all ten reporting concerns showed profits in 1968 (table 41a).

* * * * * * *

* * * * * * *

Libbey-Owens-Ford uses its own glass (mainly float and plate glass) in its tempering operation and makes no outside purchases for this purpose. It transfers the glass to the tempering operation at a computed market value. This is done, according to company officials, so that they can put the tempering operation on the same basis as their competitors who have to buy their glass from other manufacturers.

PPG Industries, which also makes a wide variety of glass products, accounted for * * * of the sales of tempered glass in each of the five years reported. The company uses its own glass in its tempering operation and transfers the glass to the tempering operation at a computed market value. It maintains the same position as LOF in regard to the tempering operations, stating that by using such a method they are on a basis competitive with other tempering companies. * * *

* * * * * * *

Appendix A

Table 2.--Sheet glass weighing over 4 ounces per square foot: U.S. rates of duty provided in the Tariff Schedules of the United States (TSUS) 1/

(In cents per pound and percent ad valorem)

TSUS item	Article	Appendix item 2/	Statutory rate 3/	Trade-agreement rate 4/	Escape-action rate 5/	Currently applicable rate 6/
	Glass (including blown or drawn glass, but excluding cast or rolled glass and excluding pressed or molded glass) (whether or not containing wire netting), in rectangles, not ground, not polished and not otherwise processed, weighing over 4 oz. per sq. ft., provided for in TSUS items 542.11-.98, inclusive:					
	Ordinary glass:					
	Weighing over 4 oz. but not over 12 oz. per sq. ft.:					
542.11	Measuring not over 40 united inches		1.5¢	0.7¢	1.3¢	0.7¢
542.13	Measuring over 40 united inches		1.9¢	.9¢	1.6¢	.9¢
	Weighing over 12 oz. but not over 16 oz. per sq. ft.:					
542.21	Measuring not over 40 united inches		2.1¢	1.0¢	1.3¢	1.0¢
542.23	Measuring over 40 but not over 60 united inches		2.4¢	1.1¢	1.6¢	1.1¢
542.25	Measuring over 60 united inches		2.5¢	1.2¢	1.9¢	1.2¢
	Weighing over 16 oz. but not over 28 oz. per sq. ft.:					
542.31	Measuring not over 40 united inches	923.31	1.5¢	.7¢	1.3¢	1.1¢
542.33	Measuring over 40 but not over 60 united inches	923.33	1.9¢	.9¢	1.6¢	1.5¢
542.35	Measuring over 60 but not over 100 united inches	923.35	2.4¢	1.1¢	1.9¢	1.5¢
542.37	Measuring over 100 united inches	923.37	2.8¢	1.4¢	2.4¢	1.4¢
	Weighing over 28 oz. per sq. ft.:					
542.42	Not over 2-2/3 sq. ft. in area		1.5¢	.7¢	1.3¢	.7¢
542.44	Over 2-2/3 but not over 7 sq. ft. in area		1.9¢	.9¢	1.6¢	.9¢
542.46	Over 7 but not over 15 sq. ft. in area		2.4¢	1.1¢	1.9¢	1.1¢
542.48	Over 15 sq. ft. in area		2.8¢	1.4¢	2.4¢ or 3.5¢ 7/	1.4¢
	Colored or special glass:					
542.57	Weighing over 4 oz. but not over 12 oz. per sq. ft.		4.0¢	1.7¢	2.2¢	1.7¢
542.67	Weighing over 12 oz. but not over 16 oz. per sq. ft.		13.0¢	6.0¢	9.0¢	6.0¢
	Weighing over 16 oz. but not over 28 oz. per sq. ft.:					
542.71	Measuring not over 40 united inches	923.71	1.5¢ + 5%	0.7¢ + 2.5%	1.3¢ + 2.5%	1.1¢ + 2.5%
542.73	Measuring over 40 but not over 60 united inches	923.73	1.9¢ + 5%	0.9¢ + 2.5%	1.6¢ + 2.5%	1.5¢ + 2.5%
542.75	Measuring over 60 but not over 100 united inches	923.75	2.4¢ + 5%	1.1¢ + 2.5%	1.9¢ + 2.5%	1.5¢ + 2.5%
542.77	Measuring over 100 united inches	923.77	2.8¢ + 5%	1.4¢ + 2.5%	2.4¢ + 2.5%	1.4¢ + 2.5%
	Weighing over 28 oz. per sq. ft.:					
542.92	Not over 2-2/3 sq. ft. in area		1.5¢ + 5%	0.7¢ + 2.5%	1.3¢ + 2.5%	0.7¢ + 2.5%
542.94	Over 2-2/3 but not over 7 sq. ft. in area		1.9¢ + 5%	0.9¢ + 2.5%	1.6¢ + 2.5%	0.9¢ + 2.5%
542.96	Over 7 but not over 15 sq. ft. in area		2.4¢ + 5%	1.1¢ + 2.5%	1.9¢ + 2.5%	1.1¢ + 2.5%
542.98	Over 15 sq. ft. in area		2.8¢ + 5%	1.4¢ + 2.5%	2.4¢ + 2.5% or 3.5¢ + 2.5% 7/	1.4¢ + 2.5%

1/ The rates of duty originally provided in the TSUS and the TSUS appendix were placed in effect Aug. 31, 1963, by Presidential Proclamation No. 3548.

2/ The rates of duty currently applicable to glass as the result of escape-clause action are set forth in these items of the TSUS appendix.

3/ Rates of duty currently applied to the products of countries or areas designated as Communist dominated or controlled.

4/ The most recent rates of duty placed in effect as a result of concessions granted under the General Agreement on Tariffs and Trade, as modified by proclamation of the TSUS. These rates were temporarily suspended on June 17, 1962.

5/ Rates of duty placed in effect June 17, 1962, by Presidential Proclamation No. 3455 under the escape-clause procedure, as modified by proclamation of the TSUS. These rates were superseded by the rates which were placed in effect by Presidential Proclamation No. 3762 on January 11, 1967.

6/ Rates of duty placed in effect on January 11, 1967 by Presidential Proclamation No. 3762 of that date. The rates of duty applicable to TSUS appendix items 923.31, 923.33, 923.35, 923.71, 923.73, and 923.75 are higher than the trade-agreement rates and are therefore temporary. Presidential Proclamation 3816, dated October 11, 1967, extended the time period for the increased rates of duty to the close of December 31, 1969. The rates applicable to all other TSUS items are the trade-agreement rates.

7/ The escape-action rate on sheet glass weighing over 28 ounces per square foot and measuring over 15 but not over 16-2/3 sq. ft. in area was 2.4¢ per lb. (plus 2.5% ad valorem if colored or special); that on sheet glass weighing over 28 oz. per sq. ft. and measuring over 16-2/3 sq. ft. in area was 3.5¢ per lb. (plus 2.5% ad valorem if colored or special).

Table 3.--Sheet glass weighing over 4 ounces: Average ad valorem equivalents of U.S. specific rates of duty imposed on ordinary and colored or special sheet glass 1/ entitled to most-favored-nation tariff treatment imported during 1966-68

Description	Average ad valorem equivalents (percent)			
	1966	1967 2/	1968 2/	1968 3/
Sheet glass weighing not over 16 ounces per square foot and measuring in united inches--				
Not over 40	13.5	7.5	7.0	7.0
Over 40 but not over 60	27.9	15.5	14.9	14.9
Over 60	29.3	17.2	14.5	14.5
Sheet glass weighing over 16 ounces but not over 28 ounces per square foot and measuring in united inches--				
Not over 40	22.0	17.9	17.7	11.3
Over 40 but not over 60	28.7	24.7	24.9	15.0
Over 60 but not over 100	28.7	20.8	21.0	15.4
Over 100	33.8	18.1	17.8	17.8
Sheet glass weighing over 28 ounces per square foot and measuring in square feet--				
Not over 2-2/3	22.7	12.5	11.2	11.2
Over 2-2/3 but not over 7	27.3	12.3	11.3	11.3
Over 7 but not over 15	30.3	14.1	13.4	13.4
Over 15	57.6	18.1	16.6	16.6

1/ The ad valorem equivalents shown here do not include the 2-1/2 percent ad valorem additional rate of duty applicable to imports of colored or special sheet glass.

2/ Based on the modified escape-action rates which became effective on Jan. 11, 1967.

3/ Based on the trade-agreement rates. The rates applicable to glass over 16 but not over 28 ounces per square foot, and not over 100 united inches are scheduled to become effective on Jan. 1, 1970.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 4.--Sheet glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June-- 1968	January-June-- 1969
	Quantity (million pounds)						
Shipments by U.S. producers	1,530.0	1,532.1	1,383.4	1,248.3	1,352.8	617.5	737.6
U.S. exports 1/	4.2	4.0	9.0	10.7	6.7	4.8	2.0
U.S. imports for consumption:							
At most-favored-nation rates of duty	444.6	386.9	422.1	416.4	582.5	276.3	248.7
At full rates of duty	32.3	38.4	40.4	44.5	46.2	18.4	17.3
Total (all rates of duty)	476.9	425.3	462.5	460.9	628.7	294.7	266.0
Apparent U.S. consumption	2,002.7	1,953.4	1,836.9	1,698.5	1,974.8	907.4	1,001.6
	Percent of U.S. consumption						
Share supplied by--							
Shipments 2/ by U.S. producers	76.2	78.2	74.8	72.9	68.2	67.5	73.4
U.S. imports for consumption:							
At most-favored-nation rates of duty	22.2	19.8	23.0	24.5	29.5	30.5	24.8
At full rates of duty	1.6	2.0	2.2	2.6	2.3	2.0	1.8
Total (all rates of duty)	23.8	21.8	25.2	27.1	31.8	32.5	26.6

1/ Official statistics are reported in square feet and have been converted to pounds at the ratio of 1 sq. ft.=1.16 pounds. Data for 1964 do not include colored glass; it is believed, however, that exports of colored glass were small.

2/ Less exports.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table 5.--Thin sheet glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June	
						1968	1969
	Quantity (million pounds)						
Shipments by U.S. producers	30.1	24.0	24.8	* * *	* * *	* * *	* * *
U.S. exports	1/	1/	1/				
U.S. imports for consumption:							
At most-favored-nation rates of duty	51.7	56.8	45.3				
At full rates of duty	.3	1.8	2.8				
Total, all rates of duty	52.0	58.6	48.1				
Apparent U.S. consumption	82.1	82.6	72.9				
	Percent of U.S. consumption						
Share supplied by--							
Shipments by U.S. producers	36.7	29.1	34.0	* * *	* * *	* * *	* * *
U.S. imports for consumption:							
At most-favored-nation rates of duty	63.0	68.8	62.1				
At full rates of duty	.3	2.1	3.9				
Total, all rates of duty	63.3	70.9	66.0				

1/ U.S. exports of sheet glass are not separately classified by weight, but it is believed that no glass weighing less than 16 ounces per square foot is exported.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table 6.--Window glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June 1968	January-June 1969
	Quantity (million pounds)						
Shipments by U.S. producers	921.1	914.3	870.7	* * *	* * *	* * *	* * *
U.S. exports 1/	4.2	4.0	9.0				
U.S. imports for consumption:							
At most-favored-nation rates of duty	227.2	190.2	211.6				
At full rates of duty	18.7	23.5	29.7				
Total, all rates of duty	245.9	213.7	241.3				
Apparent U.S. consumption	1,162.8	1,124.0	1,103.0				
	Percent of U.S. consumption						
Share supplied by--							
Shipments 2/ by U.S. producers	78.9	81.0	78.1	* * *	* * *	* * *	* * *
U.S. imports for consumption:							
At most-favored-nation rates of duty	19.5	16.9	19.2				
At full rates of duty	1.6	2.1	2.7				
Total, all rates of duty	21.1	19.0	21.9				

1/ Official statistics are reported in square feet and have been converted to pounds at the ratio of 1 sq. ft.=1.16 pounds.

2/ Less exports.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by the U.S. producers.

Table 7.--Heavy sheet glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June 1968	January-June 1969
	Quantity (million pounds)						
Shipments by U.S. producers	578.8	593.8	487.9	*	*	*	*
U.S. exports	1/	1/	1/				
U.S. imports for consumption:							
At most-favored-nation rates of duty	165.6	139.9	165.2				
At full rates of duty	13.3	13.0	8.0				
Total, all rates of duty	178.9	152.9	173.2				
Apparent U.S. consumption	757.7	746.7	661.1				
	Percent of U.S. consumption						
Share supplied by--							
Shipments by U.S. producers	76.4	79.5	73.8	*	*	*	*
U.S. imports for consumption:							
At most-favored-nation rates of duty	21.9	18.7	25.0				
At full rates of duty	1.7	1.8	1.2				
Total, all rates of duty	23.6	20.5	26.2				

1/ U.S. exports of sheet glass are not separately classified by weight, but it is believed that no glass weighing more than 28 ounces per square foot is exported.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table 8.--Indexes of selected U.S. business indicators, 1955-68

Year	Total industrial production 1/	Building construction			Automobile production 5/
		Residential		Nonresidential	
		Housing starts 2/	Value (constant dollars) 3/	Value (constant dollars) 4/	
1955	91	119	110	99	139
1956	100	98	98	102	103
1957	101	89	91	106	112
1958	94	100	96	98	80
1959	106	111	113	96	108
1960	109	92	99	105	131
1961	110	97	99	109	109
1962	118	107	109	112	136
1963	124	117	113	115	150
1964	132	111	111	124	151
1965	143	108	109	147	183
1966	156	85	97	160	170
1967	158	94	92	156	146
1968	165	110	106	153	175

1/ Index of industrial production published by the Board of Governors of the Federal Reserve System in the Federal Reserve Bulletin.

2/ Calculated from data on the number of public and private nonfarm new housing starts published in Department of Commerce, Business and Defense Services Administration, Construction Review.

3/ Calculated from data on the value of public residential and private nonfarm residential construction put in place, adjusted to constant dollars, published in Department of Commerce, Business and Defense Services Administration, Construction Review.

4/ Calculated from data on the value of public and private nonfarm nonresidential building construction put in place, adjusted to constant dollars, published in Department of Commerce, Business and Defense Services Administration, Construction Review.

5/ Index of auto production published as part of the index of industrial production by the Board of Governors of the Federal Reserve System in Federal Reserve Bulletin.

Table 9.--Monthly indexes of selected U.S. business indicators, seasonally adjusted annual rates, January 1967 to present

(1957-59=100)

Indicator/year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total industrial production: 1/												
1967	158	157	156	156	156	156	157	158	157	157	160	162
1968	157	162	163	162	164	166	166	165	165	166	168	169
1969	169	170	171	172	172	174	175	-	-	-	-	-
Building construction:												
Residential:												
Housing starts: 2/												
1967	78	82	77	80	89	88	98	100	103	108	115	91
1968	106	111	110	115	99	99	111	110	115	114	126	109
1969	136	122	115	113	109	106	97	-	-	-	-	-
Value (constant dollars): 3/												
1967	80	81	83	85	86	88	91	95	98	100	103	105
1968	102	101	104	111	111	103	101	102	105	107	108	112
1969	112	113	114	111	109	-	-	-	-	-	-	-
Nonresidential:												
Value (constant dollars): 4/												
1967	168	164	157	154	156	152	157	154	156	156	154	153
1968	163	164	161	159	155	144	142	148	149	155	154	147
1969	163	159	157	152	161	-	-	-	-	-	-	-
Automobile production: 5/												
1967	147	136	144	150	152	154	157	158	129	129	141	167
1968	162	161	168	165	174	174	174	175	174	177	178	172
1969	167	168	168	161	157	169	174	-	-	-	-	-

1/ Index of industrial published by the Board of Governors of the Federal Reserve System in the Federal Reserve Bulletin.

2/ Calculated from data on the number of private nonfarm new housing starts published in Department of Commerce, Business and Defense Services Administration, Construction Review.

3/ Calculated from data on the value of public residential and private nonfarm residential construction put in place, adjusted to constant dollars, published in Department of Commerce, Business and Defense Services Administration, Construction Review.

4/ Calculated from data on the value of public and private nonfarm nonresidential building construction put in place, adjusted to constant dollars, published in Department of Commerce, Business and Defense Services Administration, Construction Review.

5/ Index of auto production published as part of the index of industrial production by the Board of Governors of the Federal Reserve System in Federal Reserve Bulletin.

Table 10.--Sheet glass: 1/ U.S. imports for consumption, by principal sources, annual 1964-68 and January-June 1968 and 1969

Country	1964	1965	1966	1967	1968	January-June--	
						1968	1969
	Quantity (1,000 pounds)						
Belgium	147,236	122,304	142,924	134,604	170,581	87,863	70,911
West Germany	45,887	45,361	52,779	52,845	72,593	31,071	33,898
Italy	16,982	22,508	33,560	26,052	56,915	22,458	18,190
Japan	78,011	62,648	50,237	50,801	56,800	29,183	25,935
United Kingdom	25,521	30,437	38,225	36,530	48,972	21,044	20,341
Republic of China (Taiwan)	7,558	9,520	13,830	31,930	41,698	22,839	15,977
Israel	9,300	9,689	15,494	13,183	17,046	8,632	4,841
Finland	16,650	12,647	14,486	9,618	15,585	5,984	9,546
Canada	10,432	7,139	7,736	3,751	3,091	1,145	12,747
All other	87,026	64,629	52,838	57,098	99,206	46,075	36,372
Total	444,603	386,882	422,109	416,412	582,487	276,294	248,758
Communist dominated countries at full rates of duty	32,308	38,441	40,445	44,483	46,227	18,400	17,322
Grand total	476,911	425,323	462,554	460,895	628,714	294,694	266,080
	Value (1,000 dollars)						
Belgium	9,539	7,195	8,473	9,475	12,706	6,465	5,616
West Germany	3,493	3,344	4,041	4,791	6,400	2,788	2,960
Italy	1,077	1,233	1,716	1,765	7,708	1,661	1,367
Japan	5,386	4,112	3,589	4,313	4,844	2,420	2,287
United Kingdom	1,670	1,925	2,284	2,491	3,400	1,533	1,407
Republic of China (Taiwan)	434	594	851	1,810	2,301	1,248	949
Israel	535	519	744	638	889	453	264
Finland	862	695	831	626	1,024	401	651
Canada	698	461	502	274	282	92	1,240
All other	5,362	3,964	3,480	3,802	2,921	2,850	2,284
Total	29,056	24,042	26,511	29,985	42,475	19,911	19,025
Communist dominated countries at full rates of duty	1,271	1,446	1,663	1,824	1,869	733	710
Grand total	30,327	25,488	28,174	31,809	44,344	20,644	19,735

1/ Includes colored glass.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 11.--Sheet glass: 1/ U.S. exports of domestic merchandise by principal markets, 1964-68, and January-June 1968 and 1969

Country	1964	1965	1966	1967	1968	January-June	
						1968	1969
	Quantity (1,000 pounds)						
Canada	1,429	1,883	6,577	7,940	4,536	3,855	723
Mexico	351	304	544	755	441	2,263	141
Australia	387	228	406	346	420	1,222	262
Venezuela	375	655	559	418	372	554	163
Panama	103	156	119	60	45	65	62
Guatemala	133	104	113	58	70	48	56
All other	1,398	895	634	1,140	765	3,218	619
Total	4,176	4,225	8,952	10,717	6,658	4,789	2,026
	Value (1,000 dollars)						
Canada	413	814	1,759	2,210	1,162	962	171
Mexico	97	95	161	196	140	898	42
Australia	135	82	142	112	119	549	111
Venezuela	107	194	144	101	84	251	37
Panama	28	45	41	19	15	27	13
Guatemala	32	30	35	19	21	20	18
All other	441	330	253	334	284	1,442	228
Total	1,253	1,590	2,535	2,991	1,825	1,265	620

1/ Official statistics are reported in square feet and have been converted to pounds at the ratio of 1 sq. ft.=1.16 pounds.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 12.--Employment in U.S. establishments in which sheet glass was produced, 1964-68

Item	1964	1965	1966	1967	1968
Average number of employees:					
All employees	10,938	11,018	10,365	9,783	9,736
Production and related workers	9,369	9,348	8,636	7,989	8,046
Man-hours worked by production and related workers making:					
All products--1,000 hours	18,447	19,461	17,733	16,692	16,559
Sheet glass--do	14,301	14,438	12,848	12,415	12,184
Other products--do	4,146	5,023	4,885	4,277	4,375

Source: Compiled from data submitted to the U.S. Tariff Commission by U.S. producers.

Table 13.--Output of sheet glass and output of sheet glass per man-hour (OPMH) in establishments producing window glass, by company and establishment, 1964-68

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Table 14.--Sheet glass: Indexes of published prices of domestic sheet glass and the BLS wholesale price index of window glass, on selected dates, 1964-69

(May 1, 1964=100)

Date	Thin sheet glass 1/		Window glass			Heavy sheet glass 2/	
	In 100-foot boxes	In standard pallets	In 50-foot boxes 3/	In standard pallets 3/	BLS index 4/	In 100-foot boxes	standard pallets
May 1, 1964	100	100	100	100	100	100	100
Nov. 1, 1964	100	100	100	100	102	100	100
May 1, 1965	99	99	100	99	101	99	99
Nov. 1, 1965	99	99	98	97	97	99	99
May 1, 1966	105	105	97	96	99	103	104
Nov. 1, 1966	110	110	101	101	101	109	108
May 1, 1967	110	110	101	101	101	109	108
Nov. 1, 1967	118	110	108	101	109	109	108
May 1, 1968	126	117	115	107	115	115	115
Nov. 1, 1968	123	115	113	105	113	113	113
May 1, 1969	130	121	120	110	120	120	118

1/ Composite index based on published prices of 7/9-ounce, 9/11-ounce, and 16-ounce sheet glass, "B", up to 40 united inches.

2/ Composite index based on published prices of 3/16-inch, 7/32-inch, and 1/4-inch sheet glass, "B", up to 40 united inches.

3/ Based on published prices of single-strength window glass, "B", over 50 but not over 60 united inches.

4/ The BLS wholesale price index of window glass is based on prices of "Window glass, single B, 40 bracket; manufacturer to jobbers, carlots, f.o.b. factory with freight prepaid or allowed."

Source: Computed from pricelists submitted by domestic producers and from official statistics of the U.S. Bureau of Labor Statistics.

Table 15.--Sheet glass: Published prices of representative types and sizes, domestic and West European, delivered in New York City 1/ on selected dates, 1964-69

Date	Window glass 2/						
	Domestic 19-ounce glass	West European glass		Margin by which the price of West European glass was lower than the price of 19-ounce domestic glass			
		18-ounce	19-ounce	18-ounce		19-ounce	
	Per 100 sq. ft.	Per 100 sq. ft.	Per 100 sq. ft.	Per 100 sq. ft.	Percent	Per 100 sq. ft.	Percent
May 1, 1964	$11.06	$10.10	$10.41	$0.96	8.7	$0.65	5.9
Nov. 1, 1964	11.06	10.10	10.41	.96	8.7	.65	5.9
May 1, 1965	10.95	9.90	10.21	1.05	10.6	.74	6.8
Nov. 1, 1965	10.73	10.01	10.21	.72	7.2	.52	4.8
May 1, 1966	10.61	10.21	10.40	.40	3.9	.21	2.0
Nov. 1, 1966	11.15	10.37	10.71	.78	7.5	.44	3.9
May 1, 1967	11.15	10.37	10.71	.78	7.5	.44	3.9
Nov. 1, 1967	11.15	10.37	10.71	.78	7.5	.44	3.9
May 1, 1968	11.82	10.99	11.35	.83	7.6	.47	4.0
Nov. 1, 1968	11.58	10.99	11.35	.59	5.4	.23	2.0
May 1, 1969	12.16	11.53	11.92	.63	5.5	.24	2.0

See end of table for footnotes.

Table 19.--Sheet glass: Published prices of representative types and sizes, domestic and West European, delivered in New York City 1/ on selected dates, 1964-69--Continued

Date	Thin sheet glass 3/				Heavy sheet glass 4/			
	Domestic	West European	Margin by which the price of West European glass was lower than that of domestic glass		Domestic	West European	Margin by which the price of West European glass was lower than that of domestic glass	
	Per 100 sq. ft.	Per 100 sq. ft.	Per 100 sq. ft.	Percent	Per 100 sq. ft.	Per 100 sq. ft.	Per 100 sq. ft.	Percent
May 1, 1964	$14.23	$13.88	$0.35	2.5	$26.98	$25.72	$1.26	4.7
Nov. 1, 1964	14.23	13.88	.35	2.5	26.98	25.72	1.26	4.7
May 1, 1965	14.09	13.88	.21	1.5	26.71	25.23	1.48	5.5
Nov. 1, 1965	14.09	13.88	.21	1.5	26.71	25.23	1.48	5.5
May 1, 1966	14.79	13.88	.91	6.2	27.92	26.32	1.60	5.7
Nov. 1, 1966	15.53	14.17	1.36	8.8	29.34	27.28	2.06	7.0
May 1, 1967	15.53	14.44	1.09	7.0	29.34	27.28	2.06	7.0
Nov. 1, 1967	15.53	14.44	1.09	7.0	29.34	27.28	2.06	7.0
May 1, 1968	16.48	15.30	1.18	7.2	31.11	28.92	2.19	7.0
Nov. 1, 1968	16.15	15.30	.85	5.3	30.48	28.92	1.56	5.1
May 1, 1969	17.21	16.06	1.15	6.7	32.01	30.37	1.64	5.1

1/ Through May 1, 1966, published prices of West European glass were quoted on an ex-dock, duty-paid basis; an amount estimated to be equivalent to charges for customs brokerage, loading, and trucking in New York City has been added to the published prices for the dates May 1, 1964 through May 1, 1966.

2/ Single-strength "B", over 50 but not over 60 united inches in standard pallets. Prices reflect payment (cash) discounts, but not discounts for large volume orders, special stock sizes, or packing on extra heavy pallets.

3/ 7/9-ounce, not over 40 united inches, in standard pallets. Prices reflect payment (cash) discounts, but not discounts for large volume orders or packing on extra heavy pallets.

4/ 3/16-inch, clear, 10/25-foot bracket, in standard pallets. Prices reflect payment (cash) discounts, but not discounts for large volume orders or packing on heavy extra heavy pallets.

Source: Compiled from manufacturers' and sales agents' pricelists.

Table 16.--Profit-and-loss experience of domestic producers 1/ on their sheet glass operations 2/ 1964-68

Year	Net sales and intracompany transfers	Net operating profit or (loss) before income taxes	Ratio of net operating profit or (loss) to net sales
	1,000 dollars	1,000 dollars	Percent
1964	143,885	18,095	12.6
1965	141,261	13,173	9.3
1966	131,595	6,755	5.1
1967	* * *	* * *	* * *
1968			

1/ Includes data on all companies that produce significant quantities of sheet glass, except the Ford Motor Co. Ford's sheet glass production, which is predominantly captive, amounted to less than * * * (based on weight) of the domestic industry's aggregate output in 1968. Data on the Blackford Window Glass Co., which ceased operations in February 1966, are included for 1964. Data on Blackford's operations in 1965 and 1966 are not available; Blackford accounted for less than 2 percent of the industry's aggregate sales of sheet glass in 1965 and an even smaller share in 1966.

2/ The reporting establishments in which sheet glass is produced are devoted almost wholly to the production of sheet glass. The data shown, therefore, are representative of the total operations of the establishments as well as sheet-glass operations alone.

Source: Compiled from information submitted to the U.S. Tariff Commission by the domestic producers.

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Table 17.--Plate and float glass: 1/ Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68, and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June 1968	January-June 1969
	Quantity (million pounds) 2/						
Shipments by U.S. producers:							
Plate glass	1,541.3	1,717.0	1,477.8	1,064.1	1,104.6	581.9	475.5
Float glass	71.9	234.3	468.3	684.3	1,064.0	442.2	635.3
Total	1,613.2	1,951.3	1,946.1	1,748.4	2,168.6	1,024.1	1,110.8
U.S. exports	65.2	91.6	102.3	89.5	62.9	30.4	39.9
U.S. imports for consumption 3/	93.8	97.4	131.2	145.1	178.1	91.9	83.2
Apparent U.S. consumption	1,641.8	1,957.1	1,975.0	1,804.0	2,283.8	1,085.6	1,154.1
	Percent of U.S. consumption						
Share supplied by--							
Shipments 4/ by U.S. producers	94.3	95.0	93.4	92.0	92.2	91.5	92.8
U.S. imports for consumption	5.7	5.0	6.6	8.0	7.8	8.5	7.2

1/ Excludes polished wire glass.

2/ Converted to pounds from square feet by using factors developed by the Commission that take into account the various thicknesses of glass.

3/ Imports dutiable at most-favored-nation rates of duty. Excludes imports of 92,000 pounds from East Germany entered during the period Jan.-June 1969.

4/ Excludes exports.

Source: Compiled from official statistics of the U.S. Department of Commerce and from information submitted to the U.S. Tariff Commission by the U.S. producers.

Table 18.--Indexes of U.S. producers' shipments and apparent consumption of plate and float glass and selected U.S. business indicators, 1964-68

(1964=100)

Year	U.S. producers' shipments 1/	Apparent U.S. consumption 1/	Selected U.S. business indicators	
			Nonresidential building construction 2/	Automobile production 3/
1964	100	100	100	100
1965	121	119	119	121
1966	121	120	129	113
1967	108	110	126	97
1968	134	139	123	116

1/ Calculated from data in table 17 of this report.

2/ Calculated from data on the value of nonresidential building construction put in place, adjusted to constant dollars, published in U.S. Department of Commerce, Business and Defense Services Administration, Construction Review.

3/ Index of automobile production published as part of the index of industrial production by the Board of Governors of the Federal Reserve System in Federal Reserve Bulletin.

Source: Compiled from offical statistics of the Department of Commerce and the Board of Governors of the Federal Reserve System and from information submitted to the U.S. Tariff Commission by the U.S. producers.

Table 19.--Polished wire glass: Shipments by U.S. producers, U.S. imports for consumption, and apparent U.S. consumption, 1964-68, and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June 1968	January-June 1969
	Quantity (1,000 pounds) 1/						
Shipments by U.S. producers	20,188	19,348	20,064	20,568	24,460	9,936	9,840
U.S. imports for consumption 2/	6,652	6,852	6,560	8,208	9,908	4,452	3,976
Apparent U.S. consumption 3/	26,840	26,200	26,624	28,776	34,368	14,388	13,816
	Percent of U.S. consumption						
Share supplied by--							
Shipments by U.S. producers	75.2	73.8	75.4	71.5	71.2	69.1	71.2
U.S. imports for consumption	24.8	26.2	24.6	28.5	28.8	30.9	28.8

1/ Converted to pounds from square feet by using factors developed by the U.S. Tariff Commission that take into account the various thicknesses of the glass.

2/ Does not include colored polished wire glass, which is believed to be nil or negligible. U.S. imports in the period shown all entered at most-favored-nation rates of duty.

3/ U.S. exports of polished wire glass are not separately classified; they are believed to be negligible.

Source: Compiled from official statistics of the U.S. Department of Commerce and from information submitted to the U.S. Tariff Commission by the U.S. producers.

Table 20.--Plate and float glass: 1/ U.S. imports for consumption, by principal sources, 1964-68 and January-June 1968 and 1969

Country	1964	1965	1966	1967	1968	January-June--	
						1968	1969
	Quantity (1,000 square feet)						
Japan	2,244	7,881	20,314	26,297	22,664	11,573	13,765
Belgium	21,217	18,765	17,582	17,296	17,422	9,415	9,176
Italy	2	406	1,986	4,647	9,562	4,537	1,615
Canada	27	2/	240	685	8,322	5,679	55
France	8,076	7,813	8,309	6,098	7,752	3,839	4,330
West Germany	3,523	2,049	2,367	3,489	5,875	2,690	3,783
United Kingdom	4,144	3,487	3,343	2,416	2,154	735	1,432
All other	1,040	860	293	562	460	157	87
Total 3/	40,273	41,261	54,434	61,490	74,211	38,625	34,243
	Value (1,000 dollars)						
Japan	734	2,185	5,540	8,867	8,512	4,372	5,303
Belgium	6,720	5,830	5,695	5,959	6,383	3,313	3,434
Italy	1	121	551	1,416	5,533	1,415	690
Canada	12	4/	79	242	3,015	2,053	23
France	2,597	2,545	2,808	2,168	2,704	1,404	1,491
West Germany	1,099	706	1,037	1,583	2,534	1,045	1,503
United Kingdom	1,364	1,085	1,082	896	960	348	540
All other	323	254	92	204	168	96	40
Total 3/	12,850	12,726	16,884	21,335	29,809	14,046	13,024

1/ Excludes polished wire glass.
2/ Less than 500 square feet.
3/ Imports dutiable at most-favored-nation rates of duty. Excludes imports of 38,000 square feet, valued at $12,000, from East Germany entered during the period Jan.-June 1969.
4/ Less than $500.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 21.--Employment in U.S. establishments in which plate and float glass were produced, 1964-68

(Man-hours in thousands of hours)

Item	1964	1965	1966	1967	1968
Average number of employees:					
All employees	15,235	16,781	17,011	15,769	16,429
Production and related workers	12,926	14,273	14,537	13,195	13,723
Man-hours worked by production and related workers:					
All products	27,409	30,904	30,416	26,460	28,715
Plate and float glass combined	14,865	16,315	16,676	14,165	13,878
Plate glass	14,023	14,767	14,414	11,122	10,306
Float glass	842	1,548	2,262	3,043	3,572

Source: Compiled from data submitted to the U.S. Tariff Commission by U.S. producers.

Table 22.--Output of plate glass and output of plate glass per man-hour (OPMH), by company, 1964-68

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Table 23.--Output of float glass and output of float glass per man-hour (OPMH), by company, 1964-68

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Table 24.--Employment in U.S. establishments in which polished wire glass was produced, 1964-68

(Man-hours in thousands of hours)

Item	1964	1965	1966	1967	1968
Average number of employees:					
All employees	1,718	1,762	1,682	1,557	1,693
Production and related workers	1,560	1,607	1,526	1,400	1,534
Man-hours worked by production and related workers:					
All products	3,205	3,543	3,049	2,750	2,863
Polished wire glass	406	400	316	382	416

Source: Computed from data submitted to the U.S. Tariff Commission by U.S. producers.

Table 25.--Output of polished wire glass and output of polished wire glass per man-hour (OPMH), by company, 1964-68

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Table 26.--Plate and float glass: Indexes of published prices of domestic glass and BLS wholesale price index, on selected dates, 1964-69

(May 1, 1964=100)

Date	Indexes calculated by the Tariff Commission					BLS index 5/	Polished wire glass 6/
	1/8-inch, clear 1/	1/4-inch, clear 2/	1/4-inch, grey 3/	1/2-inch, clear 4/	Combined index		
May 1, 1964	100	100	100	100	100	100	100
Nov. 1, 1964	100	100	100	100	100	100	100
May 1, 1965	100	101	99	99	100	97	104
Nov. 1, 1965	100	101	99	99	101	97	104
May 1, 1966	100	101	104	99	102	93	104
Nov. 1, 1966	108	106	104	99	106	99	110
May 1, 1967	108	106	104	106	108	99	110
Nov. 1, 1967	108	114	104	106	108	107	110
May 1, 1968	103	114	123	106	112	107	116
Nov. 1, 1968	103	114	123	106	112	107	116
May 1, 1969	103	121	130	114	117	113	122

1/ 1/8-inch, clear, glazing quality, cut sizes, 1/5-foot bracket, net of cash discount.
2/ 1/4-inch, clear, glazing quality, specified stock sheets, one size per case, in even inches, net of cash discount.
3/ 1/4-inch, grey, stock sheet, minimum leeways, net of cash discount.
4/ 1/2-inch, clear, stock sheets, net of cash discount.
5/ The BLS wholesale price index, which has been adjusted to a base of May 1, 1964, is based on prices of "Plate glass, polished, 1/4", glazing quality, bracket 25-50 sq. ft.; manufacturer to jobber or wholesale distributor, carlots, f.o.b. factory with freight allowed."
6/ 1/4-inch, 10/25' bracket, stock sheets, East, net of cash discount.

Source: Computed from pricelists obtained by the Tariff Commission from domestic producers and official statistics of the U.S. Bureau of Labor Statistics.

Table 27.--Plate and float glass: Published prices of a representative type and size, 1/ domestic and West European, East Coast, on selected dates, 1964-69

Date	Domestic	West European	Margin by which the price of West European glass was lower than that of domestic glass	
	Per sq. ft.	Per sq. ft.	Per sq. ft.	Percent
May 1, 1964	$0.396	2/	-	-
Nov. 1, 1964	.396	$0.384	$0.012	3.0
May 1, 1965	.400	.388	.012	3.0
Nov. 1, 1965	.400	.388	.012	3.0
May 1, 1966	.400	.369	.031	7.8
Nov. 1, 1966	.419	.407	.012	2.9
May 1, 1967	.419	.407	.012	2.9
Nov. 1, 1967	.451	.437	.014	3.1
May 1, 1968	.451	.437	.014	3.1
Nov. 1, 1968	.451	.437	.014	3.1
May 1, 1969	.478	.464	.014	2.9

1/ 1/4-inch, glazing quality, 48 x 72 inches, specified stock sheet, one size per case, in even inches, net of cash discounts (cash against documents, for West European glass).

2/ Not available.

Source: Computed from pricelists obtained by the Tariff Commission.

Table 28.--Profit-and-loss experience of domestic producers on their plate and float glass operations, 1964-68

Year	Net sales and intracompany transfers	Net operating profit or (loss) before income taxes	Ratio of net operating profit or (loss) to net sales
	1,000 dollars	1,000 dollars	Percent
	All operations 1/		
1964	270,236	51,931	19.2
1965	325,299	68,684	21.1
1966	293,705	43,792	14.9
1967	276,204	46,503	16.8
1968	324,651	59,495	18.3
	Plate and float glass		
1964	204,944	52,615	25.7
1965	245,404	70,807	28.9
1966	225,165	49,889	22.2
1967	211,750	47,694	22.5
1968	241,090	60,652	25.2

1/ All operations of the establishment(s) in which plate and float glass is produced except that data for PPG Industries, Inc., cover plate and float glass only.

Source: Compiled from information submitted to the U.S. Tariff Commission by the domestic producers.

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Table 29.--Rolled glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June-- 1968	January-June-- 1969
	Quantity (1,000 pounds)						
Shipments by U.S. producers	155,860	150,337	140,330	122,545	136,113	62,513	79,143
U.S. exports	2,206	4,620	4,518	4,177	6,001	2,618	2,382
U.S. imports for consumption:							
At most-favored-nation rates of duty	62,299	54,322	64,041	52,877	60,726	28,642	22,482
At full rates of duty	5,157	2,269	850	1,591	536	299	283
Total (all rates of duty)	67,456	56,591	64,891	54,468	61,262	28,941	22,765
Apparent U.S. consumption	221,110	202,308	200,703	172,836	191,374	88,837	99,526
	Percent of U.S. consumption						
Share supplied by:							
Shipments 1/ by U.S. producers	69.5	72.0	67.7	68.5	68.0	67.4	77.1
U.S. imports for consumption:							
At most-favored-nation rates of duty	28.2	26.9	31.9	30.6	31.7	32.2	22.6
At full rates of duty	2.3	1.1	.4	.9	.3	.4	.3
Total (all rates of duty)	30.5	28.0	32.3	31.5	32.0	32.6	22.9

1/ Less exports.

Source: Compiled from official statistics of the U.S. Department of Commerce and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table 30.--Rolled glass: U.S. imports for consumption, by principal sources, 1964-68 and January-June 1968 and 1969

Country	1964	1965	1966	1967	1968	January-June--	
						1968	1969
	Quantity (1,000 pounds)						
Belgium	27,976	21,358	19,247	17,192	16,194	8,325	5,506
Japan	15,537	13,705	15,733	12,678	14,739	7,042	4,271
Poland	5,704	8,202	16,535	11,991	11,133	5,140	3,833
Republic of China (Taiwan)	1,520	1,129	1,435	1,002	6,612	2,816	3,167
West Germany	6,338	7,606	7,189	5,417	6,225	2,724	3,654
United Kingdom	4,065	1,339	2,642	3,462	3,960	1,697	1,622
All other	1,159	983	1,260	1,135	1,863	898	429
Total	62,299	54,322	64,041	52,877	60,726	28,642	22,482
Communist dominated countries at full rates of duty	5,157	2,269	850	1,591	536	299	283
Grand total	67,456	56,591	64,891	54,468	61,262	28,941	22,765
	Value (1,000 dollars)						
Belgium	2,282	1,669	1,418	1,334	1,316	615	511
Japan	874	799	1,033	961	1,101	509	358
Poland	299	362	524	405	359	157	127
Republic of China (Taiwan)	70	51	71	55	307	141	147
West Germany	589	699	699	531	675	313	387
United Kingdom	431	146	307	358	448	195	220
All other	72	56	76	57	98	49	33
Total	4,617	3,782	4,128	3,701	4,304	1,979	1,783
Communist dominated countries at full rates of duty	97	46	21	39	13	7	7
Grand total	4,714	3,828	4,149	3,740	4,317	1,986	1,790

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 31.--Employment in U.S. establishments in which rolled glass was produced, 1/ 1964-68

Item	1964	1965	1966	1967	1968
Average number of employees: 2/					
All employees	1,153	1,129	1,091	1,129	1,119
Production and related workers	926	907	870	899	881
Man-hours worked by production and related workers making--					
All products----1,000 hours	1,923	1,860	1,691	1,730	1,786
Rolled glass-------do-------	1,738	1,536	1,471	1,460	1,488
Other products------do-------	185	324	220	270	298

1/ Establishments producing rolled glass as a principal product.
2/ Does not include the number of employees making rough plate glass blanks.

Source: Compiled from data submitted to the U.S. Tariff Commission by U.S. producers.

Table 32.--Output of rolled glass and output of rolled glass per man-hour (OPMH) in establishments producing rolled glass by company and establishment, 1964-68

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Table 33.--Rolled glass: Indexes of published prices of domestic glass, on selected dates, 1964-69

(May 1, 1964=100)

Date	Stock sheets, lowest priced patterns 1/	7/32", special pattern in sizes for shower doors and tub enclosures
May 1, 1964	100	100
Nov. 1, 1964	100	100
May 1, 1965	100	99
Nov. 1, 1965	100	99
May 1, 1966	100	99
Nov. 1, 1966	104	103
May 1, 1967	104	103
Nov. 1, 1967	104	103
May 1, 1968	109	108
Nov. 1, 1968	109	108
May 1, 1969	115	93

1/ Combined index for 7/32-inch and 1/4-inch stock sheets, fire finished, lowest priced patterns.

Source: Calculated from pricelists obtained by the U.S. Tariff Commission from domestic producers.

Table 34.--Rolled glass: Published prices of a representative pattern, domestic f.o.b. plant east of Denver and West European c.i.f. East Coast port, on selected dates, 1964-69

Date	Domestic 1/	West European 1/	Margin by which the price of West European glass was lower than the price of domestic glass	
	Per square foot	Per square foot	Per square foot	Percent
May 1, 1964	$0.281	$0.234	$0.047	16.7
Nov. 1, 1964	.281	.234	.047	16.7
May 1, 1965	.278	.229	.049	17.6
Nov. 1, 1965	.278	.229	.049	17.6
May 1, 1966	.278	.229	.049	17.6
Nov. 1, 1966	.291	.229	.062	21.3
May 1, 1967	.291	.240	.051	17.5
Nov. 1, 1967	.291	.240	.051	17.5
May 1, 1968	.309	.240	.069	22.3
Nov. 1, 1968	.309	.252	.057	18.4
May 1, 1969	.326	.265	.061	18.7

1/ 7/32", lowest priced pattern group, stock sheets.

Source: Calculated from price lists obtained by the U.S. Tariff Commission.

Table 35.--Profit-and-loss experience of domestic producers on their rolled glass operations for 1964-1968

Year	Net sales and intracompany transfers	Net operating profit or (loss) before income taxes	Ratio of net operating profit or (loss) to net sales
	1,000 dollars	1,000 dollars	Percent
	All operations		
1964	180,618	37,972	21.0
1965	218,421	43,236	19.8
1966	190,529	30,554	16.0
1967	178,391	31,689	17.8
1968	219,361	42,279	19.3
	Rolled glass		
1964	16,715	3,070	18.4
1965	16,440	2,541	15.5
1966	16,206	1,499	9.2
1967	15,336	1,147	7.5
1968	15,968	1,326	8.3

Source: Compiled from information submitted to the U.S. Tariff Commission by the domestic producers.

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Table 36.--Tempered glass: Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption and apparent U.S. consumption, annual 1964-1968 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	Jan.-June 1968	Jan.-June 1969
	Quantity (1,000 square feet)						
Shipments by U.S. producers	217,247	286,629	272,485	273,458	348,322	167,581	184,329
U.S. exports 1/	2,469	2,796	3,148	6,195	9,287	3,825	5,157
U.S. imports for consumption:							
APTA 2/	-	40	2,576	4,820	7,736	3,488	5,563
All other 3/	1,107	2,882	2,487	4,224	9,299	4,434	5,371
Total	1,107	2,922	5,063	9,044	17,035	7,922	10,934
Apparent U.S. consumption	215,885	286,755	274,400	276,307	356,070	171,678	190,106
	Percent of U.S. consumption						
Share supplied by --							
Shipments 4/ by U.S. producers	99.5	99.0	98.2	96.7	95.2	95.4	94.2
U.S. imports for consumption:							
APTA	-	5/	.9	1.7	2.2	2.0	3.0
All other	.5	1.0	.9	1.6	2.6	2.6	2.8
Total	.5	1.0	1.8	3.3	4.8	4.6	5.8

1/ Data as reported to the U.S. Tariff Commission by producers of tempered glass.
2/ Imports entered under the provisions of the Automotive Products Trade Act of 1965.
3/ All imports entered at MFN rates of duty.
4/ Less exports.
5/ Less than 0.05 percent.

Source: Compiled from official statistics of the U.S. Department of Commerce and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table 37.--Toughened (specially tempered) glass: U.S. imports for consumption, by principal sources, 1964-68 and January-June 1968 and 1969

Country	1964	1965	1966	1967	1968	January-June-- 1968	January-June-- 1969
	Quantity (1,000 square feet)						
Canada 1/	3	61	2,593	4,841	7,763	3,501	5,619
Belgium	541	2,221	1,375	1,421	3,998	1,772	1,484
Poland	10	-	4	1,127	1,607	835	889
West Germany	180	270	435	418	989	343	261
Japan	3	47	166	562	912	527	1,719
Republic of China (Taiwan)	-	-	-	91	571	388	363
United Kingdom	306	267	420	148	356	175	172
All other	64	56	70	435	838	381	428
Total	1,107	2,922	5,063	9,043	17,034	7,922	10,935
	Value (1,000 dollars)						
Canada 1/	5	50	1,670	3,205	7,181	2,847	6,453
Belgium	210	706	449	454	1,270	575	430
Poland	2	-	1	147	202	105	106
West Germany	201	446	667	504	1,066	523	328
Japan	2	24	62	185	311	178	576
Republic of China (Taiwan)	-	-	-	9	106	73	50
United Kingdom	353	385	592	188	438	213	230
All other	28	25	38	148	293	127	160
Total	801	1,636	3,479	4,840	10,867	4,641	8,333

1/ Includes imports entered free of duty under the Automotive Products Trade Act as follows:

	1,000 sq. ft.	1,000 dollars
1965	40	35
1966	2,576	1,657
1967	4,820	3,180
1968	7,736	7,156
Jan.-June:		
1968	3,488	2,842
1969	5,563	6,304

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 38.--Employment in U.S. establishments in which tempered glass was produced, 1964-68

Item	1964	1965	1966	1967	1968
Average number of employees:					
All employees	15,853	18,025	18,340	17,779	18,750
Production and related workers	13,228	15,086	15,449	14,537	15,474
Man-hours worked by production and related workers making--					
All products----------1,000 hours----------	28,006	32,733	32,544	29,841	32,991
Tempered glass---------1,000 hours----------	8,345	10,554	10,017	9,026	11,465

Source: Compiled from data submitted to the U.S. Tariff Commission by U.S. producers.

Table 39.--Output of tempered glass and output of tempered glass per man-hour (OPMH), by company, 1/ 1964-68

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Table 40.--Tempered glass: Indexes of published prices of domestic tempered glass, on selected dates, 1964-69

(May 1, 1964=100)

Period	1/4 inch, clear 1/	1/4 inch, grey 1/	3/16 inch, clear, door sizes 2/	1/2-inch, clear 1/	Combi index
May 1, 1964	100	100	100	100	10
Nov. 1, 1964	100	100	100	100	10
May 1, 1965	88	73	99	79	8
Nov. 1, 1965	88	73	95	79	8
May 1, 1966	88	73	95	79	8
Nov. 1, 1966	88	73	99	79	8
May 1, 1967	88	73	99	79	8
Nov. 1, 1967	94	78	99	86	8
May 1, 1968	101	82	95	93	9
Nov. 1, 1968	101	82	95	93	9
May 1, 1969	106	89	95	98	9

1/ Plate or float glass, average of prices for up to 2.67 foot bracket and 10/25 foot bracket, net of cash and quantity discount.

2/ Standard patio door sizes, in standard pallets, sheet glass, "B", net of cash discount.

Source: Computed from pricelists obtained by the Tariff Commission fr domestic producers.

Table 41.--Profit-and-loss experience of domestic producers of tempered (specially hardened) glass

Year	Net sales	Net operating profit or (loss)	Ratio of net operating profit or (loss) to net sales
	1,000 dollars	1,000 dollars	Percent
	All operations 1/		
1964	187,384	20,046	10.7
1965	235,496	23,519	10.0
1966	227,150	16,679	7.3
1967	218,198	18,165	8.3
1968	306,073	45,888	15.0
	Tempered glass		
1964	110,614	14	2/
1965	137,468	319	0.2
1966	132,889	(4,659)	(3.5)
1967	131,569	377	.3
1968	162,454	3,795	2.3

1/ All operations of the establishment(s) in which tempered glass is produced except that data for PPG cover tempered-glass operations only.
2/ Less than one-tenth of one percent.

Source: Compiled from information submitted to the U.S. Tariff Commission by the domestic producers.

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Appendix B

Table B-1.--Flat glass: U.S. producers' production, shipments, productivity, profit and employment, and imports for consumption, by type of glass, 1964 and 1968

Item	Sheet glass		Plate and float glass		Rolled glass		Tempered glass 1/	
	1964	1968	1964	1968	1964	1968	1964	1968
Production----million pounds--	1,517	1,362	1,686	2,183	174	150	218	349
Shipments----------do-------	1,530	1,353	1,633	2,193	156	136	217	348
Imports----------do-------	477	629	101	188	67	61	1	17
Import ratio 2/-------percent--	23.8	31.8	6.1	8.1	30.5	32.0	0.5	4.8
Productivity (per man-hour)----------pounds--	115	118	110	153	100	101	26.1	31.4
Profit or (loss) 4/--millions--	$18,095	$8,169	$52,615	$60,652	$3,070	$1,326	3/	4
Profit ratio 4/5/-----percent--	12.6	5.8	25.7	25.5	18.4	8.3	3/	2.3
Employment:								
Production and related workers----------	9,369	8,046	13,654	14,384	817	718	13,228	15,474
Man-hours------1,000 hours--	14,301	12,184	15,271	14,294	1,738	1,488	8,345	11,465

1/ Production, shipments, and imports in millions of square feet.
2/ Ratio of imports to apparent consumption.
3/ Profits amounted to $14,000, or less than one-tenth percent of net sales.
4/ Excludes Ford Motor Co.
5/ Ratio of net operating profit or (loss) to net sales.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table B-2.—Flat glass: [1] Shipments by U.S. producers, U.S. exports of domestic merchandise, U.S. imports for consumption, and apparent U.S. consumption, annual 1964-68 and January-June 1968 and 1969

Item	1964	1965	1966	1967	1968	January-June	
						1968	1969
	Quantity (million pounds)						
Shipments by U.S. producers	3,319.3	3,653.0	3,489.9	3,139.8	3,682.0	1,714.0	1,937.3
U.S. exports	71.6	100.2	115.8	104.4	75.6	37.8	44.3
U.S. imports for consumption:							
At most-favored-nation rates of duty	627.4	545.5	623.9	622.6	831.2	401.3	358.4
At full rates of duty	37.5	40.7	41.2	46.1	46.7	18.7	17.6
Total (all rates of duty)	644.9	586.2	665.1	668.7	877.9	420.0	376.0
Apparent U.S. consumption	3,892.6	4,139.0	4,039.2	3,704.1	4,484.3	2,096.2	2,269.0
	Percent of U.S. consumption						
Share supplied by—							
Shipments [2] by U.S. producers	83.4	85.8	83.5	81.9	80.4	80.0	83.4
U.S. imports for consumption:							
At most-favored-nation rates of duty	15.6	13.2	15.5	16.8	18.5	19.1	15.8
At full rates of duty	1.0	1.0	1.0	1.3	1.1	.9	.8
Total (all rates of duty)	16.6	14.2	16.5	18.1	19.6	20.0	16.6

[1] Includes sheet, plate, float, polished wire, and rolled glass.
[2] Less exports.

Source: Compiled from official statistics of the U.S. Department of Commerce, and from information submitted to the U.S. Tariff Commission by U.S. producers.

Table B-3.--Flat glass: [1] Profit-and-loss experience of domestic producers, [2] by type of flat glass, 1964-68

(Value in thousands of dollars)

Item	1964	1965	1966	1967	1968
Net sales and intra-company transfers:					
Sheet glass	143,885	141,261	131,595	130,415	141,455
Plate and float glass	204,944	245,404	225,165	211,750	241,090
Rolled glass	16,715	16,440	16,206	15,336	15,968
Total	365,544	403,105	372,966	357,501	398,513
Net operating profit (or loss):					
Sheet glass	18,095	13,173	6,755	4,086	8,169
Plate and float glass	52,615	70,807	49,889	47,694	60,652
Rolled glass	3,070	2,541	1,499	1,147	1,326
Total	73,780	86,521	58,143	52,927	70,147
Ratio, net operating profit (or loss) to net sales:					
Sheet glass	12.6	9.3	5.1	3.1	5.2
Plate and float glass	25.7	28.9	22.2	22.5	25.2
Rolled glass	18.4	15.5	9.2	7.5	8.3
Total	20.2	21.5	15.6	14.8	17.6

1/ Excludes tempered glass.
2/ Except Ford Motor Co.

Source: Compiled and computed from information submitted to the U.S. Tariff Commission by U.S. producers.

Table B-4.--Flat glass: Profit-and-loss data of the four principal U.S. producers, by company, 1964-68 1/

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