ARMSTRONG WORLD INDUSTRIES INC
Form 10-K
February 25, 2019
UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission File Number 1-2116

ARMSTRONG WORLD INDUSTRIES, INC.

(Exact name of registrant as specified in its charter)

Pennsylvania	23-0366390
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

2500 Columbia Avenue, Lancaster, Pennsylvania	17603
(Address of principal executive offices)	(Zip Code)

Registrant’s telephone number, including area code (717) 397-0611

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	
Common Stock ($0.01 par value)	

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter time period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer	Accelerated filer
Non-accelerated filer	Smaller reporting company
Emerging growth company	

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the Common Stock of Armstrong World Industries, Inc. held by non-affiliates based on the closing price ($63.20 per share) on the New York Stock Exchange (trading symbol AWI) of June 30, 2018 was approximately $3.3 billion. As of February 19, 2019, the number of shares outstanding of the registrant's Common Stock was 48,502,391.

Documents Incorporated by Reference

Certain sections of Armstrong World Industries, Inc.’s definitive Proxy Statement for use in connection with its 2019 annual meeting of shareholders, to be filed no later than April 30, 2019 (120 days after the last day of our 2018 fiscal year), are incorporated by reference into Part III of this Form 10-K Report where indicated.

TABLE OF CONTENTS

		PAGE
	Cautionary Note Regarding Forward-Looking Statements	3
	PART I	
Item 1.	Business	4
Item 1A.	Risk Factors	8
Item 1B.	Unresolved Staff Comments	15
Item 2.	Properties	15
Item 3.	Legal Proceedings	15
Item 4.	Mine Safety Disclosures	15
	PART II	
Item 5.	Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	16
Item 6.	Selected Financial Data	17
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	18
Item 7A.	Quantitative and Qualitative Disclosures about Market Risk	32
Item 8.	Financial Statements and Supplementary Data	34
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	89
Item 9A.	Controls and Procedures	89
Item 9B.	Other Information	89
	PART III	
Item 10.	Directors, Executive Officers and Corporate Governance	90
Item 11.	Executive Compensation	91
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	91
Item 13.	Certain Relationships and Related Transactions, and Director Independence	91
Item 14.	Principal Accountant Fees and Services	91
	PART IV	
Item 15.	Exhibits and Financial Statement Schedules	92
Signatures		98

When we refer to “AWI,” the “Company,” “we,” “our” and “us”, we are referring to Armstrong World Industries, Inc. and its subsidiaries.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Certain statements in this Annual Report on Form 10-K and the documents incorporated by reference may constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Those forward-looking statements are subject to various risks and uncertainties and include all statements that are not historical statements of fact and those regarding our intent, belief or expectations, including, but not limited to, our expectations concerning our residential and commercial markets and their effect on our operating results; our expectations regarding the payment of dividends; and our ability to increase revenues, earnings and EBITDA (as discussed below). Words such as “anticipate,” “expect,” “intend,” “plan,” “target,” “project,” “predict,” “believe,” “may,” “wil “could,” “should,” “seek,” “estimate” and similar expressions are intended to identify such forward-looking statements. These statements are based on management’s current expectations and beliefs and are subject to a number of factors that could lead to actual results materially different from those described in the forward-looking statements. Although we believe that the assumptions underlying the forward-looking statements are reasonable, we can give no assurance that our expectations will be attained. Factors that could have a material adverse effect on our financial condition, liquidity, results of operations or future prospects or which could cause actual results to differ materially from our expectations include, but are not limited to:

- economic conditions;
- construction activity;
- competition;
- key customers;
- customer consolidation;
- availability and costs of raw materials and energy;
- Worthington Armstrong Venture (“WAVE”), our joint venture with Worthington Industries, Inc;
- negative tax consequences;
- the announced sale of our Europe, Middle East and Africa (including Russia) (“EMEA”) and Pacific Rim businesses is subject to various risks and uncertainties and may not be completed in accordance with the expected plans or anticipated timeline, or at all, and will involve significant time and expense, which could disrupt or adversely affect our business;
- environmental matters;
- strategic transactions;
- covenants in our debt agreements;
- our indebtedness;
- our liquidity;
- claims, litigation and cybersecurity breaches;
- international operations;
- defined benefit plan obligations;
- the tax consequences of the separation of our flooring business from our ceilings business;
- intellectual property rights;
- costs savings and productivity initiatives;
- labor; and
- other risks detailed from time to time in our filings with the Securities and Exchange Commission (the “SEC”), press releases and other communications, including those set forth under “Risk Factors” included elsewhere in this Annual Report on Form 10-K and in the documents incorporated by reference.

Such forward-looking statements speak only as of the date they are made. We expressly disclaim any obligation to release publicly any updates or revisions to any forward-looking statements to reflect any change in our expectations

with regard thereto or change in events, conditions or circumstances on which any statement is based.

PART I

ITEM 1. BUSINESS

Armstrong World Industries, Inc. ("AWI" or the "Company") is a Pennsylvania corporation incorporated in 1891. When we refer to "we," "our" and "us" in this report, we are referring to AWI and its subsidiaries.

We are a leading global producer of ceiling systems for use primarily in the construction and renovation of commercial and residential buildings. We design, manufacture and sell ceiling systems (primarily mineral fiber, fiberglass wool and metal) throughout the Americas.

In August 2018, we acquired the business and assets of Steel Ceilings, Inc. ("Steel Ceilings"), based in Johnstown, Ohio. Steel Ceilings is a manufacturer of aluminum and stainless metal ceilings that include architectural, radiant and security solutions with one manufacturing facility. Steel Ceilings' operations, and its assets and liabilities as of December 31, 2018, are included as a component of our Architectural Specialties segment.

In May 2018, we acquired the business and assets of Plasterform, Inc. ("Plasterform"), based in Mississauga, Ontario, Canada. Plasterform is a manufacturer of architectural cast ceilings, walls, facades, columns and moldings with one manufacturing facility. Plasterform's operations, and its assets and liabilities as of December 31, 2018, are included as a component of our Architectural Specialties segment.

In November 2017, we entered into a Share Purchase Agreement (the "Purchase Agreement") with Knauf International GmbH ("Knauf"), to sell certain subsidiaries comprising our business in Europe, the Middle East and Africa (including Russia) ("EMEA") and the Pacific Rim, including the corresponding businesses and operations conducted by Worthington Armstrong Venture ("WAVE"), our joint venture with Worthington Industries, Inc. ("Worthington") in which AWI holds a 50% interest. The consideration paid by Knauf in connection with the sale was $330 million in cash, inclusive of amounts due to WAVE, subject to certain adjustments as provided in the Purchase Agreement, including adjustments based on the economic impact of any required regulatory remedies and a working capital adjustment.

On July 18, 2018, we entered into an amendment to the Purchase Agreement, pursuant to which Knauf agreed to irrevocably and unconditionally pay AWI (i) $250 million on August 1, 2018, and (ii) $80 million on September 15, 2018, if, prior to such date, (A) any competition condition has not been satisfied or (B) the closing has not yet occurred. The amendment also provided for the reduction (from a maximum of $35 million to a maximum of $20 million) of potential adjustments to the purchase price consideration for the transaction based on the impact of remedies required to satisfy competition conditions. We received both the $250 million payment and the $80 million payment from Knauf in the third quarter of 2018. Following receipt of these payments, we remitted $70 million to WAVE in partial consideration of the purchase price payable in respect of the business and operations of WAVE under the transaction. WAVE subsequently paid each of AWI and Worthington a dividend of $35 million. We also recorded a $22.4 million payable to WAVE, which is reflected within Accounts Payable and Accrued Expenses. The total consideration payable by AWI to WAVE will be determined following closing in connection with the calculation of the adjustments contemplated by the Purchase Agreement.

The transaction was notified for merger control clearance in the European Union ("EU"), Bosnia and Herzegovina, Macedonia, Montenegro, Russia and Serbia, and was cleared unconditionally in Montenegro (February 2018), Serbia (February 2018), Russia (March 2018), Macedonia (July 2018) and Bosnia and Herzegovina (August 2018). On December 7, 2018, the European Commission granted conditional clearance of the transaction, subject to certain commitments intended to address concerns regarding the overlap between the activities of AWI and Knauf, including the divestment by Knauf to a third party of certain mineral fiber and grid businesses and operations in Austria, Estonia, Germany, Ireland, Italy, Latvia, Lithuania, Portugal, Spain, Turkey and the UK. This includes our sales operations in each of the relevant countries, as well as our production facilities, and those of WAVE, located in Team Valley, UK. The terms of the sale of the divestment business by Knauf and the identity of the purchaser are subject to the approval of the European Commission.

We continue to work closely with Knauf towards closing and expect the transaction to close by the end of the first half of 2019. The EMEA and Pacific Rim historical financial results have been reflected in AWI's Consolidated Financial Statements as discontinued operations for all periods presented.

In January 2017, we acquired the business and assets of Tectum, Inc. ("Tectum"), based in Newark, Ohio. Tectum is a manufacturer of acoustical ceiling, wall and structural solutions for commercial building applications with two manufacturing facilities. Tectum's operations from the date of acquisition, and its assets and liabilities as of December 31, 2018, are included as a component of our Architectural Specialties segment.

In April 2016, we completed our separation of Armstrong Flooring, Inc. ("AFI"). AFI's historical financial results have been reflected in AWI's Consolidated Financial Statements as a discontinued operation for all periods presented.

See Note 5 to the Consolidated Financial Statements for additional information related to our acquisition and discontinued operations.

We are focused on driving sustainable shareholder value by consistently delivering profitable sales and earnings growth, while maintaining a balanced approach to capital allocation. Through our expanding architectural specialties offerings, bolstered by our acquisitions of Tectum, Plasterform and Steel Ceilings, our innovative core ceilings portfolio, including our Total Acoustics solutions and Sustain family of products, and digitally-enabled systems and tools, we are expanding our capabilities to sell into more spaces and sell more into every space.

Markets

We are well positioned in the industry segments and markets in which we operate, often holding a leadership or significant market share position. Our products compete against mineral fiber and fiberglass products from other manufacturers, as well as drywall. We compete directly with other domestic and international suppliers of these products. The major markets in which we compete are:

Commercial. Our revenue opportunities come from new construction as well as renovation of existing buildings. Renovation work is estimated to represent the majority of the commercial market opportunity. Most of our revenue comes from the following sectors of commercial building – office, education, transportation, healthcare and retail. We monitor U.S. construction starts and follow project activity. Our revenue from new construction can lag behind construction starts by as much as 18 to 24 months. We also monitor office vacancy rates, the Architecture Billings Index, state and local government spending, gross domestic product ("GDP") and general employment levels, which can indicate movement in renovation and new construction opportunities. We believe that these statistics, taking into account the time-lag effect, provide a reasonable indication of our future revenue opportunity from commercial renovation and new construction. Additionally, we believe that customer preferences for product type, style, color, performance attributes (such as acoustics and sustainability), availability, affordability and ease of installation also affect our revenue.

In our Mineral Fiber segment, we estimate that a majority of our commercial market sales are used for renovation purposes by end-users of our products. The end-use of our products is based on management estimates as such information is not easily determinable.

Residential. We also sell mineral fiber products for use in single and multi-family housing. We estimate that existing home renovation (also known as replacement / remodel) work represents the majority of the residential market opportunity. Key U.S. statistics that indicate market opportunity include existing home sales (a key indicator for renovation opportunity), housing starts, housing completions, home prices, interest rates and consumer confidence.

Customers

We use our reputation, capabilities, service, innovation and brand recognition to develop long-standing relationships with our customers. We principally sell commercial products to building materials distributors, who re-sell our products to contractors, subcontractors' alliances, large architect and design firms, and major facility owners. We have important relationships with national home centers such as Lowe's Companies, Inc. and The Home Depot, Inc., with wholesalers who re-sell our products to dealers who service builders, contractors and consumers, and also with architects and designers who specify products.

Approximately 75% of our consolidated net sales are to distributors. Sales to large home centers account for slightly less than 10% of our consolidated sales. Our remaining sales are primarily to direct customers and retailers.

Net sales to three commercial distributors totaling $459.3 million, included within our Mineral Fiber and Architectural Specialties segments, individually exceeded 10% of our consolidated net sales in 2018.

Working Capital

We produce goods for inventory and sell on credit to our customers. Generally, our distributors carry inventory as needed to meet local or rapid delivery requirements. We sell our products to select, pre-approved customers using customary trade terms that allow for payment in the future. These practices are typical within the industry.

Competition

We face strong competition in all of our businesses. Principal attributes of competition include product performance, product styling, service and price. Competition comes from both domestic and international manufacturers. Additionally, some of our products

compete with alternative products or finishing solutions, namely, drywall and exposed structure (also known as open plenum). Excess industry capacity exists for certain products, which tends to increase price competition. The following companies are our primary competitors:

CertainTeed Corporation (a subsidiary of Saint-Gobain), Chicago Metallic Corporation (owned by ROCKWOOL International A/S), Georgia-Pacific Corporation, Rockfon A/S (owned by ROCKWOOL International A/S), USG Corporation, Ceilings Plus (owned by USG Corporation), Rulon International, and 9Wood.

Raw Materials

We purchase raw materials from numerous suppliers worldwide in the ordinary course of business. The principal raw materials include: wood pulp, fiberglass, perlite, starch, waste paper, pigments and clays. We manufacture most of the production needs for mineral wool at one of our manufacturing facilities. Finally, we use aluminum and steel in the production of metal ceilings by us and by WAVE, our joint venture that manufactures ceiling grid.

We also purchase significant amounts of packaging materials and consume substantial amounts of energy, such as electricity and natural gas, and water.

In general, adequate supplies of raw materials are available to all of our operations. However, availability can change for a number of reasons, including environmental conditions, laws and regulations, shifts in demand by other industries competing for the same materials, transportation disruptions and/or business decisions made by, or events that affect, our suppliers. There is no assurance that these raw materials will remain in adequate supply to us.

Prices for certain high usage raw materials can fluctuate dramatically. Cost increases for these materials can have a significant adverse impact on our manufacturing costs. Given the competitiveness of our markets, we may not be able to recover the increased manufacturing costs through increasing selling prices to our customers.

Sourced Products

Some of the products that we sell are sourced from third parties. Our primary sourced products include specialty ceiling products. We purchase some of our sourced products from suppliers that are located outside of the U.S., primarily from the Pacific Rim and Europe. Sales of sourced products represented approximately 13% of our total consolidated revenue in 2018.

In general, we believe we have adequate supplies of sourced products. However, we cannot guarantee that the supply will remain adequate.

Seasonality

Generally, our sales tend to be stronger in the second and third quarters of our fiscal year due to more favorable weather conditions, customer business cycles and the timing of renovation and new construction.

Patent and Intellectual Property Rights

Patent protection is important to our business. Our competitive position has been enhanced by patents on products and processes developed or perfected within AWI or obtained through acquisitions and licenses. In addition, we benefit from our trade secrets for certain products and processes.

Patent protection extends for varying periods according to the date of patent filing or grant and the legal term of a patent in the various countries where patent protection is obtained. The actual protection afforded by a patent, which can vary from country to country, depends upon the type of patent, the scope of its coverage and the availability of legal remedies. Although we consider that, in the aggregate, our patents, licenses and trade secrets constitute a valuable asset of material importance to our business, we do not believe we are materially dependent upon any single patent or trade secret, or any group of related patents or trade secrets.

Certain of our trademarks, including without limitation, , Armstrong®, Calla®, Cirrus®, Cortega®, DESIGNFlex™, Dune™, Humiguard®, Infusions®, Lyra®, MetalWorks™, Optima®, Perla™, Soundscapes®, Sustain®, Tectum®, Total Acoustics®, Ultima®, and WoodWorks®, are important to our business because of their significant brand name recognition. Registrations are generally for fixed, but renewable, terms.

In connection with the separation and distribution of AFI, we entered into several agreements with AFI that, together with a plan of division, provided for the separation and allocation of assets between AWI and AFI. These agreements include a Trademark License Agreement and a Transition Trademark License Agreement. Pursuant to the Trademark License Agreement, AWI provided AFI with a perpetual, royalty-free license to utilize the "Armstrong" trade name and logo. Pursuant to the Transition Trademark License Agreement, AFI provided us with a five-year royalty-free license to utilize the "Inspiring Great Spaces" tagline, logo and related color scheme.

Pursuant to our Purchase Agreement with Knauf related to the sale of our EMEA and Pacific Rim businesses and prior to the closing, AWI anticipates entering into an agreement with Knauf relating to the use of certain intellectual property by Knauf after the closing, including the Armstrong trade name.

We review the carrying value of trademarks at least annually for potential impairment. See the "Critical Accounting Estimates" section of Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 of this Form 10-K for further information.

Employees

As of December 31, 2018, we had approximately 4,000 full time and part time employees. As on December 31, 2017, we had approximately 3,900 full-time and part-time employees. Excluding our EMEA and Pacific Rim businesses, we had approximately 2,200 employees as of December 31, 2018 and December 31, 2017.

As of December 31, 2018, approximately 81% of our approximately 1,000 production employees in the U.S. were represented by labor unions. Collective bargaining agreements covering approximately 65 employees at one U.S. plant will expire during 2019. Outside the U.S., most of our production employees are covered by either industry-sponsored and/or state-sponsored collective bargaining mechanisms. We believe that our relations with our employees are satisfactory.

Research & Development

Research and development ("R&D") activities are important and necessary in helping us improve our products' competitiveness. Principal R&D functions include the development and improvement of products and manufacturing processes.

Sustainability and Environmental Matters

The adoption of environmentally responsible building codes and standards such as the Leadership in Energy and Environmental Design ("LEED") rating system established by the U.S. Green Building Council, has the potential to increase demand for products, systems and services that contribute to building sustainable spaces. Many of our products meet the requirements for the award of LEED credits, and we are continuing to develop new products, systems and services to address market demand for products that enable construction of buildings that require fewer natural resources to build, operate and maintain. Our competitors also have developed and introduced to the market products with an increased focus on sustainability.

We expect that there will be increased demand over time for products, systems and services that meet evolving regulatory and customer sustainability standards and preferences and decreased demand for products that produce significant greenhouse gas emissions. We also believe that our ability to continue to provide these products, systems and services to our customers will be necessary to maintain our competitive position in the marketplace. We are committed to complying with all environmental laws and regulations that are applicable to our operations.

Legal and Regulatory Proceedings

Regulatory activities of particular importance to our operations include proceedings under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), and state Superfund and similar type environmental laws governing existing or potential environmental contamination at three domestically owned locations allegedly resulting from past industrial activity. We are one of several potentially responsible parties in these matters and have agreed to jointly fund required investigation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies.

Most of our facilities are affected by various federal, state and local environmental requirements relating to the discharge of materials or the protection of the environment. We make expenditures necessary for compliance with applicable environmental requirements at each of our operating facilities. We have not experienced a material adverse effect upon our capital expenditures or competitive position as a result of environmental control legislation and regulations.

On September 8, 2017, Roxul USA, Inc. (d/b/a Rockfon) filed litigation against us in the United States District Court for the District of Delaware alleging anticompetitive conduct seeking remedial measures and unspecified damages. Roxul USA, Inc. is a significant ceilings systems competitor with global headquarters in Europe and expanding operations in the Americas. We believe the allegations are without merit and are vigorously defending the matter. During the first quarter of 2018, the Court denied, in part, and granted, in part, our motion to dismiss, dismissing two of the claims brought by Roxul USA, Inc. We recently filed a motion seeking summary judgment on all of Rockfon's remaining claims and have moved to exclude the testimony of Rockfon's expert witness. Rockfon moved for partial summary judgment in its favor on a single claim of alleged liability only (not damages). We subsequently opposed that motion on numerous grounds. The date for determination of motions is not currently scheduled. A trial date is reserved, if necessary, for early in the second quarter of 2019. We continue to incur defense costs for the matter.

We are involved in various other lawsuits, claims, investigations and other legal matters from time to time that arise in the ordinary course of business, including matters involving our products, intellectual property, relationships with suppliers, relationships with distributors, relationships with competitors, employees and other matters. From time to time, for example, we may be a party to various litigation matters that involve product liability, tort liability and other claims under various allegations, including illness due to exposure to certain chemicals used in the workplace, or medical conditions arising from exposure to product ingredients or the presence of trace contaminants. Such allegations may involve multiple defendants and relate to legacy products that we and other defendants purportedly manufactured or sold. We believe that any current claims are without merit and intend to defend them vigorously. For these matters, we also may have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. When applicable and appropriate, we will pursue coverage and recoveries under those policies, but are unable to predict the outcome of those demands. While complete assurance cannot be given to the outcome of these proceedings, we do not believe that any current claims, individually or in the aggregate, will have a material adverse effect on our financial condition, liquidity or results of operations.

Liabilities of $12.4 million and $13.5 million as of December 31, 2018 and December 31, 2017, respectively, were recorded for environmental liabilities that we consider probable and for which a reasonable estimate of the probable liability could be made. See Note 27 to the Consolidated Financial Statements and Risk Factors in Item 1A of this Form 10-K, for information regarding the possible effects that compliance with environmental laws and regulations may have on our businesses and operating results.

Website

We maintain a website at http://www.armstrongceilings.com. Information contained on our website is not incorporated into this document. Annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, all amendments to those reports and other information about us are available free of charge through this website as soon as reasonably practicable after the reports are electronically filed with the SEC. Reference in this Form 10-K to our website and the SEC's website is an inactive text reference only.

ITEM 1A. RISK FACTORS

Unstable market and economic conditions could have a material adverse impact on our financial condition, liquidity or results of operations.

Our business is influenced by market and economic conditions, including inflation, deflation, interest rates, availability and cost of capital, consumer spending rates, energy availability and the effects of governmental initiatives to manage economic conditions. Volatility in financial markets and the continued softness or further deterioration of national and global economic conditions could have a material adverse effect on our financial condition, liquidity or results of operations, including as follows:

- the financial stability of our customers or suppliers may be compromised, which could result in additional bad debts for us or non-performance by suppliers;
- commercial and residential consumers of our products may postpone spending in response to tighter credit, negative financial news and/or stagnation or further declines in income or asset values, which could have a material adverse impact on the demand for our products;
- the value of investments underlying our defined benefit pension plans may decline, which could result in negative plan investment performance and additional charges which may involve significant cash contributions to such plans, to meet obligations or regulatory requirements; and
- our asset impairment assessments and underlying valuation assumptions may change, which could result from changes to estimates of future sales and cash flows that may lead to substantial impairment charges.

Continued or sustained deterioration of economic conditions would likely exacerbate and prolong these adverse effects.

Our business is dependent on construction activity. Downturns in construction activity could adversely affect our financial condition, liquidity or results of operations.

Our businesses have greater sales opportunities when construction activity is strong and, conversely, have fewer opportunities when such activity declines. The cyclical nature of commercial and residential construction activity, including construction activity funded by the public sector, tends to be influenced by prevailing economic conditions, including the rate of growth in gross domestic product, prevailing interest rates, government spending patterns, business, investor and consumer confidence and other factors beyond our control. Prolonged downturns in construction activity could have a material adverse effect on our financial condition, liquidity or results of operations.

Our markets are highly competitive. Competition can reduce demand for our products or cause us to lower prices. Failure to compete effectively by meeting consumer preferences, developing and marketing innovative solutions, maintaining strong customer service and distribution relationships, growing market share, and expanding our solutions capabilities and reach could adversely affect our results.

Our markets are highly competitive. Competition can reduce demand for our products, negatively affect our product sales mix or cause us to lower prices. Failure to compete effectively by meeting consumer preferences, developing and marketing innovative solutions, maintaining strong customer service and distribution relationships, growing market share and expanding our solutions capabilities and reach could have a material adverse effect on our financial condition, liquidity or results of operations. Our customers consider our products' performance, product styling, customer service and price when deciding whether to purchase our products. Shifting consumer preference in our highly competitive markets, from acoustical solutions to other ceiling and wall products, for example, whether for performance or styling preferences or our inability to develop and offer new competitive performance features could have an adverse effect on our sales. Similarly, our ability to identify, protect and market new and innovative solutions is critical to our long-term growth strategy, namely to sell into more spaces and sell more solutions in every space. In addition, excess industry capacity for certain products in several geographic markets could lead to industry consolidation and/or increased price competition. In certain local markets, we are also subject to potential increased price competition from foreign competitors, which may have lower cost structures.

Sales fluctuations to and changes in our relationships with key customers could have a material adverse effect on our financial condition, liquidity or results of operations.

Some of our markets are dependent on certain key customers, including independent distributors. The loss, reduction, or fluctuation of sales to key customers, or any adverse change in our business relationship with them, whether as a result of competition, industry consolidation or otherwise, could have a material adverse effect on our financial condition, liquidity or results of operations.

Customer consolidation, and competitive, economic and other pressures facing our customers, may put pressure on our operating margins and profitability.

A number of our customers, including distributors and contractors, have consolidated in recent years and consolidation could continue. Such consolidation could impact margin growth and profitability as larger customers may realize benefits of scale with increased buying power and reduced inventories. The economic and competitive landscape for our customers is constantly changing, and our customers' responses to those changes could impact our business. These factors and others could have an adverse impact on our business, financial condition or results of operations.

If the availability of raw materials or energy decreases, or the costs increase, and we are unable to pass along increased costs, our financial condition, liquidity or results of operations could be adversely affected.

The availability and cost of raw materials, packaging materials, energy and sourced products are critical to our operations. For example, we use substantial quantities of natural gas and petroleum-based raw materials in our manufacturing operations. The cost of some of these items has been volatile in recent years and availability has been limited at times. We source some materials from a limited number of suppliers, which, among other things, increases the risk of unavailability. Limited availability could cause us to reformulate products or limit our production. Decreased access to raw materials and energy or significant increased cost to purchase these items and any corresponding inability to pass along such costs through price increases could have a material adverse effect on our financial condition, liquidity or results of operations.

The performance of our WAVE joint venture is important to our financial results. Changes in the demand for, or quality of, WAVE products, or in the operational or financial performance of the WAVE joint venture, could have a material adverse effect

on our financial condition, liquidity or results of operations. Similarly, if there is a change with respect to our joint venture partner that adversely impacts its relationship with us, WAVE's performance could be adversely impacted.

Our equity investment in our WAVE joint venture remains important to our financial results. We believe an important element in the success of this joint venture is the relationship with our partner, Worthington Industries, Inc. If there is a change in ownership, a change of control, a change in management or management philosophy, a change in business strategy or another event with respect to our partner that adversely impacts our relationship, WAVE's performance could be adversely impacted. In addition, our partner may have economic or business interests or goals that are different from or inconsistent with our interests or goals, which may impact our ability to influence or align WAVE's strategy and operations.

Negative tax consequences can have an unanticipated effect on our financial results.

We are subject to the tax laws of the many jurisdictions in which we operate. The tax laws are complex, and the manner in which they apply to our operations and results is sometimes open to interpretation. Because our income tax expense for any period depends heavily on the mix of income derived from the various taxing jurisdictions, our income tax expense and reported net income may fluctuate significantly, and may be materially different than forecasted or experienced in the past. Our financial condition, liquidity, results of operations or tax liability could be adversely affected by changes in the effective tax rate as a result of a change in the mix of earnings in countries with differing statutory tax rates, changes in our overall profitability, changes in tax legislation and rates, the results of examinations of previously filed tax returns, and ongoing assessments of our tax exposures.

Our financial condition, liquidity, results of operations or tax liability could also be adversely affected by changes in the valuation of deferred tax assets and liabilities. We have substantial deferred tax assets related to U.S. domestic foreign tax credits ("FTCs"), and state net operating losses ("NOLs"), which are available to reduce our U.S. income tax liability and to offset future state taxable income. However, our ability to utilize the current carrying value of these deferred tax assets may be impacted as a result of certain future events, such as changes in tax legislation and insufficient future taxable income prior to expiration of the FTCs and NOLs.

The proposed disposition of our EMEA and Pacific Rim businesses is subject to the receipt of consents and clearances from regulatory authorities that may impose conditions that could have an adverse effect on us or Knauf or, if not obtained, could prevent the completion of the proposed disposition.

Before the proposed disposition of our EMEA and Pacific Rim businesses to Knauf may be completed, applicable waiting periods must expire or terminate under antitrust and competition laws and clearances or approvals must be obtained from various regulatory entities. In deciding whether to grant antitrust or regulatory clearances, the relevant governmental entities have considered the effect of the disposition on competition within their relevant jurisdiction.

On December 7, 2018, the European Commission granted conditional clearance, subject to certain commitments, of our proposed disposition of our EMEA and Pacific Rim businesses. The commitments are intended to address concerns regarding the overlap between the activities of AWI and Knauf and include the divestment by Knauf to a third party of certain mineral fiber and grid businesses and operations of the Company in Austria, Estonia, Germany, Ireland, Italy, Latvia, Lithuania, Portugal, Spain, Turkey and the UK. This includes our sales operations in each of the relevant countries, as well as our production facilities, and those of WAVE, located in Team Valley, UK. The terms of the sale of the divestment business by Knauf and the identity of the purchaser are subject to the approval of the European Commission.

There can be no assurance that regulators will not impose additional conditions, terms, obligations or restrictions to the consummation of the disposition and that such conditions, terms, obligations or restrictions will not have the effect of delaying the completion of the disposition or resulting in additional material costs to us. In addition, we cannot provide assurance that any such additional conditions, terms, obligations or restrictions will not result in the delay or abandonment of the disposition. Additionally, the completion of the disposition is conditioned on the absence of certain restraining orders or injunctions by judgment, court order or law that would prohibit the completion of the disposition.

Our business could be adversely impacted as a result of uncertainty related to the proposed disposition of our EMEA and Pacific Rim businesses.

The proposed disposition of our EMEA and Pacific Rim businesses to Knauf could cause disruptions to our business or our business relationships, which could have an adverse impact on our results of operations. For example, our employees may experience uncertainty about their future roles with us, which may adversely affect our ability to hire and retain key personnel, and parties with which we have business relationships may experience uncertainty as to the future of such relationships and seek alternative relationships with third parties or seek to alter their present business relationships with us. In addition, our management team and other employees are devoting significant time and effort to activities related to the proposed disposition.

We have incurred and will continue to incur significant costs, expenses and fees for professional services and other transaction costs in connection with the proposed disposition, and many of these fees and costs are payable regardless of whether or not the disposition is completed. In the event the disposition is not completed for any reason, or the timing of its consummation is delayed, our operating results may be adversely affected as a result of the incurring of these significant additional expenses and the diversion of management's attention.

We may be subject to liability under, and may make substantial future expenditures to comply with, environmental laws and regulations, which could materially adversely affect our financial condition, liquidity or results of operations.

We are actively involved in environmental investigation and remediation activities relating to several domestically owned, formerly owned and non-owned locations allegedly resulting from past industrial activity, for which our ultimate liability may exceed the currently estimated and accrued amounts. See Note 27 to the Consolidated Financial Statements for further information related to our current environmental matters and the potential liabilities associated therewith. It is also possible that we could become subject to additional environmental matters and corresponding liabilities in the future.

The building materials industry has been subject to claims relating to raw materials such as silicates, polychlorinated biphenyl ("PCB"), PVC, formaldehyde, fire-retardants and claims relating to other issues such as mold and toxic fumes, as well as claims for incidents of catastrophic loss, such as building fires. We have not received any significant claims involving our raw materials or our product performance; however, product liability insurance coverage may not be available or adequate in all circumstances to cover claims that may arise in the future.

In addition, our operations are subject to various environmental, health, and safety laws and regulations. These laws and regulations not only govern our current operations and products, but also impose potential liability on us for our past operations. Our costs to comply with these laws and regulations may increase as these requirements become more stringent in the future, and these increased costs may materially adversely affect our financial condition, liquidity or results of operations.

We may pursue strategic transactions that could create risks and present unforeseen integration obstacles or costs, any of which could materially adversely affect our financial condition, liquidity or results of operations.

We have evaluated, and expect to continue to evaluate, potential strategic transactions as opportunities arise. We routinely engage in discussions with third parties regarding potential transactions, including joint ventures, which could be significant. Any such strategic transaction involves a number of risks, including potential disruption of our ongoing business and distraction of management, difficulty with integrating or separating personnel and business operations and infrastructure, and increasing or decreasing the scope, geographic diversity and complexity of our operations. Strategic transactions could involve payment by us of a substantial amount of cash, assumption of liabilities and indemnification obligations, regulatory requirements, incurrence of a substantial amount of debt or issuance of a substantial amount of equity. Certain strategic opportunities may not result in the consummation of a transaction or may fail to realize the intended benefits and synergies. If we fail to consummate and integrate our strategic transactions in a timely and cost-effective manner, our financial condition, liquidity or results of operation could be materially and adversely affected.

The agreements that govern our indebtedness contain a number of covenants that impose significant operating and financial restrictions, including restrictions on our ability to engage in activities that may be in our best long-term interests.

The agreements that govern our indebtedness include covenants that, among other things, may impose significant operating and financial restrictions, including restrictions on our ability to engage in activities that may be in our best

long-term interests. These covenants may restrict our ability to:

- incur additional debt;
- pay dividends on or make other distributions in respect of our capital stock or redeem, repurchase or retire our capital stock or subordinated debt or make certain other restricted payments;
- make certain acquisitions;
- sell certain assets;
- consolidate, merge, sell or otherwise dispose of all or substantially all of our assets; and
- create liens on certain assets to secure debt.

Under the terms of our senior secured credit facility, we are required to maintain specified leverage and interest coverage ratios. Our ability to meet these ratios could be affected by events beyond our control, and we cannot assure that we will meet them. A breach of

any of the restrictive covenants or ratios would result in a default under the senior secured credit facility. If any such default occurs, the lenders under the senior secured credit facility may be able to elect to declare all outstanding borrowings under our facilities, together with accrued interest and other fees, to be immediately due and payable, or enforce their security interest. The lenders may also have the right in these circumstances to terminate commitments to provide further borrowings.

Our indebtedness may adversely affect our cash flow and our ability to operate our business, make payments on our indebtedness and declare dividends on our capital stock.

Our level of indebtedness and degree of leverage could:

- make it more difficult for us to satisfy our obligations with respect to our indebtedness;
- make us more vulnerable to adverse changes in general economic, industry and competitive conditions and adverse changes in government regulation;
- limit our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate;
- place us at a competitive disadvantage compared to our competitors that are less leveraged and, therefore, more able to take advantage of opportunities that our leverage prevents us from exploiting;
- limit our ability to refinance existing indebtedness or borrow additional amounts for working capital, capital expenditures, acquisitions, debt service requirements, execution of our business strategy or other purposes;
- restrict our ability to pay dividends on our capital stock; and
- adversely affect our credit ratings.

We may also incur additional indebtedness, which could exacerbate the risks described above. In addition, to the extent that our indebtedness bears interest at floating rates, our sensitivity to interest rate fluctuations will increase.

Any of the above listed factors could materially adversely affect our financial condition, liquidity or results of operations.

We require a significant amount of liquidity to fund our operations, and borrowing has increased our vulnerability to negative unforeseen events.

Our liquidity needs vary throughout the year. If our business experiences materially negative unforeseen events, we may be unable to generate sufficient cash flow from operations to fund our needs or maintain sufficient liquidity to operate and remain in compliance with our debt covenants, which could result in reduced or delayed planned capital expenditures and other investments and adversely affect our financial condition or results of operations.

Adverse results caused by regulatory actions, product claims, environmental claims and other litigation could be costly. Insurance coverage may not be available or adequate in all circumstances.

In the ordinary course of business, we are subject to various claims and litigation. Any such claims, whether with or without merit, could be time consuming and expensive to defend and could divert management's attention and resources. While we strive to ensure that our products comply with applicable government regulatory standards and internal requirements, and that our products perform effectively and safely, customers from time to time could claim that our products do not meet warranty or contractual requirements, and users could claim to be harmed by use or misuse of our products. These claims could give rise to breach of contract, warranty or recall claims, or claims for negligence, product liability, strict liability, personal injury or property damage. They could also result in negative publicity.

We are currently a party to litigation filed against us in the United States District Court for the District of Delaware by Roxul USA, Inc. (d/b/a Rockfon) alleging anticompetitive conduct seeking remedial measures and unspecified

damages. Roxul USA, Inc. is a significant ceilings systems competitor with global headquarters in Europe and expanding operations in the Americas. We believe the allegations are without merit and are vigorously defending the matter.

In addition, claims and investigations may arise related to patent infringement, distributor relationships, commercial contracts, antitrust or competition law requirements, employment matters, employee benefits issues, and other compliance and regulatory matters, including anti-corruption and anti-bribery matters. While we have processes and policies designed to mitigate these risks and to investigate and address such claims as they arise, we cannot predict or, in some cases, control the costs to defend or resolve such claims.

We currently maintain insurance against some, but not all, of these potential claims. In the future, we may not be able to maintain insurance at commercially acceptable premium levels. In addition, the levels of insurance we maintain may not be adequate to fully cover any and all losses or liabilities. If any significant judgment or claim is not fully insured or indemnified against, it could have a material adverse impact. We cannot assure that the outcome of all current or future litigation will not have a material adverse effect on our financial condition, liquidity or results of operations.

A disruption in our information technology systems could interrupt or damage our operations.

In the conduct of our business, we collect, use, transmit and store data on information systems, which are vulnerable to an increasing threat of continually evolving cyber security risks. Any security breach or compromise of our information systems could significantly damage our reputation, cause the disclosure of confidential customer, employee, supplier or company information, including our intellectual property, and result in significant losses, litigation, fines and costs. The security measures we have implemented to protect against unauthorized access to our information systems and data may not be sufficient to prevent breaches. The regulatory environment related to information security, data collection and privacy is evolving, with new and constantly changing requirements applicable to our business, and compliance with those requirements could result in additional costs.

We also compete through our use of information technology. We strive to provide customers with timely, accurate, easy-to-access information about product availability, orders and delivery status using state-of-the-art systems. While we have processes for short-term failures and disaster recovery capability, a prolonged disruption of systems or other failure to meet customers' expectations regarding the capabilities and reliability of our systems may materially and adversely affect our operating results.

We are subject to risks associated with our international operations in both established and emerging markets. Legislative, political, regulatory and economic volatility, as well as vulnerability to infrastructure and labor disruptions, could have an adverse effect on our financial condition, liquidity or results of operations.

On November 20, 2017, we announced that we had entered into a definitive agreement with Knauf to sell our EMEA and Pacific Rim businesses. The transaction is subject to regulatory approvals, including the terms of the conditional clearance granted by the European Commission, and other customary conditions, and is currently expected to close by the end of the first half of 2019.

A significant portion of our products move in international trade. See Notes 3 and 5 to the Consolidated Financial Statements for further information. Our international trade is subject to currency exchange fluctuations, trade regulations, import duties, logistics costs, delays and other related risks. Our international operations are also subject to various tax rates, credit risks in emerging markets, political risks, uncertain legal systems, high costs in repatriating profits to the United States from some countries, and loss of sales to local competitors following currency devaluations in countries where we import products for sale. In addition, our international growth strategy depends, in part, on our ability to expand our operations in certain emerging markets. However, some emerging markets have greater political and economic volatility and greater vulnerability to infrastructure and labor disruptions than established markets. Similarly, our efforts to enhance the profitability or accelerate the growth of our operations in certain markets depends largely on the economic and geopolitical conditions in those local or regional markets.

In addition, in many countries outside of the United States, particularly in those with developing economies, it may be common for others to engage in business practices prohibited by laws and regulations applicable to us, such as the Foreign Corrupt Practices Act or similar local anti-corruption or anti-bribery laws. These laws generally prohibit companies and their employees, contractors or agents from making improper payments to government officials for the purpose of obtaining or retaining business. Failure to comply with these laws, as well as U.S. and foreign export and

trading laws, could subject us to civil and criminal penalties. As we continue to expand our business, we may have difficulty anticipating and effectively managing these and other risks that our operations may face, which may adversely affect our business outside the United States and our financial condition, liquidity or results of operations.

Significant changes in factors and assumptions used to measure our defined benefit plan obligations, actual investment returns on pension assets and other factors could negatively impact our operating results and cash flows.

We maintain pension and postretirement plans throughout the world, with the most significant plans located in the U.S. The recognition of costs and liabilities associated with these plans for financial reporting purposes is affected by assumptions made by management and used by actuaries engaged by us to calculate the benefit obligations and the expenses recognized for these plans.

The inputs used in developing the required estimates are calculated using a number of assumptions, which represent management's best estimate of the future. The assumptions that have the most significant impact on reported results are the discount rate, the estimated long-term return on plan assets for the funded plans, retirement rates, and mortality rates and, for postretirement plans, the estimated inflation in health care costs. These assumptions are generally updated annually.

Our U.S. pension plans were overfunded by $0.7 million as of December 31, 2018. Our unfunded U.S. postretirement plan liabilities were $65.4 million as of December 31, 2018. If our cash flows and capital resources are insufficient to fund our pension and postretirement plans obligations, we could be forced to reduce or delay investments and capital expenditures, seek additional capital, or restructure or refinance our indebtedness.

If the separation and distribution of Armstrong Flooring, Inc. ("AFI") fails to qualify as a tax-free transaction for U.S. federal income tax purposes, then AFI, AWI and AWI's shareholders could be subject to significant tax liability or tax indemnity obligations.

On April 1, 2016, we completed our previously announced separation of AFI by allocating the assets and liabilities related primarily to the Resilient Flooring and Wood Flooring segments to AFI and then distributing the common stock of AFI to our shareholders at a ratio of one share of AFI common stock for every two shares of AWI common stock. In connection with the distribution, we received an opinion from our special tax counsel, on the basis of certain facts, representations, covenants and assumptions set forth in such opinion, substantially to the effect that, for U.S. federal income tax purposes, the separation and distribution should qualify as a transaction that generally is tax-free to us and our shareholders under Sections 355 and 368(a)(1)(D) of the Internal Revenue Code.

Notwithstanding the tax opinion, the Internal Revenue Service ("IRS") could determine on audit that the distribution should be treated as a taxable transaction if it determines that any of the facts, assumptions, representations or covenants set forth in the tax opinion is not correct or has been violated, or that the distribution should be taxable for other reasons, including as a result of a significant change in stock or asset ownership after the distribution, or if the IRS were to disagree with the conclusions of the tax opinion. If the distribution is ultimately determined to be taxable, the distribution could be treated as a taxable dividend to each U.S. holder of our common shares who receives shares of AFI in connection with the spinoff for U.S. federal income tax purposes, and such shareholders could incur significant U.S. federal income tax liabilities. In addition, we and/or AFI could incur significant U.S. federal income tax liabilities or tax indemnification obligations, whether under applicable law or the Tax Matters Agreement that we entered into with AFI, if it is ultimately determined that certain related transactions undertaken in anticipation of the distribution are taxable.

Our intellectual property rights may not provide meaningful commercial protection for our products or brands, which could adversely impact our financial condition, liquidity or results of operations.

We rely on our proprietary intellectual property, including numerous patents and registered trademarks, as well as our licensed intellectual property to market, promote and sell our products. We monitor and protect against activities that might infringe, dilute, or otherwise harm our patents, trademarks and other intellectual property and rely on the patent, trademark and other laws of the U.S. and other countries. However, we may be unable to prevent third parties from using our intellectual property without our authorization. In addition, the laws of some non-U.S. jurisdictions, particularly those of certain emerging markets, provide less protection for our proprietary rights than the laws of the U.S. and present greater risks of counterfeiting and other infringement. To the extent we cannot protect our intellectual property, unauthorized use and misuse of our intellectual property could harm our competitive position and have a material adverse effect on our financial condition, liquidity or results of operations.

Our cost-saving and productivity initiatives may not achieve expected savings in our operating costs or improved operating results.

We aggressively look for ways to make our operations more efficient and effective. We reduce, move, modify and expand our plants and operations, as well as our sourcing and supply chain arrangements, as needed, to control costs and improve productivity. Such actions involve substantial planning, often require capital investments and may result in charges for fixed asset impairments or obsolescence and substantial severance costs. Our ability to achieve cost

savings and other benefits within expected time frames is subject to many estimates and assumptions. These estimates and assumptions are subject to significant economic, competitive and other uncertainties, some of which are beyond our control. If these estimates and assumptions are incorrect, if we experience delays, or if other unforeseen events occur, our financial condition, liquidity or results of operations could be materially and adversely affected.

Increased costs of labor, labor disputes, work stoppages or union organizing activity could delay or impede production and could have a material adverse effect on our financial condition, liquidity or results of operations.

Increased costs of labor, including the costs of employee benefits plans, labor disputes, work stoppages or union organizing activity could delay or impede production and have a material adverse effect on our financial condition, liquidity or results of operations. As the majority of our manufacturing employees are represented by unions and covered by collective bargaining or similar agreements, we often incur costs attributable to periodic renegotiation of those agreements, which may be difficult to project. We are also subject to the risk that strikes or other conflicts with organized personnel may arise or that we may become the subject of union organizing activity at our facilities that do not currently have union representation. Prolonged negotiations, conflicts or related activities could also lead to costly work stoppages and loss of productivity.

ITEM 1B. UNRESOLVED STAFF COMMENTS
None.

ITEM 2. PROPERTIES
We own a 100-acre, multi-building campus in Lancaster, Pennsylvania comprising the site of our corporate headquarters and most of our non-manufacturing operations.

As of December 31, 2018, we had 18 manufacturing plants in eight countries, including nine plants located throughout the U.S., which included our St. Helens, Oregon mineral fiber manufacturing facility, which closed in the second quarter of 2018. During the second quarter of 2018, as part of our acquisition of Plasterform, we acquired one additional plant located in Canada. During the third quarter of 2018, as part of our acquisition of Steel Ceilings, we acquired one additional plant located in Ohio. We have one idle mineral fiber plant in China, reported as a component of our Unallocated Corporate segment as it is not included in the pending sale to Knauf. Upon closure of the sale of our EMEA and Pacific Rim businesses to Knauf, we will have 12 plants, including nine plants in the U.S, two plants in Canada and the idle plant in China which management decided to close in the third quarter of 2017.

WAVE operates nine additional plants in five countries to produce suspension system (grid) products, which we use and sell in our ceiling systems. Upon closure of the sale of its corresponding EMEA and Pacific Rim businesses to Knauf, WAVE will operate five plants in the U.S.

Two of our plants are leased and the remaining ten are owned.

Operating Segment	Number of Plants	Location of Principal Facilities
Mineral Fiber	6	U.S. (Florida, Georgia, Ohio, Oregon, Pennsylvania and West Virginia)
Architectural Specialties	5	U.S. (Ohio), Canada (Quebec and Ontario)
Unallocated Corporate	1	China

Sales and administrative offices are leased and/or owned worldwide, and leased facilities are utilized to supplement our owned warehousing facilities.

Production capacity and the extent of utilization of our facilities are difficult to quantify with certainty. In any one facility, utilization of our capacity varies periodically depending upon demand for the product that is being manufactured. We believe our facilities are adequate and suitable to support the business. Additional incremental investments in plant facilities are made as appropriate to balance capacity with anticipated demand, improve quality and service, and reduce costs.

ITEM 3. LEGAL PROCEEDINGS
See the “Specific Material Events” section of the “Environmental Matters” section of Note 27 to the Consolidated Financial Statements, which is incorporated herein by reference, for a description of our significant legal proceedings.

ITEM 4. MINE SAFETY DISCLOSURES
Not applicable.

15

PART II

ITEM 5. MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

AWI's common shares trade on the New York Stock Exchange under the ticker symbol "AWI." As of February 19, 2019, there were approximately 240 holders of record of AWI's common stock.

Dividends are payable when declared by our Board of Directors and in accordance with restrictions set forth in our debt agreements. In general, our debt agreements allow us to make "restricted payments," which include dividends and stock repurchases, subject to certain limitations and other restrictions and provided that we are in compliance with the financial and other covenants of our debt agreements and meet certain liquidity requirements after giving effect to the restricted payment. For further discussion of the debt agreements, see the Financial Condition and Liquidity section of Management's Discussion and Analysis of Financial Condition and Results of Operations in Item 7 and Risk Factors in Item 1A in this Form 10-K.

Issuer Purchases of Equity Securities

Period	Total Number of Shares Purchased[1]	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Approximate Value of Shares that may yet be Purchased under the Plans or Programs
October 1 – 31, 2018	389,934	$ 76.96	389,825	$ 350,549,712
November 1 – 30, 2018	466,054	$ 65.19	465,440	320,207,747
December 1 – 31, 2018	312,294	$ 64.76	311,890	300,008,013
Total	1,168,282		1,167,155	

[1] Includes shares reacquired through the withholding of shares to pay employee tax obligations upon the exercise of options or vesting of restricted shares previously granted under long-term incentive plans. For more information regarding securities authorized for issuance under our equity compensation plans, see Note 21 to the Consolidated Financial Statements included in this Form 10-K.

On July 29, 2016, we announced that our Board of Directors had approved a share repurchase program pursuant to which the Company is authorized to repurchase up to $150.0 million of its outstanding shares of common stock through July 31, 2018 (as amended the "Program"). On October 30, 2017, we announced that our Board of Directors had approved an additional $250.0 million authorization to repurchase shares under the Program. The Program was also extended to October 31, 2020. On July 31, 2018, we announced that our Board of Directors had approved an additional $300.0 million authorization to repurchase shares, increasing the total authorized amount under the Program to $700.0 million.

Repurchases under the Program may be made through open market, block and privately-negotiated transactions, including Rule 10b5-1 plans, at times and in such amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The Program does not obligate the Company to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice.

On August 2, 2018, we entered into an accelerated share repurchase agreement with Deutsche Bank AG under the Program. The ASR included a pre-payment of $150.0 million to Deutsche Bank, at which time we received 1,766,004 shares. The ASR terminated on October 8, 2018, with approximately 389,825 shares returned on that day to complete the ASR.

During 2018, including the ASR, we repurchased 4.7 million shares under the Program for a total cost of $306.5 million, or an average price of $64.74 per share. Since inception of the Program, we have repurchased 7.7 million shares under the Program for a total cost of $430.6 million, or an average price of $56.01 per share.

ITEM 6. SELECTED FINANCIAL DATA

The following selected historical consolidated financial data should be read in conjunction with our audited consolidated financial statements, the accompanying notes and Management's Discussion and Analysis of Financial Condition and Results of Operations included in this Form 10-K. The selected historical consolidated financial data for the periods presented have been derived from our audited consolidated financial statements.

	2018	2017	2016	2015	2014
(amounts in millions, except for per-share data)					
Income statement data					
Net sales	$975.3	$893.6	$837.3	$805.1	$798.3
Operating income	249.4	243.8	195.9	166.6	200.9
Earnings from continuing operations	189.6	220.6	99.3	57.9	104.6
Per common share - basic (a)	$3.68	$4.12	$1.79	$1.04	$1.89
Per common share - diluted (a)	$3.63	$4.08	$1.78	$1.03	$1.88
Cash dividends per share of common stock	$0.175	$-	$-	$-	$-
Balance sheet data (end of period)					
Total assets	$1,873.5	$1,873.5	$1,758.0	$2,687.2	$2,599.6
Long-term debt	764.8	817.7	848.6	936.1	986.3
Total shareholders' equity	261.2	419.3	266.4	768.8	649.1

Notes:

(a) See definition of basic and diluted earnings per share in Note 2 to the Consolidated Financial Statements.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Armstrong World Industries, Inc. (“AWI”) is a Pennsylvania corporation incorporated in 1891.

This discussion should be read in conjunction with the financial statements, the accompanying notes, the cautionary note regarding forward-looking statements and risk factors included in this Form 10-K.

Overview

We are a leading global producer of ceiling systems for use primarily in the construction and renovation of commercial, institutional and residential buildings. We design, manufacture and sell ceiling systems (primarily mineral fiber, fiberglass wool and metal) throughout the Americas.

In August 2018, we acquired the business and assets of Steel Ceilings, Inc. (“Steel Ceilings”), based in Johnstown, Ohio. Steel Ceilings is a manufacturer of aluminum and stainless metal ceilings that include architectural, radiant and security solutions with one manufacturing facility. Steel Ceilings’ operations, and its assets and liabilities, are included as a component of our Architectural Specialties segment.

In May 2018, we acquired the business and assets of Plasterform, Inc. (“Plasterform”), based in Mississauga, Ontario, Canada. Plasterform is a manufacturer of architectural cast ceilings, walls, facades, columns and moldings with one manufacturing facility. Plasterform’s operations, and its assets and liabilities, are included as a component of our Architectural Specialties segment.

On November 17, 2017, we entered into a Share Purchase Agreement (the “Purchase Agreement”) with Knauf International GmbH (“Knauf”), to sell certain subsidiaries comprising our business in Europe, the Middle East and Africa (including Russia) (“EMEA”) and the Pacific Rim, including the corresponding businesses and operations conducted by Worthington Armstrong Venture (“WAVE”), our joint venture with Worthington Industries, Inc. (“Worthington”) in which AWI holds a 50% interest. The consideration paid by Knauf in connection with the sale is $330 million in cash, inclusive of amounts due to WAVE, subject to certain adjustments as provided in the Purchase Agreement, including adjustments based on the economic impact of any required regulatory remedies and a working capital adjustment.

On July 18, 2018, we entered into an amendment to the Purchase Agreement, pursuant to which Knauf agreed to irrevocably and unconditionally pay AWI (i) $250 million on August 1, 2018, and (ii) $80 million on September 15, 2018, if, prior to such date, (A) any competition condition has not been satisfied or (B) the closing has not yet occurred. The amendment also provided for the reduction (from a maximum of $35 million to a maximum of $20 million) of potential adjustments to the purchase price consideration for the transaction based on the impact of remedies required to satisfy competition conditions. We received both the $250 million payment and the $80 million payment from Knauf in the third quarter of 2018. Following receipt of these payments, we remitted $70 million to WAVE in partial consideration of the purchase price payable in respect of the business and operations of WAVE under the transaction. WAVE subsequently paid each of AWI and Worthington a dividend of $35 million. We also recorded a $22.4 million payable to WAVE, which is reflected within Accounts Payable and Accrued Expenses. The total consideration payable by AWI to WAVE will be determined following closing in connection with the calculation of the adjustments contemplated by the Purchase Agreement.

The transaction was notified for merger control clearance in the European Union (“EU”), Bosnia and Herzegovina, Macedonia, Montenegro, Russia and Serbia, and was cleared unconditionally in Montenegro (February 2018), Serbia (February 2018), Russia (March 2018), Macedonia (July 2018) and Bosnia and Herzegovina (August 2018). On December 7, 2018, the European Commission granted conditional clearance of the transaction, subject to certain

commitments intended to address concerns regarding the overlap between the activities of AWI and Knauf, including the divestment by Knauf to a third party of certain mineral fiber and grid businesses and operations in Austria, Estonia, Germany, Ireland, Italy, Latvia, Lithuania, Portugal, Spain, Turkey and the UK. This includes our sales operations in each of the relevant countries, as well as our production facilities, and those of WAVE, located in Team Valley, UK. The terms of the sale of the divestment business by Knauf and the identity of the purchaser are subject to the approval of the European Commission.

We continue to work closely with Knauf towards closing and expect the transaction to close by the end of the first half of 2019. The EMEA and Pacific Rim historical financial results have been reflected in AWI's Consolidated Financial Statements as discontinued operations for all periods presented.

In January 2017, we acquired the business and assets of Tectum, Inc. ("Tectum"), based in Newark, Ohio. Tectum is a manufacturer of acoustical ceiling, wall and structural solutions for commercial building applications with two manufacturing facilities. Tectum's

operations from the date of acquisition, and its assets and liabilities as of December 31, 2018, have been included as a component of our Architectural Specialties segment.

On April 1, 2016, we completed our separation of Armstrong Flooring, Inc. ("AFI"). AFI's historical financial results have been reflected in AWI's Consolidated Financial Statements as a discontinued operation for all periods presented.

See Note 5 to the Consolidated Financial Statements for additional information related to our acquisitions and discontinued operations.

As of December 31, 2018, we had 18 manufacturing plants in eight countries, including nine plants located throughout the U.S., which included our St. Helens, Oregon mineral fiber manufacturing facility, which closed in the second quarter of 2018. During the second quarter of 2018, as part of our acquisition of Plasterform, we acquired one plant located in Canada. During the third quarter of 2018, as part of our acquisition of Steel Ceilings, we acquired one plant located in Ohio. We have one idle mineral fiber plant in China, reported as a component of our Unallocated Corporate segment as it is not included in the pending sale to Knauf. Upon closure of the sale of our EMEA and Pacific Rim businesses to Knauf, we will have 12 plants, including nine plants in the U.S, two plants in Canada and the idle plant in China.

WAVE operates nine additional plants in five countries to produce suspension system (grid) products, which we use and sell in our ceiling systems. Upon closure of the sale of its corresponding EMEA and Pacific Rim businesses, WAVE will operate five plants in the U.S.

Reportable Segments

In connection with the anticipated sale of our EMEA and Pacific Rim businesses, our EMEA and Pacific Rim segments have been excluded from our results of continuing operations. As a result, our operating segments are as follows: Mineral Fiber, Architectural Specialties and Unallocated Corporate.

Mineral Fiber – produces suspended mineral fiber and soft fiber ceiling systems for use in commercial and residential settings. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. Commercial ceiling products are sold to resale distributors and to ceiling systems contractors. Residential ceiling products are sold primarily to wholesalers and retailers (including large home centers). The Mineral Fiber segment also includes the results of WAVE, which manufactures suspension system (grid) products and ceiling component products that are invoiced by both us and WAVE. Segment results relating to WAVE consist primarily of equity earnings and reflect our 50% equity interest in the joint venture. Ceiling component products consist of ceiling perimeters and trim, in addition to grid products that support drywall ceiling systems. To a lesser extent, however, in some markets, WAVE sells its suspension systems products to us for resale to customers. Mineral Fiber segment results reflect those sales transactions.

Architectural Specialties – produces and sources ceilings and walls for use in commercial settings. Products are available in numerous materials, such as metal and wood, in addition to various colors, shapes and designs. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. We sell standard and customized products, with the majority of Architectural Specialties revenues derived from sourced products. Architectural Specialties products are sold to resale distributors and ceiling systems contractors. The majority of revenues are project driven, which can lead to more volatile sales patterns due to project scheduling.

Unallocated Corporate – includes assets, liabilities, income and expenses that have not been allocated to our other business segments and consist of: cash and cash equivalents, the net funded status of our U.S. Retirement Income Plan ("RIP"), the estimated fair value of interest rate swap contracts, outstanding borrowings under our senior credit facilities and income tax balances. Our Unallocated Corporate segment also includes all assets, liabilities, income and expenses formerly reported in our EMEA and Pacific Rim segments that are not included in the pending sale to Knauf.

Factors Affecting Revenues

For information on our segments' 2018 net sales by geography, see Note 3 to the Consolidated Financial Statements included in this Form 10-K.

Markets. We compete in building material markets in the Americas. We closely monitor publicly available macroeconomic trends that provide insight into commercial and residential market activity, including GDP, office vacancy rates, the Architecture Billings Index, new commercial construction starts, state and local government spending, corporate profits and retail sales.

In addition, we noted several factors and trends within our markets that directly affected our business performance during 2018.

In our Mineral Fiber segment, we experienced increased volume activity due to growth in the distributor customer group. In our Architectural Specialties segment, we experienced strong growth primarily due to increased market penetration and due to the impact of recent acquisitions.

Average Unit Value. We periodically modify sales prices of our products due to changes in costs for raw materials and energy, market conditions and the competitive environment. In certain cases, realized price increases are less than the announced price increases because of project pricing, competitive reactions and changing market conditions. Additionally, we offer a wide assortment of products that are differentiated by style, design and performance attributes. Pricing and margins for products within the assortment vary. In addition, changes in the relative quantity of products purchased at different price points can impact year-to-year comparisons of net sales and operating income. Within our Mineral Fiber segment, we focus on improving sales dollars per unit sold, or average unit value ("AUV"), as a measure that accounts for the varying assortment of products and geographic mix impacting our revenues. We estimate that favorable AUV increased our total consolidated net sales for 2018 by approximately $43 million compared to 2017. Architectural Specialties revenues are generally earned based on individual contracts that include a mix of products, manufactured by us and sourced, that vary by project. As such, we do not track AUV performance for this segment, but rather attribute all changes in sales to volume.

In the first, second and third quarters of 2018, we implemented price increases on Mineral Fiber ceiling tile and certain grid and Architectural Specialties products. In the fourth quarter of 2018, we announced a price increase on Mineral Fiber grid products to be effective in the first quarter of 2019. We may implement additional pricing actions based on numerous factors, most notably upon future movements in raw material prices and sourced product costs.

Factors Affecting Operating Costs

Operating Expenses. Our operating expenses are comprised of direct production costs (principally raw materials, labor and energy), manufacturing overhead costs, freight, costs to purchase sourced products and selling, general, and administrative ("SG&A") expenses.

Our largest individual raw material expenditures are for fiberglass, perlite, starch, waste paper, pigments and clays. We manufacture most of the production needs for mineral wool at one of our manufacturing facilities. Natural gas and packaging materials are also significant input costs. Fluctuations in the prices of these inputs are generally beyond our control and have a direct impact on our financial results. In 2018, the costs for raw materials, sourced products and energy negatively impacted operating income by approximately $7.0 million, compared to 2017.

Employees

As of December 31, 2018 we had approximately 4,000 full time and part time employees. As of December 31, 2017, we had approximately 3,900 full-time and part-time employees. Excluding our EMEA and Pacific Rim businesses, we had approximately 2,200 employees as of December 31, 2018 and December 31, 2017.

CRITICAL ACCOUNTING ESTIMATES

In preparing our consolidated financial statements in accordance with U.S. generally accepted accounting principles ("GAAP"), we are required to make certain estimates and assumptions that affect the reported amounts of assets and

liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. We evaluate our estimates and assumptions on an on-going basis, using relevant internal and external information. We believe that our estimates and assumptions are reasonable. However, actual results may differ from what was estimated and could have a significant impact on the financial statements.

We have identified the following as our critical accounting estimates. We have discussed these critical accounting estimates with our Audit Committee.

U.S. Pension Credit and Postretirement Benefit Costs – We maintain pension and postretirement plans throughout the world, with the most significant plans located in the U.S. Our defined benefit pension and postretirement benefit costs are developed from actuarial valuations. These valuations are calculated using a number of assumptions, which represent management's best estimate of the future. The assumptions that have the most significant impact on reported results are the discount rate, the estimated long-term return on plan assets and the estimated inflation in health care costs. These assumptions are generally updated annually.

Management utilizes the Aon Hewitt AA only above median yield curve, which is a hypothetical AA yield curve comprised of a series of annualized individual discount rates, as the primary basis for determining discount rates. As of December 31, 2018 and 2017, we assumed discount rates of 4.30% and 3.63%, respectively, for the U.S. defined benefit pension plans. As of December 31, 2018 and 2017, we assumed a discount rates of 4.32% and 3.60%, respectively, for the U.S. postretirement plan. The effects of the change in discount rate will be amortized into earnings as described below. Absent any other changes, a one-quarter percentage point increase or decrease in the discount rates for the U.S. pension and postretirement plans would not have a material impact on 2019 operating income.

We manage two U.S. defined benefit pension plans, our RIP, which is a qualified funded plan, and a nonqualified unfunded plan. For the RIP, the expected long-term return on plan assets represents a long-term view of the future estimated investment return on plan assets. This estimate is determined based on the target allocation of plan assets among asset classes and input from investment professionals on the expected performance of the asset classes over 10 to 30 years. Historical asset returns are monitored and considered when we develop our expected long-term return on plan assets. An incremental component is added for the expected return from active management based on historical information obtained from the plan's investment consultants. These forecasted gross returns are reduced by estimated management fees and expenses. Over the 10 year period ended December 31, 2018, the historical annualized return was approximately 7.9% compared to an average expected return of 6.8%. The actual loss on plan assets incurred for 2018 was 4.4% net of fees. The difference between the actual and expected rate of return on plan assets will be amortized into earnings as described below.

The expected long-term return on plan assets used in determining our 2018 U.S. pension cost was 6.50%. We have assumed a return on plan assets for 2019 of 5.75%. The 2019 expected return on assets was calculated in a manner consistent with 2018. A one-quarter percentage point increase or decrease in this assumption would increase or decrease 2019 operating income by approximately $3.5 million.

Contributions to the unfunded plan were $3.9 million in 2018 and were made on a monthly basis to fund benefit payments. We estimate the 2019 contributions will be approximately $4.3 million. See Note 16 to the Consolidated Financial Statements for more information.

The estimated inflation in health care costs represents a 5-10 year view of the expected inflation in our postretirement health care costs. We separately estimate expected health care cost increases for pre-65 retirees and post-65 retirees due to the influence of Medicare coverage at age 65, as illustrated below:

	Assumptions		Actual	
	Post 65	Pre 65	Post 65	Pre 65
2017	8.5 %	7.3 %	6.8 %	11.3 %
2018	9.2 %	8.0 %	9.0 %	2.5 %
2019	8.7 %	7.6 %		

The difference between the actual and expected health care costs is amortized into earnings as described below. As of December 31, 2018, health care cost increases are estimated to decrease ratably until 2026, after which they are estimated to be constant at 4.5%. A one percentage point increase or decrease in the assumed health care cost trend

rate would not have a material impact on 2019 operating income. See Note 16 to the Consolidated Financial Statements for more information.

Actual results that differ from our various pension and postretirement plan estimates are captured as actuarial gains/losses. When certain thresholds are met, the gains and losses are amortized into future earnings over the remaining life expectancy of participants. Changes in assumptions could have significant effects on earnings in future years.

We recognized an increase in net actuarial losses related to our U.S. pension benefit plans of $57.1 million in 2018 primarily due to a worse than expected return on assets, partially offset by changes in actuarial assumptions (most significantly a 67 basis point increase in the discount rate). The $57.1 million actuarial loss impacting our U.S. pension plans is reflected as a component of other comprehensive income in our Consolidated Statement of Earnings and Comprehensive Income along with actuarial gains and losses from our foreign pension plan and our U.S. postretirement benefit plan.

Income Taxes – Our effective tax rate is primarily determined based on our pre-tax income, statutory income tax rates in the jurisdictions in which we operate, and the tax impacts of items treated differently for tax purposes than for financial reporting purposes. Some of these differences are permanent, such as expenses that are not deductible in our tax returns, and some differences are temporary, reversing over time, such as depreciation expense. These temporary differences create deferred income tax assets and liabilities. Deferred income tax assets are also recorded for net operating losses ("NOL") and foreign tax credit ("FTC") carryforwards.

Deferred income tax assets and liabilities are recognized by applying enacted tax rates to temporary differences that exist as of the balance sheet date. We reduce the carrying amounts of deferred tax assets by a valuation allowance if, based on the available evidence, it is more likely than not that such assets will not be realized. The need to establish valuation allowances for deferred tax assets is assessed quarterly. In assessing the requirement for, and amount of, a valuation allowance in accordance with the more likely than not standard, we give appropriate consideration to all positive and negative evidence related to the realization of the deferred tax assets. This assessment considers, among other matters, the nature, frequency and severity of current and cumulative losses, forecasts of future profitability and foreign source income ("FSI"), the duration of statutory carryforward periods, and our experience with operating loss and tax credit carryforward expirations. A history of cumulative losses is a significant piece of negative evidence used in our assessment. If a history of cumulative losses is incurred for a tax jurisdiction, forecasts of future profitability are not used as positive evidence related to the realization of the deferred tax assets in the assessment.

As of December 31, 2018, we have recorded valuation allowances totaling $79.6 million for various federal, state, and foreign deferred tax assets. While we have considered future taxable income in assessing the need for the valuation allowances based on our best available projections, if these estimates and assumptions change in the future or if actual results differ from our projections, we may be required to adjust our valuation allowances accordingly. Such adjustments could be material to our Consolidated Financial Statements.

As further described in Note 14 to the Consolidated Financial Statements, our Consolidated Balance Sheet as of December 31, 2018 includes net deferred income tax assets of $101.9 million. Included in this amount are deferred federal income tax assets for FTC carryforwards of $19.1 million, and state NOL deferred income tax assets of $58.7 million. We have established valuation allowances in the amount of $79.6 million consisting of $19.1 million for federal deferred tax assets related to FTC carryovers, $13.2 million for the outside basis difference between book and tax basis of our EMEA and Pacific Rim businesses, and $47.3 million for state deferred tax assets, primarily operating loss carryovers. The state deferred income tax asset and related state valuation allowance were each grossed up by $26.5 million in 2018, with no overall net change to the net deferred state income tax asset, to reflect gross Pennsylvania net operating loss deferred tax asset and valuation allowance amounts, pursuant to a change in that state's net operating loss regulations. Inherent in determining our effective tax rate, are judgments regarding business plans and expectations about future operations. These judgments include the amount and geographic mix of future taxable income, the amount of FSI, limitations on usage of NOL carryforwards, the impact of ongoing or potential tax audits, and other future tax consequences.

We estimate we will need to generate future U.S. taxable income of approximately $537.5 million for state income tax purposes during the respective realization periods (ranging from 2019 to 2036) in order to fully realize the net deferred income tax assets. As previously disclosed in prior SEC filings, our ability to utilize deferred tax assets may be impacted by certain future events, such as changes in tax legislation and insufficient future taxable income prior to expiration of certain deferred tax assets.

We recognize the tax benefits of an uncertain tax position if those benefits are more likely than not to be sustained based on existing tax law. Additionally, we establish a reserve for tax positions that are more likely than not to be

sustained based on existing tax law, but uncertain in the ultimate benefit to be sustained upon examination by the relevant taxing authorities. Unrecognized tax benefits are subsequently recognized at the time the more likely than not recognition threshold is met, the tax matter is effectively settled or the statute of limitations for the relevant taxing authority to examine and challenge the tax position has expired, whichever is earlier.

Impairments of Long-Lived Tangible, Intangible Assets and Goodwill – Our indefinite-lived intangibles are primarily trademarks and brand names, which are integral to our corporate identity and expected to contribute indefinitely to our corporate cash flows. Accordingly, they have been assigned an indefinite life. We conduct our annual impairment test for non-amortizable intangible assets during the fourth quarter, although we conduct interim impairment tests if events or circumstances indicate the asset might be impaired. We conduct impairment tests for tangible assets and amortizable intangible assets when indicators of impairment exist, such as operating losses and/or negative cash flows. In connection with the performance of an impairment test for indefinite-lived intangible assets and goodwill, we compare the carrying amount of the asset group (when testing indefinite-lived intangible assets) and reporting units (when testing goodwill) to the estimated undiscounted future cash flows expected to be generated by the assets. If the undiscounted cash flows of the asset group/reporting unit are less than the carrying value, an estimate of an asset group's/reporting unit's fair value is based on discounted future cash flows expected to be generated by the asset group/reporting unit, or based on management's estimated exit price assuming the assets could be sold in an orderly transaction between market participants or estimated salvage value if no sale is assumed. If the fair value is less than the carrying value of the asset group/reporting unit, we record an impairment charge equal to the difference between the fair value and carrying value of the asset group/reporting unit.

The principal assumption utilized in our impairment tests for definite-lived intangible assets and goodwill is operating profit adjusted for depreciation and amortization. The principal assumptions utilized in our impairment tests for indefinite-lived intangible assets include revenue growth rate, discount rate and royalty rate. The principal assumptions utilized in our impairment tests for goodwill include after-tax cash flows growth rates and discount rate. Revenue growth rates, after-tax cash flows growth rates and operating profit assumptions are primarily derived from those utilized in our operating plan and strategic planning processes. The discount rate assumption is calculated based upon an estimated weighted average cost of capital which reflects the overall level of inherent risk and the rate of return a market participant would expect to achieve. The royalty rate assumption represents the estimated contribution of the intangible assets to the overall profits of the asset group.

In 2018, indefinite-lived intangibles were tested for impairment based on our identified asset groups.

The cash flow estimates used in applying our impairment tests are based on management's analysis of information available at the time of the impairment test. Actual cash flows lower than the estimate could lead to significant future impairments. If subsequent testing indicates that fair values have declined, the carrying values would be reduced and our future statements of income would be affected.

There were no material impairment charges recorded in 2018, 2017 or 2016 related to intangible assets.

We did not test tangible assets within our continuing operations for impairment in 2018, 2017 or 2016 as no indicators of impairment existed.

We cannot predict the occurrence of certain events that might lead to material impairment charges in the future. Such events may include, but are not limited to, the impact of economic environments, particularly related to the commercial and residential construction industries, material adverse changes in relationships with significant customers, or strategic decisions made in response to economic and competitive conditions. See Notes 3 and 11 to the Consolidated Financial Statements for further information.

Environmental Liabilities – We are actively involved in the investigation, closure and/or remediation of existing or potential environmental contamination under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), and state Superfund and similar type environmental laws at several domestically owned,

formerly owned and non-owned locations allegedly resulting from past industrial activity. In a few cases, we are one of several potentially responsible parties and have agreed to jointly fund the required investigation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies.

We provide for environmental remediation costs and penalties when the responsibility to remediate is probable and the amount of associated costs is reasonably determinable. Accruals are estimates based on the judgment of management related to ongoing proceedings. Estimates of our future liability at the environmental sites are based on evaluations of currently available facts regarding each individual site. In determining the probability of contribution, we consider the solvency of other parties, the site activities of other parties, whether liability is being disputed, the terms of any existing agreements and experience with similar matters, and the effect of our October 2006 Chapter 11 reorganization upon the validity of the claim.

We evaluate the measurement of recorded liabilities each reporting period based on current facts and circumstances specific to each matter. The ultimate losses incurred upon final resolution may materially differ from the estimated liability recorded. Changes in estimates are recorded in earnings in the period in which such changes occur.

We are unable to predict the extent to which any recoveries from other parties or coverage under insurance policies might cover our final share of costs for these sites. Our final share of investigation and remediation costs may exceed any such recoveries, and such amounts net of insurance recoveries may be material.

ACCOUNTING PRONOUNCEMENTS EFFECTIVE IN FUTURE PERIODS

See Note 2 to the Consolidated Financial Statements for further information.

RESULTS OF OPERATIONS

Unless otherwise indicated, net sales in these results of operations are reported based upon the AWI location where the sale was made. Please refer to Notes 3 and 5 to the Consolidated Financial Statements for a reconciliation of segment operating income to consolidated earnings from continuing operations before income taxes and additional financial information related to discontinued operations.

2018 COMPARED TO 2017

CONSOLIDATED RESULTS FROM CONTINUING OPERATIONS

(dollar amounts in millions)

	2018	2017	Favorable	
Total consolidated net sales	$975.3	$893.6	9.1	%
Operating income	$249.4	$243.8	2.3	%

Consolidated net sales increased due to favorable AUV of $43 million and higher volumes of $39 million.

Cost of goods sold was 65.8% of net sales in 2018, compared to 64.7% in 2017. The increase in cost of goods sold as a percentage of sales in comparison to 2017 was impacted by an increase in input costs and $14 million of higher accelerated depreciation and closure costs in 2018 related to management's decision to permanently close the St. Helens, Oregon plant, partially offset by savings from the closure of the plant realized in the second half of 2018. Also impacting the increase in cost of goods sold as a percent of net sales was $10 million of environmental insurance settlements, net of charges, recorded in 2017 partially offset by $6 million of accelerated depreciation of machinery and equipment recorded in 2017 based on management's decision to permanently close a previously idled plant in China.

SG&A expenses in 2018 were $159.0 million, or 16.3% of net sales, compared to $138.6 million, or 15.5% of net sales, in 2017. The increase in SG&A expenses was primarily due to higher selling expenses due to an increase in net sales, an increase in legal fees and higher stock-based compensation expense. Also contributing to the increase in SG&A expenses was a $3 million reduction in environmental insurance settlements, net of expenses, in 2018 as compared to 2017.

Equity earnings from our WAVE joint venture were $74.9 million in 2018, compared to $67.0 million in 2017. The increase in WAVE earnings was primarily driven by an increase in net sales as a result of positive AUV, partially

offset by higher input costs, particularly steel and freight. See Note 10 to the Consolidated Financial Statements for further information.

Interest expense was $39.2 million in 2018, compared to $35.4 million in 2017. The increase in interest expense in 2018 was due to increased floating interest rates. Also contributing in the increase of interest expense over 2017 was the expiration of a $250 interest rate swap on March 31, 2018.

Other non-operating income was $32.5 million in 2018 and $13.7 million in 2017. The increase in other non-operating income was primarily related to higher pension and postretirement net periodic benefit credits, excluding service costs. In accordance with our adoption of Accounting Standards Update ("ASU") 2017-07, all non-service cost components of net periodic pension and postretirement benefit costs were recorded as a component of non-operating income in both 2018 and 2017. Also contributing to the increase in other non-operating income, net was a $20 million partial settlement loss recorded in 2017 for our RIP. See Note 16 to the Consolidated Financial Statements for further information.

Income tax expense was $53.1 million and $1.5 million in 2018 and 2017, respectively. The effective tax rate for 2018 was 21.9% as compared to a rate of 0.7% for 2017. On December 22, 2017, the U.S. federal government enacted the Tax Cut and Jobs Act of 2017 (the "2017 Tax Act"), resulting in significant changes from previous tax law. Effective January 1, 2018, the 2017 Tax Act reduces the federal corporate income tax rate from 35% to 21%. We applied the guidance in Staff Accounting Bulletin ("SAB") 118 when

accounting for the enactment-date effects of the 2017 Tax Act in 2017 and throughout 2018. As a result, in the fourth quarter of 2017 we recorded a net $82.5 million income tax benefit. At December 31, 2018 we have now completed our accounting for the enactment-date income tax effects of the 2017 Tax Act. We increased our December 31, 2017 estimated tax benefit of $82.5 million to $83.7 million in 2018, primarily related to the mandatory repatriation of earnings feature of federal tax reform. Excluding the December 31, 2017 enactment-date impact of the 2017 Tax Act, income tax expense for 2018 decreased in comparison to 2017 due primarily to the reduced 21% federal income tax rate that took effect January 1, 2018. The 2017 Tax Act subjects a U.S. shareholder to tax on Global Intangible Low Tax Income ("GILTI") earned by certain foreign subsidiaries. We have elected to account for GILTI as a current period expense when incurred, with the December 31, 2018 GILTI income tax expense being immaterial. Other than the items noted above, the remaining provisions of the 2017 Tax Act did not have a material effect on our financial condition, liquidity or results of operations.

Total other comprehensive income (loss) ("OCI") was a $59.4 million loss for 2018 compared to $57.9 million of income for 2017. The change was primarily due to foreign currency translation adjustments and pension and post retirement adjustments. Foreign currency translation adjustments represent the change in the U.S. dollar value of assets and liabilities denominated in foreign currencies. Foreign currency translation adjustments in 2018 were driven primarily by changes in the exchange rates of the Russian ruble and the British pound. Foreign currency translation adjustments in 2017 were driven primarily by changes in the exchange rates of the British pound, the Chinese renminbi, the Russian ruble and the Canadian dollar. Pension and postretirement adjustments represent actuarial gains and losses related to our defined benefit pension and postretirement plans and amortization of net losses on the U.S. pension plans. These losses in OCI in 2018 primarily related to our U.S. pension plans. Derivative gain/loss represents the mark to market value adjustments of our derivative assets and liabilities and the recognition of gains and losses previously deferred in OCI. See Note 24 to the Consolidated Financial Statements for further information.

REPORTABLE SEGMENT RESULTS

Mineral Fiber

(dollar amounts in millions)

	2018	2017	Change is Favorable / (Unfavorable)	
Net sales	$801.6	$756.4	6.0	%
Operating income	$223.8	$233.5	(4.2	)%

Net sales increased due to favorable AUV of $42 million and higher volumes of $3 million. The favorable AUV was due to improved price and positive mix from the sale of higher end ceiling tile products.

Operating income decreased due to higher manufacturing and input costs of $26 million and higher SG&A expenses of $19 million, partially offset by the favorable margin impact of higher AUV of $27 million and higher equity earnings from WAVE of $8 million.

The increase in manufacturing costs was impacted by increases in input costs and $10 million environmental insurance settlements, net of charges, recorded in 2017. Also impacting the increase in manufacturing costs was a $14 million increase in depreciation and closure costs attributable to our St. Helens manufacturing plant, partially offset by savings from the closure of the plant. The increase in SG&A expenses was primarily due to a $6 million increase in legal fees, a $6 million increase in selling expenses, a $3 million increase in stock-based compensation expense and a $3 million reduction in environmental insurance settlements, net of charges.

Architectural Specialties

(dollar amounts in millions)

	2018	2017	Change is Favorable	
Net sales	$173.7	$137.2	26.6	%
Operating income	$34.3	$27.7	23.8	%

Net sales increased due to higher volumes from increased market penetration and new construction activity as well as the 2018 acquisitions of Plasterform and Steel Ceilings.

Operating income increased due to the positive impact of higher volumes, partially offset by an increase in manufacturing costs, due to investments in design capabilities and investments related to recent years' acquisitions, and higher SG&A expenses due primarily to increased selling expenses as a result of increased net sales.

Unallocated Corporate

Unallocated Corporate expense of $9 million decreased from $17 million in the prior year primarily due to $6 million of accelerated depreciation charges for machinery and equipment recorded in 2017 due to management's decision to permanently close a plant in China that will be retained by AWI after the sale of our Pacific Rim businesses and a $3 decrease in service costs associated with our RIP.

FINANCIAL CONDITION AND LIQUIDITY

Cash Flow

The discussion that follows includes cash flows related to discontinued operations.

Operating activities for 2018 provided $203.2 million of cash, compared to $170.4 million of cash provided in 2017. The increase was primarily due to a decrease in accounts receivable primarily related to proceeds received in 2018 for environmental insurance recoveries.

Net cash provided by investing activities was $309.6 million for 2018, compared to a $54.2 million use of cash for 2017. The increase was primarily due to $330 million of proceeds received from Knauf related to the anticipated sale of our EMEA and Pacific Rim businesses, net of $70 million of payments to WAVE. Also contributing to the increase in investing cash flows was an increase of dividends from our WAVE joint venture.

Net cash used by financing activities was $329.3 million in 2018, compared to $102.7 million in 2017. The decrease was primarily due to the higher repurchases of outstanding common stock, payments of dividends and an increase in credit facility payments, partially offset by proceeds from exercised employee stock awards.

Liquidity

Our liquidity needs for operations vary throughout the year. We retain lines of credit to facilitate our seasonal cash flow needs, since cash flow is generally lower during the first and fourth quarters of our fiscal year.

We have a $1,050.0 million senior credit facility which is comprised of a $200.0 million revolving credit facility (with a $150.0 million sublimit for letters of credit), a $600.0 million Term Loan A and a $250.0 million Term Loan B. The revolving credit facility and Term Loan A are currently priced at 2.00% over LIBOR and the Term Loan B portion is priced at 2.75% over LIBOR with a 0.75% floor. The senior credit facility also has a $25.0 million letter of credit facility, also known as our bi-lateral facility. The revolving credit facility and Term Loan A mature in March 2021 and Term Loan B matures in November 2023. This $1,050.0 million senior credit facility is secured by U.S. personal property, the capital stock of material U.S. subsidiaries and a pledge of 65% of the stock of our material first tier foreign subsidiaries.

As of December 31, 2018, total borrowings outstanding under our senior credit facility were $547.5 million under Term Loan A and $243.1 million under Term Loan B. There were no borrowings outstanding under the revolving credit facility.

Under our senior credit facility, we are subject to year-end leverage tests that may trigger mandatory prepayments. If our ratio of consolidated funded indebtedness minus AWI and domestic subsidiary unrestricted cash and cash equivalents up to $100 million to consolidated earnings before interest, taxes, depreciation and amortization ("EBITDA") ("Consolidated Net Leverage Ratio") is greater than 3.5 to 1.0, the prepayment amount would be based on a computation of 50% of Consolidated Excess Cash Flow, as defined by the credit agreement. These annual payments would be made in the first quarter of the following year. No payment was made in 2018 or will be required in 2019.

The senior credit facility includes two financial covenants that require the ratio of consolidated EBITDA to consolidated cash interest expense minus cash consolidated interest income to be greater than or equal to 3.0 to 1.0 and requires the Consolidated Net Leverage Ratio to be less than or equal to 3.75 to 1.0. As of December 31, 2018, we were in compliance with all covenants of the senior credit facility.

The Term Loan A and Term Loan B were both fully drawn and are currently priced on a variable interest rate basis. The following table summarizes our interest rate swaps (dollar amounts in millions):

Trade Date	Notional Amount	Coverage Period	Risk Coverage
November 13, 2016	$ 200.0	November 2016 to March 2021	USD-LIBOR
April 1, 2016	$ 100.0	April 2016 to March 2023	USD-LIBOR
November 28, 2018	$ 200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$ 100.0	March 2021 to March 2025	USD-LIBOR

Under the terms of our April 2016 swap, we receive the greater of 3-month LIBOR or a 0.75% LIBOR Floor and pay a fixed rate over the hedged period.

Under the terms of our November 2016 swap, we receive 3-month LIBOR and pay a fixed rate over the hedged period, in addition to a basis rate swap to convert the floating rate risk under our November 2016 Swap from 3-month LIBOR to 1-month LIBOR. As a result, we receive 1-month LIBOR and pay a fixed rate over the hedged period.

We entered into two new swap positions effective November 28, 2018. Under the $200.0 million notional 2018 swap we pay a fixed rate over the hedged amount and receive 1-month LIBOR. This includes a 0% floor. Under the $100.0 million notional 2021 swap, we will pay a fixed rate monthly and receive 1-month LIBOR. This is inclusive of a 0% floor.

These swaps are designated as cash flow hedges against changes in LIBOR for a portion of our variable rate debt.

As of December 31, 2018, our outstanding long-term debt included a $35.0 million variable rate, tax-exempt industrial development bond that financed the construction of a plant in prior years. This bond has a scheduled final maturity of 2041 and is remarketed by an agent on a regular basis at a market-clearing interest rate. Any portion of the bond that is not successfully remarketed by the agent is required to be repurchased. This bond is backed by letters of credit which will be drawn if a portion of the bond is not successfully remarketed. We have not had to repurchase the bond.

As of December 31, 2018, we had $325.7 million of cash and cash equivalents, $259.9 million in the U.S and $65.8 million in various foreign jurisdictions. Upon completion of the sale of our EMEA and Pacific Rim businesses, it is our intention to repatriate a significant majority of the cash held in various foreign jurisdictions; however our Purchase Agreement with Knauf allows AWI to transfer any cash balances held in our EMEA businesses to Knauf up to $10.0 million. See Note 1 to the Consolidated Financial Statements for additional information.

As of December 31, 2018, we had a $40.0 million Accounts Receivable Securitization Facility with the Bank of Nova Scotia (the “funding entity”) that matures in March 2019. Under our Accounts Receivable Securitization Facility we sell accounts receivables to Armstrong Receivables Company, LLC (“ARC”), a Delaware entity that is consolidated in these financial statements. ARC is a 100% wholly owned single member LLC special purpose entity created specifically for this transaction; therefore, any receivables sold to ARC are not available to the general creditors of AWI. ARC then sells an undivided interest in the purchased accounts receivables to the funding entity. This undivided interest acts as collateral for drawings on the facility. Any borrowings under this facility are obligations of ARC and not AWI. ARC contracts with and pays a servicing fee to AWI to manage, collect and service the purchased accounts receivables. All new receivables under the program are continuously purchased by ARC with the proceeds from collections of receivables previously purchased. As of December 31, 2018, we had no borrowings under this facility. In February 2019, the facility was amended to resize the purchase limit from $40.0 million to $36.2 million and to extend the maturity to March 2020.

We utilize lines of credit and other commercial commitments in order to ensure that adequate funds are available to meet operating requirements. Letters of credit are currently arranged through our revolving credit facility, our bi-lateral facility and our securitization facility. Letters of credit may be issued to third party suppliers, insurance and financial institutions and typically can only be drawn upon in the event of AWI’s failure to pay its obligations to the beneficiary. The following table presents details related to our letters of credit (dollar amounts in millions):

	As of December 31, 2018		
Financing Arrangement	Limit	Used	Available
Accounts receivable securitization facility	$30.2	$36.2	$ (6.0)
Bi-lateral facility	25.0	13.4	11.6
Revolving credit facility	150.0	-	150.0
Total	$205.2	$49.6	$ 155.6

As of December 31, 2018 and 2017, $6.0 million and $6.6 million, respectively, of letters of credit issued under our accounts receivable securitization facility in excess of our maximum limit were classified as restricted cash and reported as a component of Cash and cash equivalents on our Consolidated Balance Sheets. This restriction will lapse upon replacement of collateral with accounts receivables and/or upon a change in the letter of credit limit as a result of higher securitized accounts receivable balances.

We believe that cash on hand and cash generated from operations, together with lines of credit, availability under our revolving credit facility, will be adequate to address our foreseeable liquidity needs based on current expectations of our business operations, capital expenditures and scheduled payments of debt obligations.

2017 COMPARED TO 2016

CONSOLIDATED RESULTS FROM CONTINUING OPERATIONS

(dollar amounts in millions)

	2017	2016	Change is Favorable	
Total consolidated net sales	$893.6	$837.3	6.7	%
Operating income	$243.8	$195.9	24.5	%

Consolidated net sales increased due to favorable AUV of $29 million and higher volumes of $27 million.

Cost of goods sold was 64.7% of net sales in 2017, compared to 63.3% in 2016 due to higher manufacturing and input costs. The increase in cost of goods sold as a percentage of sales in comparison to 2016 was impacted by $10 million of accelerated depreciation charges due to management's decision to permanently close a plant in China that will be retained by AWI after the sale of our Pacific Rim business and management's decision to close our St. Helens, Oregon plant. Cost of goods sold for 2017 were also impacted by an increase in manufacturing and input costs and $3 million of severance and other charges associated with the announced closure of our St. Helens, Oregon plant. Partially offsetting these increases was a $10 million reduction of cost of goods sold related to environmental insurance settlements recorded in 2017.

SG&A expenses in 2017 were $138.6 million, or 15.5% of net sales, compared to $184.2 million, or 21.9% of net sales, in 2016. The decrease in SG&A expenses was impacted by a $6 million reduction in expenses resulting from an increase in certain selling, promotional and administrative processing service reimbursements from WAVE and a $5 million reduction related to environmental insurance settlements, net of charges. These decreases in SG&A expenses were partially offset by higher SG&A expenses as a result of the Tectum acquisition and $2 million of severance related to cost control measures in the U.S.

Separation costs of $34.5 million in 2016 were primarily related to outside professional services and employee retention and severance accruals incurred in conjunction with our initiative to separate our flooring business from our ceilings business.

Equity earnings from our WAVE joint venture were $67.0 million in 2017, compared to $73.1 million in 2016. The decrease in WAVE earnings was primarily driven by an increase in selling and administrative processing charges from AWI and Worthington Industries, Inc. WAVE earnings were also negatively impacted by higher input costs, particularly steel. See Note 9 to the Consolidated Financial Statements for further information.

Interest expense was $35.4 million in 2017, compared to $49.5 million in 2016. Interest expense in 2016 included higher debt financing costs as a result of the refinancing of our credit facilities in April 2016 and $8.3 million of net losses that were reclassified from accumulated other comprehensive income as a result of the settlement of interest rate swaps which occurred in April 2016 and in connection with our entering into $450.0 million of notional amount of basis rate swaps during the fourth quarter of 2016. Also contributing to the decrease in interest expense was a reduction in total debt outstanding and a lower interest rate spread in comparison to 2016.

Other non-operating income was $13.7 million in 2017 and $4.2 million in 2016. The changes in other non-operating income were primarily due to higher pension and postretirement net periodic benefit credits, excluding service costs. In accordance with our adoption of Accounting Standards Update (“ASU”) 2017-07, all non-service cost components of net periodic pension and postretirement benefit costs were recorded as a component of non-operating income in both 2017 and 2016. Also contributing to the change were the foreign exchange rate gains on the translation of unhedged cross-currency intercompany loans in 2016.

Income tax expense was $1.5 million and $51.3 million in 2017 and 2016, respectively. The effective tax rate for 2017 was 0.7% as compared to a rate of 34.1% for 2016. As a result of the 2017 Tax Act, we recorded a net $82.5 million income tax benefit in the fourth quarter of 2017. Excluding the impact of the 2017 Tax Act, income tax expense for 2017 increased in comparison to 2016 due to an increase in pre-tax income, a decrease in reversals of reserves for uncertain tax positions from the expiration of the federal statute of limitations and an increase to the valuation allowance on foreign tax credits due to the anticipated sale of our EMEA and Pacific Rim businesses.

Total other comprehensive income ("OCI") was $57.9 million for 2017 compared to $23.6 million for 2016. Foreign currency translation adjustments represent the change in the U.S. dollar value of assets and liabilities denominated in foreign currencies. Foreign currency translation adjustments in 2017 were driven primarily by changes in the exchange rates of the British pound, the Chinese renminbi, the Russian ruble and the Canadian dollar. Derivative gain/loss represents the mark to market value adjustments of our derivative assets and liabilities and the recognition of gains and losses previously deferred in OCI. Derivative gains in 2016 were impacted by $8.3 million of net losses related to settlements of interest rates swaps. Pension and postretirement adjustments represent actuarial gains and losses related to our defined benefit pension and postretirement plans and amortization of net losses on the U.S. pension plans. Increases in OCI in 2017 primarily related to our U.S. pension plans.

REPORTABLE SEGMENT RESULTS

Mineral Fiber

(dollar amounts in millions)

	2017	2016	Change is Favorable	
Net sales	$756.4	$736.6	2.7	%
Operating income	$233.5	$226.5	3.1	%

Net sales increased due to favorable AUV of $29 million, partially offset by lower volumes of $10 million. The favorable AUV was primarily due to improved mix from the sale of higher end ceiling tile products, while the decrease in volumes was primarily in lower end ceiling tile products.

Operating income increased due to lower SG&A expenses of $20 million and the favorable margin impact of higher AUV of $12 million, partially offset by higher manufacturing and input costs of $13 million, lower earnings from WAVE of $6 million and the negative impact of lower volumes of $2 million. The reduction in SG&A expenses was impacted by $6 million of additional expense reimbursements from WAVE and $5 million of environmental insurance settlements, net of charges, both recorded in 2017. The increase in manufacturing costs was impacted by higher costs associated with planned enhancements to our manufacturing footprint to produce high end products and $7 million of severance and accelerated depreciation charges, primarily associated with the announced closure of our St. Helens manufacturing plant, partially offset by a $10 million reduction in costs related to environmental insurance settlements, net of charges, in 2017.

Architectural Specialties

(dollar amounts in millions)

	2017	2016	Change is Favorable	
Net sales	$137.2	$100.7	36.2	%
Operating income	$27.7	$19.2	44.3	%

Net sales increased due to higher volumes, partially as a result of our acquisition of Tectum and increased new construction activity.

Operating income increased due to the positive impact of higher volumes, partially offset by an increase in SG&A expenses due primarily to the acquisition of Tectum and investments in selling and design capabilities.

Unallocated Corporate

Unallocated Corporate expense of $17 million decreased from $50 million in the prior year, primarily due to $35 million of charges incurred in connection with our separation of AFI in 2016.

Cash Flow

The discussion that follows includes cash flows related to discontinued operations.

Operating activities for 2017 provided $170.4 million of cash, compared to $49.3 million of cash provided in 2016. The increase was primarily due to changes in working capital, most notably a decrease accounts payable and accrued expenses related to the separation of AFI.

Net cash used for investing activities was $54.2 million in 2017, compared to $17.0 million in 2016. The change in investing activities cash flows was primarily due to the acquisition of Tectum and lower dividends from our WAVE joint venture, partially offset by decreased purchases of property, plant and equipment.

Net cash used by financing activities was $102.7 million in 2017, compared to $128.9 million in 2016. The favorable change in use of cash was primarily the result of lower payments of debt, partially offset by higher repurchases of outstanding common stock.

OFF-BALANCE SHEET ARRANGEMENTS

No disclosures are required pursuant to Item 303(a)(4) of Regulation S-K.

CONTRACTUAL OBLIGATIONS

As part of our normal operations, we enter into numerous contractual obligations that require specific payments during the term of the various agreements. The following table includes amounts ongoing under contractual obligations existing as of December 31, 2018. Only known payments that are dependent solely on the passage of time are included. Obligations under contracts that contain minimum payment amounts are shown at the minimum payment amount. Contracts that contain variable payment structures without minimum payments are excluded. Purchase orders that are entered into in the normal course of business are also excluded because they are generally cancelable and not legally binding. Amounts are presented below based upon the currently scheduled payment terms. Actual future payments may differ from the amounts presented below due to changes in payment terms or events affecting the payments.

(dollar amounts in millions)	2019	2020	2021	2022	2023	Thereafter	Total
Long-term debt [1]	$55.0	$62.5	$437.5	$2.5	$233.1	$ 35.0	$825.6
Scheduled interest payments [2]	37.7	35.4	20.1	15.2	4.0	11.0	123.4
Operating lease obligations, net of sublease income [3]	5.3	4.7	4.2	3.7	2.2	4.7	24.8
Unconditional purchase obligations [4]	29.3	12.5	9.5	2.0	1.6	0.5	55.4
Pension contributions [5]	4.3	-	-	-	-	-	4.3
Other obligations [6], [7]	0.6	-	-	-	-	-	0.6
Total contractual obligations	$132.2	$115.1	$471.3	$23.4	$240.9	$ 51.2	$1,034.1

[1] Excludes $5.8 million of unamortized debt financing costs as of December 31, 2018.

(2) For debt with variable interest rates and interest rate swaps, we projected future interest payments based on market-based interest rate swap curves.

(3) Lease obligations include the minimum payments due under existing agreements with non-cancelable lease terms in excess of one year.

(4) Unconditional purchase obligations include (a) purchase contracts whereby we must make guaranteed minimum payments of a specified amount regardless of how little material is actually purchased ("take or pay" contracts) and (b) service agreements. Unconditional purchase obligations exclude contracts entered into during the normal course of business that are non-cancelable and have fixed per unit fees, but where the monthly commitment varies based upon usage. Cellular phone contracts are an example.

(5) Pension contributions include estimated contributions for our defined benefit pension plans. We are not presenting estimated payments in the table above beyond 2019 as funding can vary significantly from year to year based upon changes in the fair value of plan assets, funding regulations and actuarial assumptions.

(6) Other obligations include payments under severance agreements.

(7) Other obligations excludes $42.6 million of unrecognized tax benefit liabilities under ASC 740 "Income Taxes." Due to the uncertainty relating to these positions, we are unable to reasonably estimate the ultimate amount or timing of the settlement of these issues. See Note 14 to the Consolidated Financial Statements for more information.

This table excludes obligations related to postretirement benefits (retiree health care and life insurance) since we voluntarily provide these benefits. The amount of benefit payments we made in 2018 was $11.2 million. See Note 16 to the Consolidated Financial Statements for additional information regarding future expected cash payments for postretirement benefits.

We are party to supply agreements, some of which require the purchase of inventory remaining at the supplier upon termination of the agreement. Had these agreements terminated at December 31, 2018, we would have been obligated to purchase approximately $0.8 million of inventory. Historically, due to production planning, we have not had to purchase material amounts of product at the end of similar contracts. Accordingly, no liability has been recorded for these guarantees.

Letters of credit are currently arranged through our revolving credit facility, our bi-lateral facility and our securitization facility. Our securitization facility is with the Bank of Nova Scotia and matures in March 2020. Letters of credit may be issued to third party suppliers, insurance and financial institutions and typically can only be drawn upon in the event of AWI's failure to pay its obligations to the beneficiary. The following table summarizes the commitments we have available for use as of December 31, 2018.

Other Commercial Commitments (dollar amounts in millions)	Total Amounts Committed	Less Than 1 Year	1 – 3 Years	4 – 5 Years	Over 5 Years
Letters of credit	$ 49.6	$49.6	$ -	$ -	$ -

In connection with our disposition of certain assets through a variety of unrelated transactions, we have entered into contracts that included various indemnity provisions, some of which are customary for such transactions, while others hold the acquirer of the assets harmless with respect to liabilities relating to such matters as taxes, environmental and other litigation. Some of these provisions include exposure limits, but many do not. Due to the nature of the indemnities, it is not possible to estimate the potential maximum exposure under these contractual provisions. As of December 31, 2018, we had no liabilities recorded for which an indemnity claim had been received.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk

Our primary exposure to market risk is from changes in interest rates that could impact our results of operations, cash flows and financial condition. We use forward swap contracts to hedge these exposures. The Company utilizes derivative financial instruments as risk management tools and not for speculative trading purposes. In addition, derivative financial instruments are entered into with a diversified group of major financial institutions in order to manage our exposure to potential nonperformance on such instruments. We regularly monitor developments in the capital markets.

In July 2017, the Financial Conduct Authority (the authority that regulates LIBOR) announced it intends to replace LIBOR rates with the Secured Overnight Financing Rate ("SOFR") effective in 2021. The Alternative Reference Rates Committee ("ARRC") has proposed that the SOFR rate that represents best practice as the alternative to USD-LIBOR for use in derivatives and other financial contracts that are currently indexed to USD-LIBOR. ARRC has proposed a paced market transition plan to SOFR from USD-LIBOR and organizations are currently working on industry wide and company specific transition plans as it relates to derivatives and cash markets exposed to USD-LIBOR. The Company has material contracts that are indexed to USD-LIBOR at the present time and will monitor the new SOFR rates in relation to our debt and interest rate hedging instruments.

Counterparty Risk

We only enter into derivative transactions with established counterparties having an investment grade or better. We monitor counterparty credit default swap levels and credit ratings on a regular basis. All of our derivative transactions with counterparties are governed by master International Swap and Derivatives Association agreements (“ISDAs”) with netting arrangements. These agreements can limit our exposure in situations where we have gain and loss positions outstanding with a single counterparty. We do not post nor receive cash collateral with any counterparty for our derivative transactions. These ISDAs do not contain any credit contingent features other than those contained in our bank credit facility. Exposure to individual counterparties is controlled, and thus we consider the risk of counterparty default to be negligible.

Interest Rate Sensitivity

We are subject to interest rate variability on our Term Loan A, Term Loan B, revolving credit facility and other borrowings. A hypothetical increase of one-quarter percentage point in LIBOR interest rates from December 31, 2018 levels would increase 2019 interest expense by approximately $0.9 million. As of December 31, 2018, $243.1 million of our debt under Term Loan B has a 0.75% LIBOR floor, which would not be affected by a one-quarter percentage point move in LIBOR given the current interest rate environment. We also have $500.0 million of active interest rate swaps outstanding, which fix the interest rates for a portion of our debt. These active interest rate swaps are included in this calculation.

As of December 31, 2018, we had interest rate swaps outstanding on Term Loan A and on Term Loan B, with notional amounts of $400.0 million and $100.0 million, respectively. We utilize interest rate swaps to minimize the fluctuations in earnings caused by interest rate volatility. Under the terms of the Term Loan A swaps we receive 1-month LIBOR and pay a fixed rate over the hedged period. Under the terms of our Term Loan B, we receive the greater of 3-month LIBOR or a 0.75% LIBOR Floor and pay a fixed rate over the hedged period. The following table

summarizes our interest rate swaps as of December 31, 2018 (dollar amounts in millions):

Trade Date	Notional Amount	Coverage Period	Risk Coverage
November 13, 2016	$ 200.0	November 2016 to March 2021	USD-LIBOR
April 1, 2016	$ 100.0	April 2016 to March 2023	USD-LIBOR
November 28, 2018	$ 200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$ 100.0	March 2021 to March 2025	USD-LIBOR

These swaps are designated as cash flow hedges against changes in LIBOR for a portion of our variable rate debt. The net asset measured at fair value was $3.5 million at December 31, 2018.

The table below provides information about our long-term debt obligations as of December 31, 2018, including payment requirements and related weighted-average interest rates by scheduled maturity dates. Weighted average variable rates are based on implied forward rates in the yield curve and are exclusive of our interest rate swaps.

Scheduled maturity date						After	
(dollar amounts in millions)	2019	2020	2021	2022	2023	2024	Total
Variable rate principal payments	$55.0	$62.5	$437.5	$2.5	$233.1	$35.0	$825.6
Average interest rate	4.58%	4.54%	4.44 %	4.00%	5.40 %	1.91%	4.62 %

Variable rate principle payments reflected in the preceding table exclude $5.8 million of unamortized debt financing costs as of December 31, 2018.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

SUPPLEMENTARY DATA

Quarterly Financial Information for the Years Ended December 31, 2018 and 2017 (Unaudited)

The following consolidated financial statements are filed as part of this Annual Report on Form 10-K:

Reports of Independent Registered Public Accounting Firm.

Consolidated Statements of Earnings and Comprehensive Income for the Years Ended December 31, 2018, 2017 and 2016.

Consolidated Balance Sheets as of December 31, 2018 and 2017.

Consolidated Statements of Equity for the Years Ended December 31, 2018, 2017 and 2016.

Consolidated Statements of Cash Flows for the Years Ended December 31, 2018, 2017 and 2016.

Notes to Consolidated Financial Statements.

Schedule II for the Years Ended December 31, 2018, 2017 and 2016.

Armstrong World Industries, Inc., and Subsidiaries

Quarterly Financial Information (unaudited)

(dollar amounts in millions, except for per share data)

	First	Second	Third	Fourth
2018				
Net sales	$227.3	$248.6	$260.5	$238.9
Gross profit	70.8	82.7	97.9	82.1
Earnings from continuing operations	41.2	47.6	64.2	36.6
Per share of common stock:				
Basic	$0.78	$0.91	$1.26	$0.74
Diluted	$0.76	$0.90	$1.23	$0.73
Price range of common stock - high	$64.60	$65.00	$73.45	$71.50
Price range of common stock - low	$55.65	$54.45	$62.15	$54.34
Cash dividend per common share	$-	$-	$-	$0.175
2017				
Net sales	$219.8	$225.6	$233.9	$214.3
Gross profit	78.3	85.2	90.8	61.1
Earnings from continuing operations	35.5	43.7	37.3	104.1
Per share of common stock:				
Basic	$0.65	$0.82	$0.70	$1.96
Diluted	$0.65	$0.81	$0.69	$1.92
Price range of common stock - high	$48.00	$47.95	$51.98	$61.50
Price range of common stock - low	$38.45	$41.20	$43.77	$49.25

Note: The net sales and gross profit amounts above are reported on a continuing operations basis. The sum of the quarterly earnings per share data may not equal the total year amounts due to changes in the average shares outstanding and, for diluted data, the exclusion of the anti-dilutive effect in certain quarters.

Armstrong World Industries, Inc., and Subsidiaries

Quarterly Financial Information (unaudited)

(dollar amounts in millions, except for per share data)

Fourth Quarter 2018 Compared With Fourth Quarter 2017 – Continuing Operations

Consolidated net sales of $238.9 million in the fourth quarter of 2018 increased 11.4% due to higher volumes of $16 million and favorable AUV of $9 million.

Mineral Fiber net sales increased 7.8% due to favorable AUV of $9 million and higher volumes of $5 million. Architectural Specialties net sales increased 29.1% due to higher volumes as a result of increased market penetration and new construction activity, as well as the 2018 acquisitions of Plasterform and Steel Ceilings.

For the fourth quarter of 2018, cost of goods sold was 65.6% of net sales, compared to 71.5% in 2017. The decrease in cost of goods sold as a percentage of sales in comparison to 2017 was impacted by a $6 million reduction in accelerated depreciation and closure costs related to management's decision to permanently close the St. Helens, Oregon plant in the fourth quarter of 2017, combined with savings from the closure of the plant realized in the fourth quarter of 2018. Also contributing to the decrease in cost of goods sold was $2 million of accelerated depreciation of machinery and equipment recorded in 2017 based on management's decision to permanently close a previously idled plant in China. Partially offsetting these decreases in cost of goods sold was $2 million of environmental insurance settlements, net of charges, recorded in 2017.

SG&A expenses for the fourth quarter of 2018 were $45.3 million, or 19.0% of net sales compared to $32.8 million, or 15.3% of net sales, for the fourth quarter of 2017. The increase in SG&A expenses was primarily due an $8 million reduction in environmental insurance settlements, net of expenses, in the fourth quarter of 2018 as compared to fourth quarter of 2017. Also contributing to the increase in SG&A expenses was higher stock-based compensation expense, higher selling expenses, primarily due to an increase in net sales, and an increase in legal fees.

Equity earnings in the fourth quarter of 2018 were $15.7 million compared to $15.1 million for the fourth quarter of 2017. The increase in WAVE earnings was primarily driven by an increase in net sales as a result of positive AUV, partially offset by higher input costs, particularly steel. See Note 10 to the Consolidated Financial Statements for further information.

Operating income was $52.5 million in the fourth quarter of 2018 compared to $43.4 million in the fourth quarter of 2017.

Interest expense in the fourth quarter of 2018 increased to $10.3 million compared to $8.9 million in the fourth quarter of 2017 due to an increase in floating interest rates.

Fourth quarter income tax expense was $10.8 million on pre-tax earnings from continuing operations of $47.4 million in 2018 compared to income tax benefit of $60.7 million on a pre-tax earnings from continuing operations of $43.4 million in 2017. The effective tax rate for 2018 was significantly higher than 2017 primarily due to the income tax benefits derived in 2017 from the 2017 Tax Act. As a result, we recorded a net $82.5 million income tax benefit in the fourth quarter of 2017. Excluding the impact of the 2017 Tax Act on 2017 results, income tax expense for the fourth quarter of 2018 decreased in comparison to 2017 due to the decrease in the federal tax rate on current activity in 2018.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended. Our internal control over financial reporting was designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of our financial statements for external purposes in accordance with generally accepted accounting principles.

Because of inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation and the criteria in the COSO framework, our management concluded that our internal control over financial reporting was effective as of December 31, 2018.

KPMG LLP, an independent registered public accounting firm, audited our internal control over financial reporting as of December 31, 2018, as stated in their report included herein.

/s/ Victor D. Grizzle

Victor D. Grizzle
Director, President and Chief Executive Officer

/s/ Brian L. MacNeal

Brian L. MacNeal
Senior Vice President and Chief Financial Officer

/s/ Stephen F. McNamara

Stephen F. McNamara
Vice President and Corporate Controller
February 25, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Armstrong World Industries, Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Armstrong World Industries, Inc. and subsidiaries' (the "Company") internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated balance sheets of the Company as of December 31, 2018 and 2017, the related consolidated statements of earnings and comprehensive income, equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes and financial statement schedule of valuation and qualifying reserves (collectively, the "consolidated financial statements"), and our report dated February 25, 2019 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance

with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ KPMG LLP

Philadelphia, Pennsylvania
February 25, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Armstrong World Industries, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Armstrong World Industries, Inc. and subsidiaries (the "Company") as of December 31, 2018 and 2017, the related consolidated statements of earnings and comprehensive income, equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes and financial statement schedule of valuation and qualifying reserves (collectively, the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 25, 2018 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, effective January 1, 2018, the Company adopted Financial Accounting Standards Board (FASB) Topic 606, Revenue from Contracts with Customers, and the related FASB Accounting Standard Updates using the modified retrospective transition method.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

We have served as the Company’s auditor since 1929.

Philadelphia, Pennsylvania

February 25, 2019

Armstrong World Industries, Inc., and Subsidiaries

Consolidated Statements of Earnings and Comprehensive Income

(amounts in millions, except per share data)

	Years Ended December 31,		
	2018	2017	2016
Net sales	$975.3	$893.6	$837.3
Cost of goods sold	641.8	578.2	530.3
Gross profit	333.5	315.4	307.0
Selling, general and administrative expenses	159.0	138.6	184.2
Equity earnings from joint venture	(74.9)	(67.0)	(73.1)
Operating income	249.4	243.8	195.9
Interest expense	39.2	35.4	49.5
Other non-operating (income) expense, net	(32.5)	(13.7)	(4.2)
Earnings from continuing operations before income taxes	242.7	222.1	150.6
Income tax expense	53.1	1.5	51.3
Earnings from continuing operations	189.6	220.6	99.3
Net gain (loss) from discontinued operations, net of tax expense (benefit) of $8.2, $3.6 and ($0.8)	9.6	4.2	(9.9)
(Loss) gain on disposal of discontinued business, net of tax (benefit) of ($6.0), ($4.1) and ($15.2)	(13.3)	(70.0)	15.3
Net (loss) gain from discontinued operations	(3.7)	(65.8)	5.4
Net earnings	$185.9	$154.8	$104.7
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	(27.6)	24.5	(33.2)
Derivative gain (loss)	1.1	(0.3)	7.5
Pension and postretirement adjustments	(32.9)	33.7	49.3
Total other comprehensive (loss) income	(59.4)	57.9	23.6
Total comprehensive income	$126.5	$212.7	$128.3
Earnings per share of common stock, continuing operations:			
Basic	$3.68	$4.12	$1.79
Diluted	$3.63	$4.08	$1.78
(Loss) earnings per share of common stock, discontinued operations:			
Basic	$(0.07)	$(1.23)	$0.09
Diluted	$(0.07)	$(1.22)	$0.09
Net earnings per share of common stock:			
Basic	$3.61	$2.89	$1.88
Diluted	$3.56	$2.86	$1.87
Average number of common shares outstanding:			
Basic	51.3	53.3	55.4
Diluted	52.1	53.9	55.7

See accompanying notes to consolidated financial statements beginning on page 44.

Armstrong World Industries, Inc., and Subsidiaries

Consolidated Balance Sheets

(amounts in millions, except share data)

	December 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$ 325.7	$ 159.6
Accounts and notes receivable, net	79.9	90.8
Inventories, net	61.2	53.8
Current assets of discontinued operations	279.5	306.1
Income tax receivable	1.7	30.7
Other current assets	4.8	7.9
Total current assets	752.8	648.9
Property, plant, and equipment, less accumulated depreciation and amortization of $412.9 and $361.4, respectively	501.0	499.9
Prepaid pension costs	52.8	88.3
Investment in joint venture	40.8	107.3
Goodwill and intangible assets, net	442.0	441.1
Deferred income taxes	14.8	19.6
Income tax receivable	0.8	4.1
Other noncurrent assets	68.5	64.3
Total assets	$ 1,873.5	$ 1,873.5
Liabilities and Shareholders' Equity		
Current liabilities:		
Current installments of long-term debt	$ 55.0	$ 32.5
Accounts payable and accrued expenses	383.3	108.4
Liabilities of discontinued operations	110.3	128.5
Income tax payable	0.9	0.5
Total current liabilities	549.5	269.9
Long-term debt, less current installments	764.8	817.7
Postretirement benefit liabilities	58.8	79.2
Pension benefit liabilities	50.3	57.2
Other long-term liabilities	38.0	35.5
Income tax payable	26.5	53.0
Deferred income taxes	124.4	141.7
Total noncurrent liabilities	1,062.8	1,184.3
Shareholders' equity:		
Common stock, $0.01 par value per share, authorized 200 million shares; issued 61,553,724 shares, outstanding 48,808,239 shares in 2018 and 60,782,736 shares issued, 52,772,139 outstanding shares in 2017	0.6	0.6
Capital in excess of par value	547.4	516.8
Retained earnings	865.0	633.4
	(692.2)	(385.6)

Treasury stock, at cost, 12,745,485 shares as of December 31, 2018 and 8,010,597 shares as of December 31, 2017		
Accumulated other comprehensive (loss)	(459.6)	(345.9)
Total shareholders' equity	261.2	419.3
Total liabilities and shareholders' equity	$ 1,873.5	$ 1,873.5

See accompanying notes to consolidated financial statements beginning on page 44.

Armstrong World Industries, Inc., and Subsidiaries

Consolidated Statements of Equity

(amounts in millions, except share data)

	Common Stock		Additional Paid-In	Retained	Treasury Stock		Accumulated Other Comprehensive	
	Shares	Amount	Capital	Earnings	Shares	Amount	Income (Loss)	Total
December 31, 2015	55,359,064	$ 0.6	$ 1,151.8	$ 365.2	5,057,382	$ (261.4)	$ (487.4)	$ 768.8
Stock issuances, net	180,694							
Share-based employee compensation			9.2					9.2
Net earnings				104.7				104.7
Other comprehensive income							23.6	23.6
Separation of Armstrong Flooring, Inc.			(656.1)				60.0	(596.1)
Acquisition of treasury stock	(1,111,525)				1,111,525	(43.8)		(43.8)
December 31, 2016	54,428,233	$ 0.6	$ 504.9	$ 469.9	6,168,907	$ (305.2)	$ (403.8)	$ 266.4
Cumulative effect impact of ASU 2016-09 adoption				8.7				8.7
Stock issuance, net	185,596							-
Share-based employee compensation			11.4					11.4
Net earnings				154.8				154.8
Other comprehensive income							57.9	57.9
Separation of Armstrong Flooring, Inc.			0.5					0.5
Acquisition of treasury stock	(1,841,690)				1,841,690	(80.4)		(80.4)
December 31, 2017	52,772,139	$ 0.6	$ 516.8	$ 633.4	8,010,597	$ (385.6)	$ (345.9)	$ 419.3
Cumulative effect impact of				54.3			(54.3)	-

ASU 2018-02 adoption								
Stock issuance, net	770,988							-
Share-based employee compensation			30.6					30.6
Cash dividends - $0.175 per common share				(8.6)				(8.6)
Net earnings				185.9				185.9
Other comprehensive (loss)							(59.4)	(59.4)
Acquisition of treasury stock	(4,734,888)				4,734,888	(306.6)		(306.6)
December 31, 2018	48,808,239	$ 0.6	$ 547.4	$ 865.0	12,745,485	$ (692.2)	$ (459.6)	$ 261.2

See accompanying notes to consolidated financial statements beginning on page 44.

Armstrong World Industries, Inc., and Subsidiaries

Consolidated Statements of Cash Flows

(amounts in millions)

	Years Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net earnings	$185.9	$154.8	$104.7
Adjustments to reconcile earnings to net cash provided by operating activities:			
Depreciation and amortization	79.4	89.2	89.2
Loss (gain) on disposal of discontinued operations	19.3	74.1	(0.1)
Deferred income taxes	(3.8)	(12.3)	51.0
Share-based compensation	14.0	10.2	12.4
Equity earnings from joint venture	(74.9)	(67.0)	(73.1)
Separation costs	-	-	34.5
Loss on interest rate swap	-	-	10.7
U.S. pension (credit) expense	(26.3)	(4.5)	15.0
Non-cash foreign currency translation on intercompany loans	0.8	(2.6)	(3.6)
Other, non-cash adjustments, net	2.1	2.2	0.8
Changes in operating assets and liabilities:			
Receivables	13.2	(37.1)	(23.9)
Inventories	(8.9)	3.6	(7.0)
Other current assets	9.4	2.2	7.1
Other noncurrent assets	(5.5)	(1.6)	(9.9)
Accounts payable and accrued expenses	5.4	(20.0)	(82.1)
Income taxes payable	7.5	(18.8)	(49.3)
Other long-term liabilities	(14.4)	(1.2)	(22.0)
Other, net	-	(0.8)	(5.1)
Net cash provided by operating activities	203.2	170.4	49.3
Cash flows from investing activities:			
Purchases of property, plant and equipment	(71.9)	(89.7)	(104.2)
Return of investment from joint venture	141.7	69.1	86.9
Cash paid for acquisitions	(22.2)	(31.2)	-
Proceeds from (payment of) company-owned life insurance, net	2.0	(2.4)	-
Payments of proceeds from Knauf to investment in joint venture	(70.0)	-	-
Cash consideration received from Knauf	330.0	-	
Other investing activities	-	-	0.3
Net cash provided by (used for) investing activities	309.6	(54.2)	(17.0)
Cash flows from financing activities:			
Proceeds from revolving credit facility and other short-term debt	-	103.0	90.0
Payments of revolving credit facility and other short-term debt	-	(103.0)	(90.0)
Proceeds from long-term debt	-	-	363.5
Payments of long-term debt	(32.5)	(25.0)	(434.1)
Financing costs	-	(0.6)	(8.1)
Dividend paid	(8.6)	-	-
Proceeds from exercised stock options	18.4	3.3	0.7
Cash transferred to Armstrong Flooring, Inc.	-	-	(9.1)

Proceeds from company-owned life insurance loans, net	-	-	2.0
Payment for treasury stock acquired	(306.6)	(80.4)	(43.8)
Net cash (used for) financing activities	(329.3)	(102.7)	(128.9)
Effect of exchange rate changes on cash and cash equivalents	(7.4)	4.2	(6.3)
Net increase (decrease) in cash and cash equivalents	176.1	17.7	(102.9)
Cash and cash equivalents at beginning of year	159.6	141.9	244.8
Cash and cash equivalents at end of year	335.7	159.6	141.9
Cash and cash equivalents at end of year from discontinued operations	10.0	-	-
Cash and cash equivalents at end of year from continued operations	$325.7	$159.6	$141.9
Supplemental Cash Flow Disclosures:			
Interest paid	$29.9	$30.7	$33.4
Income taxes paid, net	$51.6	$32.1	$33.7
Amounts in accounts payable for capital expenditures	$1.9	$2.6	$4.4

See accompanying notes to consolidated financial statements beginning on page 44.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 1. BUSINESS

Armstrong World Industries, Inc. (“AWI”) is a Pennsylvania corporation incorporated in 1891. When we refer to “AWI,” the “Company,” “we,” “our” and “us” in these notes, we are referring to AWI and its subsidiaries.

On August 16, 2018, we acquired the business and assets of Steel Ceilings, Inc. (“Steel Ceilings”), based in Johnstown, Ohio. Steel Ceilings is a manufacturer of aluminum and stainless metal ceilings that include architectural, radiant and security solutions with one manufacturing facility. Steel Ceilings’ operations, and its assets and liabilities, are included as a component of our Architectural Specialties segment. See Note 5 for further information.

On May 31, 2018, we acquired the business and assets of Plasterform, Inc. (“Plasterform”), based in Mississauga, Ontario, Canada. Plasterform is a manufacturer of architectural cast ceilings, walls, facades, columns and moldings with one manufacturing facility. Plasterform’s operations, and its assets and liabilities, are included as a component of our Architectural Specialties segment. See Note 5 for further information.

On November 17, 2017, we entered into a Share Purchase Agreement (the “Purchase Agreement”) with Knauf International GmbH (“Knauf”), to sell certain subsidiaries comprising our business in Europe, the Middle East and Africa (including Russia) (“EMEA”) and the Pacific Rim, including the corresponding businesses and operations conducted by Worthington Armstrong Venture (“WAVE”), our joint venture with Worthington Industries, Inc. (“Worthington”) in which AWI holds a 50% interest. The consideration paid by Knauf in connection with the sale is $330 million in cash, inclusive of amounts due to WAVE, subject to certain adjustments as provided in the Purchase Agreement, including adjustments based on the economic impact of any required regulatory remedies and a working capital adjustment.

On July 18, 2018, we entered into an amendment to the Purchase Agreement, pursuant to which Knauf agreed to irrevocably and unconditionally pay AWI (i) $250 million on August 1, 2018, and (ii) $80 million on September 15, 2018, if, prior to such date (A) any competition condition has not been satisfied, or (B) the closing has not yet occurred. The amendment also provided for the reduction (from a maximum of $35 million to a maximum of $20 million) of potential adjustments to the purchase price consideration for the transaction based on the impact of remedies required to satisfy competition conditions. We received both the $250 million payment and the $80 million payment from Knauf in the third quarter of 2018. Following receipt of these payments, we remitted $70 million to WAVE in partial consideration of the purchase price payable in respect of the business and operations of WAVE under the transaction. WAVE subsequently paid each of AWI and Worthington a dividend of $35 million. We also recorded a $22.4 million payable to WAVE, which is reflected within Accounts Payable and Accrued Expenses. The total consideration payable by AWI to WAVE will be determined following closing in connection with the calculation of the adjustments contemplated by the Purchase Agreement.

The transaction was notified for merger control clearance in the European Union (“EU”), Bosnia and Herzegovina, Macedonia, Montenegro, Russia and Serbia, and was cleared unconditionally in Montenegro (February 2018), Serbia (February 2018), Russia (March 2018), Macedonia (July 2018) and Bosnia and Herzegovina (August 2018). On December 7, 2018, the European Commission granted conditional clearance of the transaction, subject to certain

commitments intended to address concerns regarding the overlap between the activities of AWI and Knauf, including the divestment by Knauf to a third party of certain mineral fiber and grid businesses and operations in Austria, Estonia, Germany, Ireland, Italy, Latvia, Lithuania, Portugal, Spain, Turkey and the UK. This includes our sales operations in each of the relevant countries, as well as our production facilities, and those of WAVE, located in Team Valley, UK. The terms of the sale of the divestment business by Knauf and the identity of the purchaser are subject to the approval of the European Commission.

We continue to work closely with Knauf towards closing and expect the transaction to close by the end of the first half of 2019. The EMEA and Pacific Rim historical financial results have been reflected in AWI's Consolidated Financial Statements as discontinued operations for all periods presented.

In January 2017, we acquired the business and assets of Tectum, Inc. ("Tectum"), based in Newark, Ohio. Tectum is a manufacturer of acoustical ceiling, wall and structural solutions for commercial building applications with two manufacturing facilities. Tectum's operations and its assets and liabilities have been included as a component of our Architectural Specialties segment. See Note 5 for additional information.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Consolidation Policy. The consolidated financial statements and accompanying data in this report include the accounts of AWI and its majority-owned subsidiaries. All significant intercompany transactions have been eliminated from the consolidated financial statements.

Use of Estimates. We prepare our financial statements in conformity with U.S. Generally Accepted Accounting Principles ("U.S. GAAP"), which requires management to make estimates and assumptions. These estimates and assumptions affect the reported amounts of assets, liabilities, revenues and expenses. When preparing an estimate, management determines the amount based upon the consideration of relevant internal and external information. Actual results may differ from these estimates.

Reclassifications. Certain amounts in the prior year's Consolidated Financial Statements and related notes have been recast to conform to the 2018 presentation.

Revenue Recognition. We recognize revenue upon transfer of control of our products to the customer, which typically occurs upon shipment. Our main performance obligation to our customers is the delivery of products in accordance with purchase orders. Each purchase order defines the transaction price for the products purchased under the arrangement. Direct sales to building materials distributors, home centers, direct customers, and retailers represent the majority of our sales. Our standard sales terms are Free On Board ("FOB") shipping point. We have some sales terms that are FOB destination. At the point of shipment, the customer is required to pay under normal sales terms. Our normal payment terms in most cases are 45 days or less and our sales arrangements do not have any material financing components. In addition, our customer arrangements do not produce contract assets or liabilities that are material to our consolidated financial statements. Within our Architectural Specialties segment, the majority of revenues are project driven, which includes a minority of revenues derived from the sale of customer specified customized products that have no alternative use to us. The manufacturing cycle for these custom products is short.

Incremental costs to fulfill our customer arrangements are expensed as incurred, as the amortization period is less than one year.

Our products are sold with normal and customary return provisions. We provide limited warranties for defects in materials or factory workmanship, sagging and warping, and certain other manufacturing defects. Warranties are not sold separately to customers. Our product warranties place certain requirements on the purchaser, including installation and maintenance in accordance with our written instructions. In addition to our warranty program, under certain limited circumstances, we will occasionally and at our sole discretion, provide a customer accommodation repair or replacement. Warranty repairs and replacements are most commonly made by professional installers employed by or affiliated with our independent distributors. Reimbursement for costs associated with warranty repairs are provided to our independent distributors through a credit against accounts receivable from the distributor to us. Sales returns and warranty claims have historically not been material and do not constitute separate performance obligations.

We often enter into agreements with our customers to offer incentive programs, primarily volume rebates and promotions. The majority of our rebates are designated as a percentage of annual customer purchases. We estimate the amount of rebate based on actual sales for the period and accrue for the projected incentive programs costs. We record the costs of the rebate accruals as a reduction to our revenue. In addition, other sales discounts, including early pay promotions, are deducted immediately from the sales invoice.

See Note 4 to the Consolidated Financial Statements for additional information related to our Revenues.

Shipping and Handling Costs. We account for product shipping and handling costs as fulfillment activities and present the associated costs in costs of goods sold in the period in which we sell our product.

Advertising Costs. We recognize advertising expenses as they are incurred.

Research and Development Costs. We expense research and development costs as they are incurred.

Pension and Postretirement Benefits. We have benefit plans that provide for pension, medical and life insurance benefits to certain eligible employees when they retire from active service. See Note 16 to the Consolidated Financial Statements for disclosures on pension and postretirement benefits.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Taxes. The provision for income taxes has been determined using the asset and liability approach of accounting for income taxes to reflect the expected future tax consequences of events recognized in the financial statements. Deferred income tax assets and liabilities are recognized by applying enacted tax rates to temporary differences that exist as of the balance sheet date, which result from differences in the timing of reported taxable income between tax and financial reporting.

We reduce the carrying amounts of deferred tax assets by a valuation allowance if, based on the available evidence, it is more likely than not that such assets will not be realized. The need to establish valuation allowances for deferred tax assets is assessed quarterly. In assessing the requirement for, and amount of, a valuation allowance in accordance with the more likely than not standard, we give appropriate consideration to all positive and negative evidence related to the realization of the deferred tax assets. This assessment considers, among other matters, the nature, frequency and severity of current and cumulative losses, forecasts of future profitability and foreign source income, the duration of statutory carryforward periods, and our experience with operating loss and tax credit carryforward expirations. A history of cumulative losses is a significant piece of negative evidence used in our assessment. If a history of cumulative losses is incurred for a tax jurisdiction, forecasts of future profitability are generally not used as positive evidence related to the realization of the deferred tax assets in the assessment.

We recognize the tax benefits of an uncertain tax position if those benefits are more likely than not to be sustained based on existing tax law. Additionally, we establish a reserve for tax positions that are more likely than not to be sustained based on existing tax law, but uncertain in the ultimate benefit to be sustained upon examination by the relevant taxing authorities. Unrecognized tax benefits are subsequently recognized at the time the more likely than not recognition threshold is met, the tax matter is effectively settled or the statute of limitations for the relevant taxing authority to examine and challenge the tax position has expired, whichever is earlier.

Taxes collected from customers and remitted to governmental authorities are reported on a net basis.

Earnings per Share. Basic earnings per share is computed by dividing the earnings attributable to common shares by the weighted average number of shares of common stock outstanding during the period. Diluted earnings per share reflects the potential dilution of securities that could share in the earnings.

Cash and Cash Equivalents. Cash and cash equivalents include cash on hand, short-term investments that have maturities of three months or less when purchased and restricted cash. Our government money market fund is carried at fair value and is recorded as a component of cash and cash equivalents.

Concentration of Credit. We principally sell products to customers in building products industries in various geographic regions. Revenues from three commercial distributors, included within our Mineral Fiber and Architectural Specialties segments, individually exceeded 10% of our revenues in 2018. Gross sales to these three customers totaled $459.3 million, $426.1 million and $372.9 million in 2018, 2017 and 2016, respectively. We monitor the creditworthiness of our customers and generally do not require collateral.

Receivables. We sell our products to select, pre-approved customers using customary trade terms that allow for payment in the future. Customer trade receivables, customer notes receivable and miscellaneous receivables (which include supply related rebates and other), net of allowances for doubtful accounts, customer credits and warranties are

reported in accounts and notes receivable, net. Cash flows from the collection of receivables are classified as operating cash flows on the consolidated statements of cash flows.

We establish credit-worthiness prior to extending credit. We estimate the recoverability of receivables each period. This estimate is based upon new information in the period, which can include the review of any available financial statements and forecasts, as well as discussions with legal counsel and the management of the debtor company. As events occur, which impact the collectability of the receivable, all or a portion of the receivable is reserved. Account balances are charged off against the allowance when the potential for recovery is considered remote. We do not have any off-balance sheet credit exposure related to our customers.

Inventories. Inventories are valued at the lower of cost and net realizable value. See Note 7 to the Consolidated Financial Statements for further information on our accounting for inventories.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Property Plant and Equipment. Property plant and equipment is recorded at cost reduced by accumulated depreciation. Depreciation expense is recognized on a straight-line basis over the assets' estimated useful lives. Machinery and equipment includes manufacturing equipment (depreciated over 3 to 15 years), computer equipment (depreciated over 3 to 5 years) and office furniture and equipment (depreciated over 5 to 7 years). Within manufacturing equipment, assets that are subject to accelerated obsolescence or wear out quickly, such as dryer components, are depreciated over shorter periods (3 to 7 years). Heavy production equipment, such as conveyors and production presses, are depreciated over longer periods (13 to 15 years). Buildings are depreciated over 15 to 30 years, depending on factors such as type of construction and use. Computer software is depreciated over 3 to 7 years.

Property, plant and equipment is tested for impairment by asset group when indicators of impairment are present, such as operating losses and/or negative cash flows. If an indication of impairment exists, we compare the carrying amount of the asset group to the estimated undiscounted future cash flows expected to be generated by the asset group. The estimate of an asset group's fair value is based on discounted future cash flows expected to be generated by the asset group, or based on management's estimated exit price assuming the assets could be sold in an orderly transaction between market participants, or estimated salvage value if no sale is assumed. If the fair value is less than the carrying value of the asset group, we record an impairment charge equal to the difference between the fair value and carrying value of the asset group. Impairments of assets related to our manufacturing operations are recorded in cost of goods sold.

When assets are disposed of or retired, their costs and related depreciation are removed from the financial statements, and any resulting gains or losses normally are reflected in cost of goods sold or selling, general and administrative ("SG&A") expenses depending on the nature of the asset.

Asset Retirement Obligations. We recognize the fair value of obligations associated with the retirement of tangible long-lived assets in the period in which they are incurred. Upon initial recognition of a liability, the discounted cost is capitalized as part of the related long-lived asset and depreciated over the corresponding asset's useful life. Over time, accretion of the liability is recognized as an operating expense to reflect the change in the liability's present value.

Intangible Assets. Our definite-lived intangible assets are primarily customer relationships (amortized over 7 to 20 years) and developed technology (amortized over 15 years). We review significant definite-lived intangible assets for impairment when indicators of impairment exist. We review our businesses for indicators of impairment such as operating losses and/or negative cash flows. If an indication of impairment exists, we compare the carrying amount of the asset group to the estimated undiscounted future cash flows expected to be generated by the asset group. The estimate of an asset group's fair value is based on discounted future cash flows expected to be generated by the asset group, or based on management's estimated exit price assuming the assets could be sold in an orderly transaction between market participants. If the fair value is less than the carrying value of the asset group, we record an impairment charge equal to the difference between the fair value and carrying value of the asset group.

Our indefinite-lived intangibles are primarily trademarks and brand names with Armstrong representing our primary trademark, which are integral to our corporate identity and expected to contribute indefinitely to our cash flows. Accordingly, they have been assigned an indefinite life. We perform annual impairment tests during the fourth quarter on these indefinite-lived intangibles. These assets undergo more frequent tests if an indication of possible impairment exists.

The principal assumption used in our impairment tests for definite-lived intangible assets is future operating profit adjusted for depreciation and amortization. The principal assumptions used in our impairment tests for indefinite-lived intangible assets include revenue growth rate, discount rate and royalty rate. Revenue growth rate and future operating profit assumptions are derived from those utilized in our operating plan and strategic planning processes. The discount rate assumption is calculated based upon an estimated weighted average cost of capital which reflects the overall level of inherent risk and the rate of return a market participant would expect to achieve. The royalty rate assumption represents the estimated contribution of the intangible asset to the overall profits of the reporting unit. Methodologies used for valuing our intangible assets did not change from prior periods.

See Note 11 to the Consolidated Financial Statements for disclosure on intangible assets.

Foreign Currency Transactions. Assets and liabilities of our subsidiaries operating outside the United States which are accounted in a functional currency other than U.S. dollars are translated using the period end exchange rate. Revenues and expenses are translated at exchange rates effective during each month. Foreign currency translation gains or losses are included as a component of accumulated other comprehensive income (loss) within shareholders' equity. Gains or losses on foreign currency transactions are recognized through earnings.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Financial Instruments and Derivatives. From time to time, we use derivatives and other financial instruments to offset the effect of interest rate variability. See Notes 17 and 18 to the Consolidated Financial Statements for further discussion.

Share-based Employee Compensation. We recognize share-based compensation expense on a straight-line basis over the vesting period for the entire award. Compensation expense for performance based awards with non-market based conditions are also recognized over the vesting period for the entire award, however, compensation expense may vary based on the expectations for actual performance relative to defined performance measures. See Note 21 to the Consolidated Financial Statements for additional information on share-based employee compensation.

Subsequent Events. On January 22, 2019, we entered into an agreement to acquire the business and assets of Architectural Components Group, Inc. (“ACGI”). ACGI is a manufacturer of custom wood ceilings and walls located in Marshfield, Missouri with annual revenue of approximately $35.0 million. The transaction is expected to close in the first half of 2019.

On February 20, 2019, we declared a dividend of $0.175 per common share outstanding. The dividend will be paid on March 20, 2019, to shareholders of record as of the close of business on March 5, 2019.

Recently Adopted Accounting Standards

In May 2014, the Financial Accounting Standard Board (“FASB”) issued Accounting Standards Update (“ASU”) 2014-09, “Revenue from Contracts with Customers.” The guidance requires an entity to recognize the amount of revenue to which it expects to be entitled for the transfer of promised goods or services to a customer. The ASU replaces most existing revenue recognition guidance in U.S. GAAP. In March 2016, the FASB issued ASU 2016-08, “Principal versus Agent Considerations (Reporting Gross versus Net),” which clarifies the implementation guidance relating to principle versus agent considerations. In April 2016, the FASB issued ASU 2016-10, “Identifying Performance Obligations and Licensing,” which clarifies the implementation guidance relating to the identification of performance obligations in a contract, including how entities should account for shipping and handling services it provides after control of goods transfers to a customer. In May 2016, the FASB issued ASU 2016-12, “Narrow-Scope Improvements and Practical Expedients,” which clarifies the guidance related to the presentation of sales taxes, noncash consideration, and completed contracts and contract modifications. In December 2016, the FASB issued ASU 2016-20, “Technical Corrections and Improvements to Topic 606, Revenue from Contracts with Customers,” which clarifies the scope and application of the adoption of the new revenue recognition standard.

Effective January 1, 2018, we adopted these standards using the modified retrospective transition method and have applied all practical expedients related to completed contracts upon adoption. Substantially all of our revenues from contracts with customers are recognized from the sale of products with standard shipping terms, sales discounts and warranties. This adoption did not have a material impact to our financial condition, results of operations or cash flows as the amount and timing of substantially all of our revenues will continue to be recognized at a point in time. As required by the revenue recognition Accounting Standards Codification (“ASC”) updates, we have expanded our disclosure of revenues from contracts with customers. See Note 4 for additional information.

In January 2016, the FASB issued ASU 2016-01, “Recognition and Measurement of Financial Assets and Financial Liabilities,” which addresses certain aspects of recognition, measurement, presentation, and disclosure of financial instruments. This new guidance requires equity investments (except those accounted for under the equity method of accounting or those that result in consolidation of the investee) to be measured at fair value with changes in fair value recognized in net income. Effective January 1, 2018, our adoption of this standard had no material impact on our financial condition, results of operations or cash flows.

In August 2016, the FASB issued ASU 2016-15, “Classification of Certain Cash Receipts and Cash Payments.” This guidance clarifies how entities should classify certain cash receipts and cash payments on the statement of cash flows. Effective January 1, 2018, our adoption of this guidance had no material impact on our cash flows.

In March 2017, the FASB issued ASU 2017-07, “Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost,” which requires companies to report the service cost component of net benefit cost in the same line item or items as other compensation costs arising from services rendered by the pertinent employees during the period. The other components of net benefit cost are required to be presented in the income statement separately from the service cost component and outside a subtotal of income from operations, if one is presented. Effective January 1, 2018, we have adopted this guidance for all periods presented. Upon adoption of this standard we reclassified all non-service cost components of net benefit costs for our defined benefit pension and health and welfare plans. For the year 2017, this reclassification resulted in an increase of $8.4 million in cost of

goods sold and an increase of $3.0 million in SG&A expenses, offset by an increase of $11.4 million in other non-operating income, net on the Consolidated Statement of Earnings and Comprehensive Income. For the year 2016, this reclassification resulted in a decrease of $1.3 million in cost of goods sold and a decrease of $5.7 million in SG&A expenses, offset by an increase of $7.0 million in other non-operating income, net on the Consolidated Statement of Earnings and Comprehensive Income. See Note 16 for details related to our components of net benefit costs.

In February 2018, the FASB issued ASU 2018-02, “Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income.” On December 22, 2017, the U.S. federal government enacted the Tax Cuts and Jobs Act of 2017 (the “2017 Tax Act”), which, in addition to numerous other provisions, lowered the Corporate statutory tax rate from 35% to 21%. Under U.S. GAAP, all deferred tax assets and liabilities are required to be adjusted for the effect of a change in tax laws or rates, with the effect included in income from continuing operations in the reporting period that includes the enactment date. This standard allows entities to record a reclassification from Accumulated Other Comprehensive Income (“AOCI”) to retained earnings for the purpose of appropriately including the tax effect of items within AOCI at the newly enacted 21% U.S. federal tax rate. This new guidance is effective for annual periods beginning after December 15, 2018. Effective January 1, 2018, we early adopted the guidance and recorded a $54.3 million reduction to AOCI with a corresponding increase to retained earnings.

Recently Issued Accounting Standards

In February 2016, the FASB issued ASU 2016-02, “Leases,” which amends accounting for leases, most notably by requiring a lessee to recognize the assets and liabilities that arise from a lease agreement. Specifically, this new guidance will require lessees to recognize a liability to make lease payments and a right-of-use asset representing its right to use the underlying asset for the lease term, with limited exceptions. The accounting applied by a lessor is largely unchanged from that applied under existing U.S. GAAP.

In January 2018, FASB issued ASU 2018-01, “Land Easement Practical Expedient for Transition to Topic 842,” which permits an entity to elect an optional transition practical expedient to not evaluate under Topic 842 land easements that exist or expired before the adoption of Topic 842 and that were not previously accounted for as leases under Topic 840. In July 2018, FASB issued ASU 2018-10, “Codification improvements to Topic 842, Leases,” which affect narrow aspects of the guidance issued in the amendments in Update 2016-02. In July 2018, FASB also issued ASU 2018-11, “Targeted Improvements,” which allows companies to adopt ASC Topic 842 without revising comparative period reporting or disclosures and provides an optional practical expedient for lessors to not separate lease and non-lease components of a contract when certain criteria are met.

Collectively, the guidance and all related ASU updates are effective for annual reporting periods beginning after December 15, 2018. The new standard is effective for us on January 1, 2019. A modified retrospective transition approach is required, applying the new standard to all leases existing at the date of initial application. An entity may choose to use either (1) its effective date or (2) the beginning of the earliest comparative period presented in the

financial statements as its date of initial application. If an entity chooses the second option, the transition requirements for existing leases also apply to leases entered into between the date of initial application and the effective date. The entity must also recast its comparative period financial statements and provide the disclosures required by the new standard for the comparative periods. We adopted the new standard on January 1, 2019 and selected the effective date as our date of initial application. Consequently, financial information will not be updated, and the disclosures required under the new standard will not be provided for dates and periods before January 1, 2019.

The new standard provides several optional practical expedients in transition. We elected to adopt all of the new standard's available transition practical expedients.

A new system tool has been implemented to assist in the collection and analysis of data related to our lease portfolio. We have also evaluated our accounting policies, processes and internal controls that are impacted by the new guidance.

This standard will have a material effect on our Consolidated Balance Sheet but not on the Consolidated Statement of Earnings and Comprehensive Income or Consolidated Statement of Cash Flows. While we continue to assess all the effects of adoption, we currently believe the most significant changes to the Consolidated Balance Sheet relates to the recognition of new Right Of Use ("ROU") assets and lease liabilities. The adoption will significantly affect our disclosures about non-cash investing and financing activities and the lease related disclosures.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Effective January 1, 2019, we currently expect to recognize ROU asset and lease liabilities in the range of $25.0 million to $30.0 million, based on the present value of the future minimum rental payments under current leasing standards for existing operating leases.

In August 2017, the FASB issued ASU 2017-12, "Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities," which amends the financial reporting of hedging relationships in order to better portray the economic results of an entity's risk management activities in its financial statements. In addition, the guidance simplifies the application of current hedge accounting guidance. This guidance is effective for annual periods beginning after December 15, 2018. A modified retrospective transition approach is required in which the Company will recognize the cumulative effect of the change on the opening balance of each affected component of equity in the statement of financial position as of the date of adoption. We have adopted the guidance effective January 1, 2019. We believe that the adoption will not have a material impact on our consolidated financial statements.

In June 2018, the FASB issued ASU 2018-07, "Improvements to Nonemployee Share-Based Payment Accounting," which simplifies the aspects of accounting for non–employee share-based payment transactions resulting from expanding the scope of ASC Topic 718, Compensation – Stock Compensation, to include share-based payment transactions for acquiring goods and services from non-employees. The guidance is effective for annual periods beginning after December 15, 2018. A modified retrospective transition approach is required where a Company will use the fair value measurement of unsettled liability classified non-employee awards and equity-classified non-employee awards where a measurement date has not been established. We have adopted the guidance effective January 1, 2019. We believe that the adoption will not have a material impact on our consolidated financial statements.

In August 2018, the FASB issued ASU 2018-14, "Disclosure Framework – Changes to the Disclosure Requirements for Defined Benefit Plans," which amends ASC 715-20, Compensation – Retirement Benefits – Defined Benefit Plans. The ASU modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The disclosure requirements to be removed include the amounts in accumulated other comprehensive income expected to be recognized in net periodic benefit costs over the next fiscal year, the amount and timing of plan assets expected to be returned to the employer and the effect of a one percentage point change in assumed health care cost trend rates on the aggregate service cost and benefit obligation for postretirement health care benefits. The new disclosure requirements include the interest crediting rates for cash balance plans, and an explanation of significant gains and losses related to changes in benefit obligations. This guidance is effective for fiscal years ending after December 15, 2020. We are currently evaluating the impact the adoption of this standard will have on our consolidated financial statements.

In August 2018, the FASB issued ASU 2018-15, "Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract," which amends ASC 350-40 Intangibles – Goodwill and Other – Internal-Use Software. The ASU requires implementation costs incurred by customers in cloud computing arrangements to be deferred and recognized over the term of the arrangement, if these costs were capitalized by the customer in a software licensing arrangement. This guidance is effective for fiscal years beginning after December 15, 2019. We are currently evaluating the impact the adoption of this standard will have on our results of operations.

NOTE 3. NATURE OF OPERATIONS

In connection with the announced sale of our EMEA and Pacific Rim businesses, our former EMEA and Pacific Rim segments have been excluded from our results of continuing operations and segment assets. As a result, our operating segments are as follows: Mineral Fiber, Architectural Specialties and Unallocated Corporate.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Mineral Fiber – produces suspended mineral fiber and soft fiber ceiling systems for use in commercial and residential settings. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. Commercial ceiling products are sold to resale distributors and to ceiling systems contractors. Residential ceiling products are sold primarily to wholesalers and retailers (including large home centers). The Mineral Fiber segment also includes the results of our Worthington Armstrong Venture ("WAVE") joint venture with Worthington Industries, Inc., which manufactures suspension system (grid) products and ceiling component products that are invoiced by both us and WAVE. Segment results relating to WAVE consist primarily of equity earnings and reflect our 50% equity interest in the joint venture. Ceiling component products consist of ceiling perimeters and trim, in addition to grid products that support drywall ceiling systems. To a lesser extent, however, in some markets, WAVE sells its suspension systems products to us for resale to customers. Our segment results reflect those sales transactions. The Mineral Fiber segment also includes all assets and liabilities not specifically allocated to our Architectural Specialties or Unallocated Corporate segment, including all property and related depreciation associated with our Lancaster, PA headquarters. Operating results for the Mineral Fiber segment include a significant majority of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Architectural Specialties – produces and sources ceilings and walls for use in commercial settings. Products are available in numerous materials, such as metal and wood, in addition to various colors, shapes and designs. Products offer various performance attributes such as acoustical control, rated fire protection and aesthetic appeal. We produce standard and customized products, with the majority of Architectural Specialties revenues derived from sourced products. Architectural Specialties products are sold to resale distributors and ceiling systems contractors. The majority of revenues are project driven, which can lead to more volatile sales patterns due to project scheduling. Operating results for the Architectural Specialties segment include a minor portion of allocated Corporate administrative expenses that represent a reasonable allocation of general services to support its operations.

Unallocated Corporate – includes assets, liabilities, income and expenses that have not been allocated to our other business segments and consist of: cash and cash equivalents, the net funded status of our U.S. Retirement Income Plan ("RIP"), the estimated fair value of interest rate swap contracts, outstanding borrowings under our senior credit facilities and income tax balances. Effective December 31, 2017 and for all periods presented, our Unallocated Corporate segment also includes all assets, liabilities, income and expenses formerly reported in our EMEA and Pacific Rim segments that are not included in the pending sale to Knauf.

Segment results below have been restated for all periods presented as a result of the disaggregation of our former Americas segment and the reclassification of Unallocated Corporate assets.

	Mineral Fiber	Architectural Specialties	Unallocated	Total

			Corporate	
For the year ended 2018				
Net sales to external customers	$801.6	$ 173.7	$ -	$975.3
Equity (earnings) from joint venture	(74.9)	-	-	(74.9)
Segment operating income (loss)	223.8	34.3	(8.7)	249.4
Segment assets	1,096.1	84.7	413.2	1,594.0
Depreciation and amortization [1]	75.3	3.5	0.6	79.4
Investment in joint venture	40.8	-	-	40.8
Purchases of property, plant and equipment [1]	60.5	4.1	-	64.6

	Mineral Fiber	Architectural Specialties	Unallocated Corporate	Total
For the year ended 2017				
Net sales to external customers	$756.4	$ 137.2	$ -	$893.6
Equity (earnings) from joint venture	(67.0)	-	-	(67.0)
Segment operating income (loss)	233.5	27.7	(17.4)	243.8
Segment assets	1,193.5	53.2	320.7	1,567.4
Depreciation and amortization [1]	59.2	1.8	6.0	67.0
Investment in joint venture	107.3	-	-	107.3
Purchases of property, plant and equipment [1]	76.1	1.6	-	77.7

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

	Mineral Fiber	Architectural Specialties	Unallocated Corporate	Total
For the year ended 2016				
Net sales to external customers	$736.6	$ 100.7	$ -	$837.3
Equity (earnings) from joint venture	(73.1)	-	-	(73.1)
Segment operating income (loss)	226.5	19.2	(49.8)	195.9
Segment assets	1,145.1	17.3	249.3	1,411.7
Depreciation and amortization [1]	53.6	0.8	0.4	54.8
Investment in joint venture	106.2	-	-	106.2
Purchases of property, plant and equipment [1]	66.1	0.2	-	66.3

[1] Totals will differ from the totals on our Consolidated Statement of Cash Flows by the amounts that have been classified as discontinued operations. See Note 5 for additional details.

Segment operating income (loss) is the measure of segment profit or loss reviewed by the chief operating decision maker. The sum of the segments' operating income (loss) equals the total consolidated operating income as reported on our Consolidated Statements of Earnings and Comprehensive Income. The following reconciles our total consolidated operating income to earnings from continuing operations before income taxes. These items are only measured and managed on a consolidated basis:

	2018	2017	2016
Segment operating income	$249.4	$243.8	$195.9
Interest expense	39.2	35.4	49.5
Other non-operating (income) expense, net	(32.5)	(13.7)	(4.2)
Earnings from continuing operations before income taxes	$242.7	$222.1	$150.6

Accounting policies of the segments are the same as those described in the summary of significant accounting policies.

The sales in the table below are allocated to geographic areas based on the location of our selling entities.

	2018	2017	2016
Geographic Areas			
Net trade sales			
Mineral Fiber:			

United States	$739.2	$699.8	$680.8
Canada	62.4	56.6	55.8
Total Mineral Fiber	801.6	756.4	736.6
Architectural Specialties:			
United States	157.5	129.5	95.1
Canada	16.2	7.7	5.6
Total Architectural Specialties	173.7	137.2	100.7
Total net trade sales	$975.3	$893.6	$837.3

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

	2018	2017
Property, plant and equipment, net at December 31,		
Mineral Fiber:		
United States	$487.5	$488.7
Total Mineral Fiber	487.5	488.7
Architectural Specialties:		
United States	$5.9	$3.0
Canada	4.5	4.5
Total Architectural Specialties	10.4	7.5
Unallocated Corporate [(1)]	3.1	3.7
Total property, plant and equipment, net	$501.0	$499.9

[(1)] Includes property, plant and equipment located in China that were formerly reported in our Pacific Rim segment and will not be included in the sale to Knauf.

Impairment testing of our tangible assets occurs whenever events or changes in circumstances indicate that the carrying amount of the asset group may not be recoverable.

In connection with the closing of our St. Helens, Oregon Mineral Fiber manufacturing facility we recorded $14.1 million in 2018 in cost of goods sold related to accelerated depreciation of property, plant and equipment. In 2017, we recorded $4.0 million in cost of goods sold related to accelerated depreciation of property, plant and equipment within our Mineral Fiber segment.

In September 2017, we made the decision to permanently close a previously idled plant in China. As a result, during 2017 we recorded $5.6 million in costs of goods sold for accelerated depreciation of machinery and equipment.

NOTE 4. REVENUE

Disaggregation of Revenues

Our Mineral Fiber and Architectural Specialties operating segments both manufacture and sell ceiling systems (primarily mineral fiber, fiberglass wool and metal) throughout the Americas. We disaggregate revenue based on our product based segments and major customer grouping as these categories represent the most appropriate depiction of how the nature, amount, and timing of revenues and cash flows are affected by economic factors. Net sales by major customer group are as follows:

Distributors – represents net sales to building materials distributors, who re-sell our products to contractors, subcontractors' alliances, large architect and design firms, and major facility owners. Geographically, this category includes sales throughout the U.S., Canada, and Latin America.

Home centers – represents net sales to home centers such as Lowe's Companies, Inc. and The Home Depot, Inc.

Direct customers – represents net sales sold directly to contractors, subcontractors' alliances, large architect and design firms, and major facility owners. Only sales to U.S. customers are reported within this customer group.

Retailers and other – represents net sales to independent retailers and certain national account customers, including wholesalers who re-sell our products to dealers who service builders, contractors and consumers. Geographically, this category includes sales throughout the U.S., Canada, and Latin America.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The following tables provide net sales by major customer group within the Mineral Fiber and Architectural Specialties segments for the years ended December 31, 2018, 2017 and 2016:

Mineral Fiber	2018	2017	2016
Distributors	$601.4	$563.3	$549.0
Home centers	84.0	82.2	78.7
Direct customers	60.3	62.1	61.9
Retailers and other	55.9	48.8	47.0
Total	$801.6	$756.4	$736.6

Architectural Specialties	2018	2017	2016
Distributors	$129.8	$111.5	$73.4
Direct customers	36.7	22.3	23.9
Retailers and other	7.2	3.4	3.4
Total	$173.7	$137.2	$100.7

NOTE 5. ACQUISITIONS AND DISCONTINUED OPERATIONS

ACQUISITION OF STEEL CEILINGS

On August 16, 2018, we acquired the business and assets of Steel Ceilings. The $12.3 million purchase price was allocated to the assets acquired and the liabilities assumed based on their estimated fair values, with the remaining amount recorded as goodwill. In October 2018, we sold certain assets related to an acquired product line to WAVE for $2.0 million. The total fair value of tangible assets acquired, less liabilities assumed, was $4.4 million. The total fair value of identifiable intangible assets acquired was mostly comprised of amortizable customer relationships of $1.4 million and tradenames of $1.3 million, resulting in $3.2 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

ACQUISTION OF PLASTERFORM

On May 31, 2018, we acquired the business and assets of Plasterform. The $11.9 million purchase price was allocated to the assets acquired and the liabilities assumed based on their estimated fair values, with the remaining amount recorded as goodwill. The total fair value of tangible assets acquired, less liabilities assumed, was $2.2 million. The total fair value of identifiable intangible assets acquired, comprised of amortizable customer relationships, was $4.8 million, resulting in $4.9 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

ACQUISITION OF TECTUM

On January 13, 2017, in connection with the acquisition of Tectum, the $31.2 million purchase price was allocated to the tangible and intangible assets acquired and the liabilities assumed based on their estimated fair values, with the remaining unallocated amount recorded as goodwill. The total fair value of tangible assets acquired, less liabilities assumed, in connection with the Tectum acquisition was $4.4 million. The total fair value of intangible assets acquired, comprised of amortizable customer relationships and non-amortizing brand names, was $16.0 million, resulting in $10.8 million of goodwill. All of the acquired goodwill is deductible for tax purposes.

EMEA AND PACIFIC RIM BUSINESSES

On November 17, 2017, we agreed to sell certain subsidiaries comprising our businesses in EMEA and the Pacific Rim to Knauf. Pursuant to the Purchase Agreement, prior to the closing, we and Knauf will enter into (i) an agreement relating to the mutual supply of certain products after the closing, (ii) an agreement relating to the use of certain intellectual property by Knauf after the closing,

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

including the Armstrong trade name and (iii) an agreement relating to certain transition services to be provided by AWI to Knauf after closing for a period of up to one year. WAVE and Knauf will also enter into similar agreements for such purposes.

Each quarter we compare the anticipated sales proceeds from Knauf to the carrying value of EMEA and Pacific Rim net assets. We record an estimated loss if the carrying value exceeds the anticipated sales proceeds. Net gains can only be recorded to the extent of previous estimated losses. In 2017 we recorded an estimated loss of $74.0 million, which included $51.4 million of AOCI adjustments. In 2018, we recorded an estimated loss of $19.3 million, which included $25.5 million of unfavorable AOCI adjustments. These AOCI adjustments related to accumulated foreign currency translation amounts that will be subsequently reclassified to earnings from discontinued operations upon sale of our EMEA and Pacific Rim businesses.

See Note 1 for further discussion of the divestiture status.

FLOORING BUSINESSES

Separation and Distribution of AFI

On April 1, 2016, we completed our separation of Armstrong Flooring, Inc. (“AFI”) by allocating the assets and liabilities related primarily to our Resilient and Wood Flooring segments to AFI and then distributing the common stock of AFI to our shareholders at a ratio of one share of AFI common stock for every two shares of AWI common stock. Separation costs for 2016 were $34.5 million. Separation costs primarily related to outside professional services and employee compensation and retention and severance accruals which were recorded within the Unallocated Corporate segment in conjunction with this initiative.

On April 1, 2016, in connection with the separation and distribution of AFI, we entered into several agreements with AFI that, together with a plan of division, provide for the separation and allocation between AWI and AFI of the flooring assets, employees, liabilities and obligations of AWI and its subsidiaries attributable to periods prior to, at and after AFI’s separation from AWI, and govern the relationship between AWI and AFI subsequent to the completion of the separation and distribution. These agreements include a Transition Services Agreement, a Tax Matters Agreement, an Employee Matters Agreement, a Trademark License Agreement, a Transition Trademark License Agreement and a Campus Lease Agreement. Under the Transition Services Agreement, AWI and AFI provided various services to each other during a transition period that expired on December 31, 2017.

The Tax Matters Agreement generally governs AWI’s and AFI’s respective rights, responsibilities and obligations after the separation and distribution with respect to tax matters. Upon distribution, AWI received an opinion from its tax counsel that the separation and distribution qualified as a tax-free transaction for AWI and its shareholders.

The Employee Matters Agreement governed certain compensation and employee benefit obligations with respect to the current and former employees and non-employee directors of AWI and AFI. Pursuant to this agreement and in connection with the distribution, AWI transferred assets and liabilities from the AWI defined benefit pension and

postretirement plans to AFI that relate to active AFI employees and certain former AFI employees to mirror plans established by AFI. See Note 16 for additional details.

Pursuant to the Trademark License Agreement, AWI provided AFI with a perpetual, royalty-free license to utilize the "Armstrong" trade name and logo. Pursuant to the Transition Trademark License Agreement, AFI provided us with a five-year royalty-free license to utilize the "Inspiring Great Spaces" tagline, logo and related color scheme.

Under the Campus Lease Agreement, certain portions of the AWI headquarters are being leased to AFI to use as its corporate headquarters for an initial term of five years, subject to certain renewal rights.

European Resilient Flooring

On December 4, 2014, our Board of Directors approved the cessation of funding to our former DLW subsidiary, which was our former European flooring business. As a result, DLW management filed for insolvency in Germany on December 11, 2014. The German insolvency court subsequently appointed an administrator (the "Administrator") to oversee DLW operations.

As of December 4, 2014, DLW had a net liability of $12.9 million, representing assets of $151.9 million and liabilities of $164.8 million, which were removed from our balance sheet. This net liability was recognized as a contingent liability on our consolidated balance sheet pending the closure and results of the insolvency proceeding. In April 2017, we entered into a settlement agreement and mutual release with the Administrator on behalf of the DLW estate to settle all claims of the Administrator related to the insolvency for a cash payment of $11.8 million.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Summarized Financial Information of Discontinued Operations

The following tables detail the businesses and line items that comprise income from discontinued operations on the Consolidated Statements of Earnings and Comprehensive Income.

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2018:			
Net sales	$ 446.1	$ -	$446.1
Cost of goods sold	341.4	-	341.4
Gross profit	104.7	-	104.7
Selling, general and administrative expenses	85.8		85.8
Operating income	18.9	-	18.9
Interest expense	1.4	-	1.4
Other non-operating (income), net	(0.3)	-	(0.3)
Earnings from discontinued operations before income tax	17.8	-	17.8
Income tax expense	8.2		8.2
Gain from discontinued operations	$ 9.6	$ -	$9.6
(Loss) on expected disposal of discontinued businesses before income tax [1]	$ (19.3)	$ -	$(19.3)
Income tax (benefit)	-	(6.0)	(6.0)
Net (loss) gain on disposal of discontinued businesses	$ (19.3)	$ 6.0	$(13.3)
Net (loss) gain from discontinued operations	$ (9.7)	$ 6.0	$(3.7)

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2017:			
Net sales	$ 436.2	$ -	$436.2
Cost of goods sold	350.8	-	350.8
Gross profit	85.4	-	85.4
Selling, general and administrative expenses	78.3	-	78.3
Operating income	7.1	-	7.1
Interest expense	1.2	-	1.2

Other non-operating (income), net	(1.9)	-	(1.9)
Earnings from discontinued operations before income tax	7.8	-	7.8
Income tax expense	3.6	-	3.6
Gain from discontinued operations	$ 4.2	$ -	$4.2
(Loss) on expected disposal of discontinued businesses before income tax [1]	$ (74.0)	$ (0.1)	$(74.1)
Income tax (benefit)	-	(4.1)	(4.1)
Net (loss) gain on disposal of discontinued businesses	$ (74.0)	$ 4.0	$(70.0)
Net (loss) gain from discontinued operations	$ (69.8)	$ 4.0	$(65.8)

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

(1) Loss on disposal of EMEA and Pacific Rim businesses for the years ended December 31, 2018 and 2017 represents the estimated write-down of EMEA and Pacific Rim assets based on our expected sales proceeds to be received upon closure of the transaction.

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2016:			
Net sales	$ 397.2	$ 284.4	$681.6
Cost of goods sold	331.5	237.5	569.0
Gross profit	65.7	46.9	112.6
Selling, general and administrative expenses	69.7	50.5	120.2
Operating (loss)	(4.0)	(3.6)	(7.6)
Interest expense	0.3	-	0.3
Other non-operating expense, net	1.9	0.9	2.8
(Loss) from discontinued operations before income tax	(6.2)	(4.5)	(10.7)
Income tax (benefit) expense	(0.9)	0.1	(0.8)
(Loss) from discontinued operations	$ (5.3)	$ (4.6)	$(9.9)
Gain on disposal of discontinued businesses before income tax	$ -	$ 0.1	$0.1
Income tax (benefit)	-	(15.2)	(15.2)
Net gain on disposal of discontinued businesses	$ -	$ 15.3	$15.3
Net (loss) gain from discontinued operations	$ (5.3)	$ 10.7	$5.4

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The following is a summary of the carrying amount of the major classes of assets and liabilities classified as assets and liabilities of discontinued operations as of December 31, 2018 and 2017 related to our EMEA and Pacific Rim businesses.

	December 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$ 10.0	$ -
Accounts and notes receivable, net	56.2	61.4
Inventories, net	59.8	59.2
Income tax receivable	1.8	3.1
Other current assets	8.2	12.9
Total current assets discontinued operations	136.0	136.6
Property, plant, and equipment, less accumulated depreciation and amortization [1] [2]	103.8	131.3
Prepaid pension costs [1]	28.9	26.1
Goodwill and intangible assets, net [1]	6.8	7.2
Deferred income taxes [1]	3.0	4.0
Other non-current assets [1]	1.0	0.9
Total non-current assets of discontinued operations [1]	143.5	169.5
Total assets of discontinued operations [1]	$ 279.5	$ 306.1
Liabilities		
Current liabilities:		
Accounts payable and accrued expenses	$ 67.1	$ 78.6
Income tax payable	1.1	1.3
Total current liabilities	68.2	79.9
Pension benefit liabilities [3]	33.8	34.7
Other long-term liabilities [3]	1.8	1.8
Deferred income taxes [3]	6.5	12.1
Total non-current liabilities of discontinued operations [3]	42.1	48.6
Total liabilities of discontinued operations [3]	$ 110.3	$ 128.5

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

(1) Presented as Current assets of discontinued operations on the Consolidated Balance Sheets as of December 31, 2018 and 2017.
(2) Includes estimated losses of $19.3 million recorded in 2018 and $74.0 million recorded during the fourth quarter of 2017.
(3) Presented as Current liabilities of discontinued operations on the Consolidated Balance Sheets as of December 31, 2018 and 2017.

The following is a summary of total depreciation and amortization, estimated losses and capital expenditures presented as discontinued operations and included as components of operating and investing cash flows on our Consolidated Statements of Cash Flows:

	EMEA and Pacific Rim Businesses	Flooring Businesses	Total
2018:			
Depreciation and amortization	$ -	$ -	$-
Estimated loss on sale to Knauf (1)	19.3	-	19.3
Purchases of property, plant and equipment	(7.3)	-	(7.3)
2017:			
Depreciation and amortization	$ 22.2	$ -	$22.2
Estimated loss on sale to Knauf (1)	74.0	-	$74.0
Purchases of property, plant and equipment	(12.0)	-	(12.0)
2016:			
Depreciation and amortization	$ 23.0	$ 11.4	$34.4
Purchases of property, plant and equipment	(25.8)	(12.1)	(37.9)

(1) Loss on sale of EMEA and Pacific Rim businesses for the years ended December 31, 2018 and 2017 represents the estimated write-down of EMEA and Pacific Rim assets based on our expected sales proceeds to be received upon closure of the transaction.

NOTE 6. ACCOUNTS AND NOTES RECEIVABLE

	December 31, 2018	December 31, 2017
Customer receivables	$ 70.4	$ 62.8
Miscellaneous receivables	11.5	29.9
Less allowance for warranties, discounts, and losses	(2.0)	(1.9)
Accounts and notes receivable, net	$ 79.9	$ 90.8

We sell our products to select, pre-approved customers whose businesses are affected by changes in economic and market conditions. We consider these factors and the financial condition of each customer when establishing our allowance for losses from doubtful accounts.

Miscellaneous receivables as of December 31, 2018 and December 31, 2017 included $6.5 million and $28.7 million of insurance recoveries, primarily related to environmental matters. Insurance recoveries outstanding as of December 31, 2017 were collected during the first quarter of 2018. Insurance recoveries outstanding as of December 31, 2018 are expected to be received in the first quarter of 2019. See Note 27 for additional information.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 7. INVENTORIES

	December 31, 2018	December 31, 2017
Finished goods	$ 38.8	$ 33.2
Goods in process	4.4	2.7
Raw materials and supplies	27.8	26.1
Less LIFO reserves	(9.8)	(8.2)
Total inventories, net	$ 61.2	$ 53.8

Approximately 76% and 84% of our total inventory in 2018 and 2017, respectively, were valued on a LIFO (last-in, first-out) basis.

The distinction between the use of different methods of inventory valuation is primarily based on geographical locations and/or legal entities. The following table summarizes the amount of inventory that is not accounted for under the LIFO method.

	December 31, 2018	December 31, 2017
U.S. locations	$ 11.8	$ 6.5
Canada locations	2.9	2.2
Total	$ 14.7	$ 8.7

Our Canadian locations use the First in first out (“FIFO”) method of inventory valuation (or other methods which closely approximate the FIFO method) primarily because the Last in first out (“LIFO”) method is not permitted for local tax and/or statutory reporting purposes. In these situations, a conversion to LIFO would be highly complex and involve excessive cost and effort to achieve under local tax and/or statutory reporting requirements. U.S. locations that use the FIFO method of inventory valuation primarily represent certain finished goods sourced from third party suppliers and recent acquisitions.

NOTE 8. OTHER CURRENT ASSETS

	December 31, 2018	December 31, 2017

Prepaid expenses	$ 4.1	$ 7.1
Other	0.7	0.8
Total other current assets	$ 4.8	$ 7.9

NOTE 9. PROPERTY, PLANT AND EQUIPMENT

	December 31, 2018	December 31, 2017
Land	$ 32.4	$ 32.5
Buildings	232.5	224.6
Machinery and equipment	575.4	537.1
Computer software	23.8	20.9
Construction in progress	49.8	46.2
Less accumulated depreciation and amortization	(412.9)	(361.4)
Net property, plant and equipment	$ 501.0	$ 499.9

See Note 2 to the Consolidated Financial Statements for discussion of policies related to property and depreciation and asset retirement obligations.

NOTE 10. EQUITY INVESTMENTS

Investment in joint venture as of December 31, 2018 reflected the equity interest in our 50% investment in our WAVE joint venture. The WAVE joint venture is reflected within the Mineral Fiber segment in our consolidated financial statements using the equity method of accounting.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

We use the equity in earnings method to determine the appropriate classification of distributions from WAVE within our cash flow statement. During 2018, 2017 and 2016, WAVE distributed amounts in excess of our capital contributions and proportionate share of retained earnings. Accordingly, the distributions in these years were reflected as a return of investment in cash flows from investing activity in our Consolidated Statement of Cash Flows. Distributions from WAVE in 2018, 2017 and 2016 were $141.7 million, $69.1 million, and $86.9 million, respectively.

In certain markets, we sell WAVE products directly to customers pursuant to specific terms of sale. In those circumstances, we record the sales and associated costs within our consolidated financial statements. The total sales associated with these transactions were $32.8 million, $31.2 million and $29.8 million for the years ended 2018, 2017 and 2016, respectively.

Our recorded investment in WAVE was higher than our 50% share of the carrying values reported in WAVE's consolidated financial statements by $155.5 million as of December 31, 2018 and $161.0 million as of December 31, 2017. These differences are due to our adoption of fresh-start reporting upon emergence from Chapter 11 in October 2006, while WAVE's consolidated financial statements do not reflect fresh-start reporting. The differences are composed of the following fair value adjustments to assets:

	December 31, 2018	December 31, 2017
Property, plant and equipment	$ 0.4	$ 0.4
Other intangibles	124.7	130.2
Goodwill	30.4	30.4
Total	$ 155.5	$ 161.0

Other intangibles include customer relationships, trademarks and developed technology. Customer relationships are amortized over 20 years and developed technology is amortized over 15 years. Trademarks have an indefinite life.

See Exhibit 99.1 for WAVE's consolidated financial statements. On November 17, 2017, in connection with the Purchase Agreement we entered into with Knauf, the corresponding European and Pacific Rim businesses of WAVE will also be subject to sale to Knauf. Accordingly, WAVE's European and Pacific Rim historical financial statement results have been reflected in WAVE's consolidated financial statements as a discontinued operation for all periods presented. Our equity earnings in joint venture reflected as a component of earnings from continuing operations included $1.5 million, $1.7 million and $2.8 million of equity earnings from WAVE's European and Pacific Rim businesses in 2018, 2017 and 2016, respectively. Condensed financial data for WAVE is summarized below.

	December 31, 2018	December 31, 2017
Current assets	$ 112.9	$ 96.8
Current assets of discontinued operations	33.8	36.4

Noncurrent assets	34.9	32.6
Current liabilities	113.6	18.1
Current liabilities of discontinued operations	6.9	8.1
Other noncurrent liabilities	293.6	246.6

	2018	2017	2016
Net sales	$375.0	$344.5	$330.7
Gross profit	205.8	192.7	192.4
Net earnings	156.6	144.3	151.9

Management evaluated its investment in WAVE for impairment as a result of WAVE's anticipated sale of its European and Pacific Rim businesses. Based on that evaluation, management concluded that as of December 31, 2018, its investment in WAVE was not impaired.

See discussion in Note 26 to the Consolidated Financial Statements for additional information on this related party.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 11. GOODWILL AND INTANGIBLE ASSETS

We conduct our annual impairment testing of goodwill and non-amortizing intangible assets during the fourth quarter. The 2018, 2017 and 2016 reviews concluded that no impairment charges were necessary. See Note 2 to the Consolidated Financial Statements for a discussion of our accounting policy for intangible assets.

The following table details amounts related to our intangible assets as of December 31, 2018 and 2017:

		December 31, 2018		December 31, 2017	
	Original Estimated Useful Life	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortizing intangible assets					
Customer relationships	7-20 years	$181.4	$ 103.0	$176.3	$ 93.9
Developed technology	15 years	84.3	66.5	83.7	60.9
Trademarks and brand names	10 years	1.1	0.2		
Other	Various	5.6	1.2	5.9	1.1
Total		$272.4	$ 170.9	$265.9	$ 155.9
Goodwill and non-amortizing intangible assets					
Trademarks and brand names	Indefinite	321.3		319.8	
Goodwill	Indefinite	19.2		11.3	
Total goodwill and intangible assets		$612.9		$597.0	

	2018	2017	2016
Amortization expense	$15.1	$14.6	$13.9

The expected annual amortization expense for the years 2019 through 2023 are as follows:

2019	$15.6
2020	15.6
2021	14.2
2022	10.2
2023	10.2

NOTE 12. OTHER NON-CURRENT ASSETS

	December 31, 2018	December 31, 2017
Cash surrender value of company-owned life insurance policies	$ 54.3	$ 53.9
Fair value of derivative assets	9.6	8.7
Other	4.6	1.7
Total other non-current assets	$ 68.5	$ 64.3

NOTE 13. ACCOUNTS PAYABLE AND ACCRUED EXPENSES

	December 31, 2018	December 31, 2017
Payables, trade and other	$ 82.2	$ 67.6
Employment costs	18.6	18.0
Current portion of pension and postretirement benefit liabilities	10.9	11.6
Advance receipt of Knauf proceeds	237.6	-
Payable to WAVE for advance receipt of Knauf proceeds	22.4	-
Other	11.6	11.2
Total accounts payable and accrued expenses	$ 383.3	$ 108.4

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 14. INCOME TAXES

On December 22, 2017, the U.S. federal government enacted the 2017 Tax Act, resulting in significant changes from existing U.S. tax laws that impact us, including, but not limited to, reducing the U.S. federal corporate income tax rate from 35% to 21%, allowing immediate 100% deduction for the cost of qualified property, eliminating the domestic production activities deduction, and imposing a one-time transition tax in 2017 on the cumulative earnings and profits of certain foreign subsidiaries that were previously not repatriated and therefore not taxed for U.S. income tax purposes. Our federal income tax expense is based on the new 21% rate for periods beginning in 2018.

In December 2017, the Securities and Exchange Commission ("SEC") issued Staff Accounting Bulletin No. 118 ("SAB 118"), which addresses situations where the accounting is incomplete for the income tax effects of the 2017 Tax Act. SAB 118 directs registrants to consider the impact of the Act as "provisional" when they do not have the necessary information available, prepared or analyzed (including computations) to finalize the accounting for the change in tax law. Registrants are provided a measurement period of up to one year to obtain, prepare, and analyze information necessary to finalize the accounting for provisional amounts or amounts that cannot be estimated as of December 31, 2017. In the fourth quarter of 2017 we recorded a net provisional $82.5 million income tax benefit, primarily related to the revaluation of deferred tax assets and liabilities at the reduced 21% tax rate. The 2017 adjustments to deferred tax assets and liabilities, the liability related to the one-time 2017 transition tax, changes in our valuation allowance, the realizability of foreign tax credits and the immediate deduction of 100% of the costs of qualifying property were provisional amounts estimated based on information available as of December 31, 2017. These amounts were subject to change as we obtained information necessary to complete the calculations. Additional information that affected our provisional amounts included further clarification and guidance on how the Internal Revenue Service implemented tax reform, including guidance with respect to the one-time transition tax, further clarification and guidance on the impact of the 2017 Act from state taxing authorities and completion of our 2017 tax return filings. We applied the guidance in SAB 118 when accounting for the enactment-date effects of the 2017 Tax Act in 2017 and throughout 2018. At December 31, 2018 we have now completed our accounting for the enactment-date income tax effects of the 2017 Tax Act. We increased our December 31, 2017 estimated tax benefit of $82.5 million to $83.7 million in 2018, primarily related to the mandatory repatriation of earnings feature of federal tax reform.

The tax effects of principal temporary differences between the carrying amounts of assets and liabilities and their tax basis are summarized below. Management believes it is more likely than not that the results of future operations will generate sufficient taxable income in the appropriate jurisdiction to realize deferred tax assets, net of valuation allowances. In arriving at this conclusion, we considered the profit before tax generated for the years 2016 through 2018, future reversals of existing taxable temporary differences, and projections of future profit before tax.

We reduce the carrying amounts of deferred tax assets by a valuation allowance if, based on the available evidence, it is more likely than not that such assets will not be realized. The need to establish valuation allowances for deferred

tax assets is assessed quarterly. In assessing the requirement for, and amount of, a valuation allowance in accordance with the more likely than not standard for all periods, we give appropriate consideration to all positive and negative evidence related to the realization of the deferred tax assets. This assessment considers, among other matters, the nature, frequency and severity of current and cumulative losses, forecasts of future profitability, the duration of statutory carryforward periods, and our experience with operating loss and tax credit carryforward expirations. A history of cumulative losses is a significant piece of negative evidence used in our assessment. If a history of cumulative losses is incurred for a tax jurisdiction, forecasts of future profitability are not used as positive evidence related to the realization of the deferred tax assets in the assessment.

As of December 31, 2018 and 2017, we had $954.5 million and $664.6 million, respectively, of gross state net operating loss ("NOL") carryforwards expiring between 2019 and 2036. The gross state NOL carryforward and related gross state valuation allowance, prior to being tax effected, were each grossed up by $335.0 million in 2018, there was no change to the net deferred state income tax asset, to reflect a change in Pennsylvania's net operating loss regulations. As of December 31, 2018, we also had foreign tax credits ("FTC") carryforwards of $19.1 million that expire between 2019 and 2028. U.S. FTC carryforwards as of December 31, 2017 were $15.7 million.

As of December 31, 2018 and 2017, we had valuation allowances of $79.6 million and $47.4 million, respectively. As of December 31, 2018, our valuation allowance consisted of $19.1 million for federal deferred tax assets related to FTC carryforwards, $13.2 million for the outside basis difference between book and tax of our EMEA and Pacific Rim businesses and $47.3 million for state

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

deferred tax assets, primarily operating loss carryforwards. Our valuation allowance increased in comparison to December 31, 2017 for both the FTC valuation allowance and the outside basis difference due to the completion of the analysis of the 2017 Tax Act under SAB 118. The state operating loss carryforward also increased due to a state law change, but this was fully offset by a similar increase in the state valuation allowance.

We estimate we will need to generate future federal taxable foreign source income of $91.0 million to fully realize FTC carryforwards before they expire in 2028. We estimate we will need to generate future taxable income of approximately $537.5 million for state income tax purposes during the respective realization periods (ranging from 2019 to 2036) in order to fully realize the net deferred income tax assets discussed above.

Our ability to utilize deferred tax assets may be impacted by certain future events, such as changes in tax legislation or insufficient future taxable income prior to expiration of certain deferred tax assets.

	December 31, 2018	December 31, 2017
Deferred income tax assets (liabilities)		
Net operating losses	$ 58.7	$ 35.6
Postretirement benefits	18.2	23.3
Pension benefit liabilities	14.3	16.7
Deferred compensation	11.8	12.1
Undistributed foreign earnings	32.5	17.7
Foreign tax credit carryforwards	19.1	15.7
State tax credit carryforwards	9.8	10.5
Other	17.1	12.6
Total deferred income tax assets	181.5	144.2
Valuation allowances	(79.6)	(47.4)
Net deferred income tax assets	101.9	96.8
Intangibles	(132.3)	(136.3)
Accumulated depreciation	(62.0)	(56.1)
Prepaid pension costs	(11.5)	(20.4)
Inventories	(5.5)	(4.4)
Other	(0.2)	(1.7)
Total deferred income tax liabilities	(211.5)	(218.9)
Net deferred income tax liabilities	$ (109.6)	$ (122.1)
Deferred income taxes have been classified in the Consolidated Balance Sheet as:		
Deferred income tax assets - noncurrent	$ 14.8	$ 19.6
Deferred income tax liabilities - noncurrent	(124.4)	(141.7)
Net deferred income tax liabilities	$ (109.6)	$ (122.1)

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

	2018	2017	2016
Details of taxes			
Earnings (loss) from continuing operations before income taxes:			
Domestic	$234.0	$224.1	$147.8
Foreign	8.7	(2.0)	2.8
Total	$242.7	$222.1	$150.6
Income tax expense (benefit):			
Current:			
Federal	$45.7	$26.2	$15.1
Foreign	2.1	1.4	5.0
State	8.0	4.7	(6.7)
Total current	55.8	32.3	13.4
Deferred:			
Federal	(3.7)	(36.6)	22.6
Foreign	-	(0.1)	(1.1)
State	1.0	5.9	16.4
Total deferred	(2.7)	(30.8)	37.9
Total income tax expense	$53.1	$1.5	$51.3

We reviewed our position with regards to foreign unremitted earnings and determined that unremitted earnings will not be permanently reinvested as a result of the anticipated sale of our EMEA and Pacific Rim businesses. Accordingly, in 2018, we have recorded foreign withholding taxes of $2.2 million, primarily within continuing operations, on approximately $208.0 million of net undistributed earnings of foreign subsidiaries. In 2017, we have recorded foreign withholding taxes of $7.6 million, primarily within continuing operations, on approximately $245.5 million of net undistributed earnings of foreign subsidiaries.

	2018	2017	2016
Reconciliation to U.S. statutory tax rate			
Continuing operations tax at statutory rate	$51.0	$77.7	$52.7
Increase in valuation allowances on deferred domestic income tax assets	10.0	9.1	0.8
State income tax expense, net of federal benefit	9.2	7.9	3.2
AFI separation costs	-	-	15.1
Domestic production activities	-	(5.8)	(1.9)

Federal statute closure	(9.6)	(2.3)	(15.2)
2017 Tax Act	(1.2)	(82.5)	-
Excess tax benefits on share-based compensation	(3.8)	-	-
Tax on foreign and foreign-source income	(4.4)	-	(3.4)
Other	1.9	(2.6)	-
Tax expense at effective rate	$53.1	$1.5	$51.3

We recognize the tax benefits of an uncertain tax position only if those benefits are more likely than not to be sustained based on existing tax law. Additionally, we establish a reserve for tax positions that are more likely than not to be sustained based on existing tax law, but uncertain in the ultimate benefit to be sustained upon examination by the relevant taxing authorities. Unrecognized tax benefits are subsequently recognized at the time the more likely than not recognition threshold is met, the tax matter is effectively settled or the statute of limitations for the relevant taxing authority to examine and challenge the tax position has expired, whichever is earlier.

We have $42.6 million of Unrecognized Tax Benefits (“UTB”) as of December 31, 2018, $23.5 million ($22.1 million, net of federal benefit) of this amount, if recognized in future periods, would impact the reported effective tax rate.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

It is reasonably possible that certain UTB's may increase or decrease within the next twelve months due to tax examination changes, settlement activities, expirations of statute of limitations, or the impact on recognition and measurement considerations related to the results of published tax cases or other similar activities. Over the next twelve months we estimate that UTB's may decrease by $0.7 million related to state statutes expiring and increase by $2.8 million due to uncertain tax positions expected to be taken on domestic tax returns.

We account for all interest and penalties on uncertain income tax positions as income tax expense. We reported $2.6 million of interest and penalty exposure as noncurrent income tax payable in the Consolidated Balance Sheet as of December 31, 2018.

We had the following activity for UTB's for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
Unrecognized tax benefits balance at January 1,	$53.4	$86.9	$150.6
Gross change for current year positions	3.6	(2.2)	2.3
Increases for prior period positions	1.1	2.9	0.2
Decrease for prior period positions	(2.0)	(0.1)	(12.8)
Decrease due to settlements and payments	-	-	-
Decrease due to statute expirations	(13.5)	(34.1)	(53.4)
Unrecognized tax benefits balance at December 31,	$42.6	$53.4	$86.9

We file income tax returns in the U.S., various states and international jurisdictions. In the normal course of business, we are subject to examination by taxing authorities in Canada and the United States. Generally, we have open tax years subject to tax audit on average of between three years and six years. The statute of limitations is no longer open for U.S. federal returns before 2015. With few exceptions, the statute of limitations is no longer open for state or non-U.S. income tax examinations for the years before 2013. We have not significantly extended any open statutes of limitation for any major jurisdiction and have reviewed and accrued for, where necessary, tax liabilities for open periods.

	2018	2017	2016
Other taxes			
Payroll taxes	$15.6	$14.2	$13.9
Property, franchise and capital stock taxes	3.7	4.0	4.0

NOTE 15. DEBT

	December 31, 2018	Weighted Average Interest Rate for 2018		December 31, 2017	Weighted Average Interest Rate for 2017	
Term loan A due 2021	$ 547.5	4.00	%	$ 577.5	3.24	%
Term loan B due 2023	243.1	5.39	%	245.6	4.25	%
Tax exempt bonds due 2041	35.0	1.47	%	35.0	0.79	%
Principal debt outstanding	825.6	4.33	%	858.1	3.43	%
Unamortized debt financing costs	(5.8)			(7.9)		
Long-term debt	819.8	4.33	%	850.2	3.43	%
Less current portion and short-term debt	55.0	4.07	%	32.5	3.32	%
Total long-term debt, less current portion	$ 764.8	4.35	%	$ 817.7	3.43	%

The weighted average interest rates above are inclusive of our interest rate swaps. See Note 18 to the Consolidated Financial Statements for further information.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

We have a $1,050.0 million senior credit facility which is composed of a $200.0 million revolving credit facility (with a $150.0 million sublimit for letters of credit), a $600.0 million Term Loan A and a $250.0 million Term Loan B. The revolving credit facility and Term Loan A are currently priced at 2.00% over LIBOR and the Term Loan B portion is priced at 2.75% over LIBOR with a 0.75% floor. The senior credit facility also has a $25.0 million letter of credit facility, also known as our bi-lateral facility. The revolving credit facility and Term Loan A mature in March 2021 and Term Loan B matures in November 2023. The facility is secured by U.S. personal property, the capital stock of material U.S. subsidiaries and a pledge of 65% of the stock of our material first tier foreign subsidiaries.

On November 28, 2018 we entered into two new swap positions. Under the $200 million notional 2018 swap we pay a fixed rate over the hedged amount and receive 1-month LIBOR. This facility will expire November 30, 2023 and includes a 0% floor. We also entered into a $100 million forward starting swap beginning March 31, 2021 and expiring on March 31, 2025. Under this $100 million notional 2021 swap we will pay a fixed rate monthly and receive 1-month LIBOR. This also includes a 0% floor.

Under our senior credit facility we are subject to year-end leverage tests that may trigger mandatory prepayments. If our ratio of consolidated funded indebtedness, minus AWI and domestic subsidiary unrestricted cash and cash equivalents up to $100.0 million, to consolidated earnings before interest, taxes, depreciation and amortization (“EBITDA”) (“Consolidated Net Leverage Ratio”) is greater than 3.5 to 1.0, the prepayment amount would be 50% of fiscal year Consolidated Excess Cash Flow. These annual payments would be made in the first quarter of the following year. No payment will be required in 2019 under the senior credit facility.

As of December 31, 2018, we were in compliance with all covenants of the amended senior credit facility. Our debt agreements include other restrictions, including restrictions pertaining to the acquisition of additional debt, the redemption, repurchase or retirement of our capital stock, payment of dividends, and certain financial transactions as it relates to specified assets. We currently believe that default under these covenants is unlikely. Fully borrowing under our revolving credit facility would not violate these covenants. In anticipation of net sales proceeds to be received from Knauf in connection with the sale of our EMEA and Pacific Rim businesses, we received a consent from Bank of America, N.A., the administrative agent and collateral agent of our amended senior credit facility, that among other conditions, waives any mandatory prepayment provisions under our credit facility related to this transaction.

As of December 31, 2018, our outstanding long-term debt included a $35.0 million variable rate, tax-exempt industrial development bond that financed the construction of a plant in prior years. This bond has a scheduled final maturity of 2041 and is remarketed by an agent on a regular basis at a market-clearing interest rate. Any portion of the bond that is not successfully remarketed by the agent is required to be repurchased by AWI. This bond is backed by letters of credit which will be drawn if a portion of the bond is not successfully remarketed. We have not had to repurchase the bond.

As of December 31, 2018, we had a $40.0 million Accounts Receivable Securitization Facility with the Bank of Nova Scotia (the “funding entity”) that matures in March 2019. Under our Accounts Receivable Securitization Facility we sell accounts receivables to Armstrong Receivables Company, LLC (“ARC”), a Delaware entity that is consolidated in these financial statements. ARC is a 100% wholly owned single member LLC special purpose entity created specifically

for this transaction; therefore, any receivables sold to ARC are not available to the general creditors of AWI. ARC then sells an undivided interest in the purchased accounts receivables to the funding entity. This undivided interest acts as collateral for drawings on the facility. Any borrowings under this facility are obligations of ARC and not AWI. ARC contracts with and pays a servicing fee to AWI to manage, collect and service the purchased accounts receivables. All new receivables under the program generated by the originators are continuously purchased by ARC with the proceeds from collections of receivables previously purchased. As of December 31, 2018, we had $6.0 million classified as restricted cash under this facility. In February 2019, the facility was amended to resize the purchase limit from $40.0 million to $36.2 million and to extend the maturity to March 2020.

None of our remaining outstanding debt as of December 31, 2018 was secured with buildings and other assets. The credit lines under our revolving credit facility are subject to immaterial annual commitment fees.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Scheduled payments of long-term debt:

2019	$55.0
2020	62.5
2021	437.5
2022	2.5
2023	233.1
2024 and later	35.0

We utilize lines of credit and other commercial commitments in order to ensure that adequate funds are available to meet operating requirements. Letters of credit are currently arranged through our revolving credit facility, our bi-lateral facility and our securitization facility. Letters of credit may be issued to third party suppliers, insurance and financial institutions and typically can only be drawn upon in the event of AWI's failure to pay its obligations to the beneficiary.

The following table presents details related to our letters of credit:

	As of December 31, 2018		
Financing Arrangement	Limit	Used	Available
Accounts receivable securitization facility	$30.2	$36.2	$ (6.0)
Bi-lateral facility	25.0	13.4	11.6
Revolving credit facility	150.0	-	150.0
Total	$205.2	$49.6	$ 155.6

The maximum limit for letters of credit availability under our accounts receivable securitization facility is subject to securitized accounts receivable balances and other collateral adjustments. As of December 31, 2018 and 2017, $6.0 million and $6.6 million of letters of credits issued under our accounts receivable securitization facility in excess of our maximum limit were classified as restricted cash and reported as a component of Cash and cash equivalents on our Consolidated Balance Sheets. This restriction will lapse upon replacement of collateral with accounts receivables and/or upon a change in the letter of credit limit as a result of higher securitized accounts receivable balances.

NOTE 16. PENSION AND OTHER BENEFIT PROGRAMS

DEFINED CONTRIBUTION BENEFIT PLANS

We sponsor several defined contribution plans, which cover substantially all U.S. and non-U.S. employees. Eligible employees may defer a portion of their pre-tax covered compensation on an annual basis. We match employee contributions up to pre-defined percentages. Employee contributions are 100% vested. Employer contributions are vested based on pre-defined requirements. Costs for worldwide defined contribution benefit plans were $6.3 million in 2018, $6.2 million in 2017 and $5.6 million in 2016.

DEFINED BENEFIT PENSION PLANS

Benefits from defined benefit pension plans are based primarily on an employee's compensation and years of service. We fund our pension plans when appropriate.

Our U.S. defined benefit pension plans include both the qualified, funded RIP and the Retirement Benefit Equity Plan, which is a nonqualified, unfunded plan designed to provide pension benefits in excess of the limits defined under Sections 415 and 401(a)(17) of the Internal Revenue Code.

Our RIP was amended to freeze accruals for salaried non-production employees, effective December 31, 2017. The impact of this amendment resulted in a reduction to our December 31, 2016 projected benefit obligation with a corresponding increase to unrecognized loss, resulting in no curtailment gain or loss. The impact of this amendment has been reflected in the net periodic pension credit for 2017.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

In 2017, certain RIP participants with deferred vested benefits were offered an opportunity to elect a lump sum distribution of the participant's entire accrued benefit. These distributions resulted in a partial plan settlement necessitating a plan remeasurement as of August 31, 2017. Settlement losses of $20.8 million were recorded as components of other non-operating (income) expense, net during 2017.

Effective December 31, 2017, AWI merged the Tectum, Inc. Pension Plan (the "Tectum Plan") with and into the RIP. Tectum sponsored the Tectum Plan for the benefit of its eligible employees, which are limited to certain union employees at Tectum's Newark, Ohio plant.

Our non-U.S. defined benefit pension plan represents an unfunded plan in Germany not to be acquired by Knauf in connection with the announced sale of our EMEA and Pacific Rim segments. This plan utilizes assumptions which are consistent with, but not identical to, those of the U.S. plans.

The following tables summarize the balance sheet impact of our defined benefit pension plans, as well as the related benefit obligations, assets, funded status and rate assumptions. We use a December 31 measurement date for all our defined benefit pension plans.

	U.S. Pension Plans		Non-U.S. Pension Plan	
	2018	2017	2018	2017
Change in benefit obligation:				
Benefit obligation as of beginning of period	$1,500.1	$1,522.4	$2.7	$2.5
Service cost	5.7	8.6	-	-
Interest cost	46.1	48.1	-	-
Partial settlement	-	(58.1)	-	-
Foreign currency translation adjustment	-	-	(0.1)	0.4
Actuarial loss (gain)	(90.0)	77.2	-	(0.1)
Benefits paid	(102.2)	(103.2)	(0.1)	(0.1)
Merger of Tectum Plan	-	5.1	-	-
Benefit obligation as of end of period	$1,359.7	$1,500.1	$2.5	$2.7

	U.S. Pension Plans		Non-U.S. Pension Plan	
	2018	2017	2018	2017
Change in plan assets:				
Fair value of plan assets as of beginning of period	$1,529.7	$1,512.9	$-	$-
Actual return on plan assets	(71.0)	170.8	-	-
Employer contribution	3.9	3.9	0.1	0.1

Partial settlement	-	(58.1)	-	-
Benefits paid	(102.2)	(103.2)	(0.1)	(0.1)
Merger of Tectum Plan	-	3.4	-	-
Fair value of plan assets as of end of period	$1,360.4	$1,529.7	$-	$-
Funded status of the plans	$0.7	$29.6	$(2.5)	$(2.7)

	U.S. Pension Plans		Non-U.S. Pension Plan	
	2018	2017	2018	2017
Weighted-average assumptions used to determine benefit obligations at end of period:				
Discount rate	4.30%	3.63%	1.70%	1.50%
Rate of compensation increase	3.05%	3.05%	-	-
Weighted-average assumptions used to determine net periodic benefit cost for the period:				
Discount rate	3.62%	4.12%	1.50%	1.40%
Expected return on plan assets	6.50%	6.50%	-	-
Rate of compensation increase	3.05%	3.10%	-	-

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Basis of Rate-of-Return Assumption

Long-term asset class return assumptions for the RIP are determined based on input from investment professionals on the expected performance of the asset classes over 10 to 30 years. The forecasts were averaged to come up with consensus passive return forecasts for each asset class. Incremental components were added for the expected return from active management and asset class rebalancing based on historical information obtained from investment consultants. These forecasted gross returns were reduced by estimated management fees and expenses, yielding a long-term return forecast of 6.50% and 6.50% for the years ended December 31, 2018 and 2017.

The accumulated benefit obligation for the U.S. defined benefit pension plans was $1,356.8 million and $1,496.4 million as of December 31, 2018 and 2017, respectively. The accumulated benefit obligation for the non-U.S. defined benefit pension plan was $2.5 million and $2.7 million as of December 31, 2018 and 2017, respectively.

	U.S. Pension Plans		Non-U.S. Pension Plan	
	2018	2017	2018	2017
Pension plans with benefit obligations in excess of assets				
Projected benefit obligation, December 31	$52.1	$58.5	$2.5	$2.7
Accumulated benefit obligation, December 31	52.1	58.5	2.5	2.7

The components of the pension (credit) cost are as follows:

	U.S. Pension Plans			Non-U.S. Pension Plan		
	2018	2017	2016	2018	2017	2016
Service cost of benefits earned during the period	$5.7	$8.6	$10.1	$2.2	$2.2	$2.2
Interest cost on projected benefit obligation	46.1	48.1	69.8	5.0	5.4	6.9
Expected return on plan assets	(95.9)	(98.7)	(110.6)	(6.4)	(6.8)	(7.8)
Amortization of prior service cost	-	1.5	1.6	-	-	-
Recognized net actuarial loss	20.0	17.5	48.3	0.6	1.3	1.2
Partial settlement	-	20.8	-	-	-	-
Net periodic pension (credit) cost	$(24.1)	$(2.2)	$19.2	$1.4	$2.1	$2.5
Less: Discontinued operations	-	-	2.2	1.4	2.0	2.4
Net periodic pension (credit) cost, continuing	$(24.1)	$(2.2)	$17.0	$-	$0.1	$0.1

operations

The change in amortization of net actuarial loss for the U.S. defined-benefit plans for 2017 in comparison to 2016 was due to a reduction in active plan participants due to the separation of AFI. During 2016, actuarial gains and losses were amortized into future earnings over the expected remaining service period of plan participants, which was approximately 8 years for our U.S. defined-benefit pension plans. For 2018 and 2017, actuarial gains and losses were amortized over the remaining life expectancy of plan participants, which was approximately 18 years for 2018 and 19 years for 2017 for our U.S. defined-benefit pension plans.

Investment Policies

U.S. Pension Plans

The RIP's primary investment objective is to maintain the funded status of the plan such that the likelihood that we will be required to make significant contributions to the plan is limited. This objective is expected to be achieved by (a) investing a substantial portion of the plan assets in high quality corporate bonds whose duration is at least equal to that of the plan's liabilities, (b) investing in publicly traded equities in order to increase the ratio of plan assets to liabilities over time, (c) limiting investment return volatility by diversifying among additional asset classes with differing expected rates of return and return correlations, and (d) using derivatives to either implement investment positions efficiently or to hedge risk but not to create investment leverage.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Each asset class utilized by the RIP has defined asset allocation targets and allowable ranges. The table below shows the asset allocation targets and the December 31, 2018 and 2017 positions for each asset class:

Asset Class	Target Weight at December 31, 2018	Position at December 31, 2018 [1]	Position at December 31, 2017 [1]
Long duration bonds	59.0%	62.0%	59.0%
Equities	27.0%	25.0%	28.0%
High yield bonds and real assets	9.0%	2.0%	3.0%
Real estate and private equity	4.0%	5.0%	4.0%
Other	1.0%	6.0%	6.0%

[1] Investments in collective trust funds as of December 31, 2018 and 2017 have been categorized within the asset classes above based on the underlying investments in those funds.

Pension plan assets are required to be reported and disclosed at fair value. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Three levels of inputs may be used to measure fair value:

Level 1 - Quoted prices in active markets for identical assets or liabilities.

Level 2 - Observable inputs other than quoted prices included in Level 1, such as quoted prices for similar assets and liabilities in active markets; quoted prices for identical or similar assets and liabilities in markets that are not active; or other inputs that are observable or can be corroborated by observable market data.

Level 3 - Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. This includes certain pricing models, discounted cash flow methodologies and similar techniques that use significant unobservable inputs.

The asset's fair value measurement level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. Valuation techniques used need to maximize the use of observable inputs and minimize the use of unobservable inputs.

The following table sets forth by level within the fair value hierarchy a summary of the RIP plan assets measured at fair value on a recurring basis:

	Value at December 31, 2018			
Description	Level 1	Level 2	Level 3	Total
Bonds	$-	$832.2	$-	$832.2
Collective trust fund	-	460.1	-	460.1
Other investments	-	-	2.6	2.6
Cash, other short-term investments and payables, net	(22.7)	24.2	-	1.5
Net assets measured at fair value	$(22.7)	$1,316.5	$2.6	$1,296.4
Investments measured at net asset value				64.0
Net assets				$1,360.4

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

	Value at December 31, 2017			
Description	Level 1	Level 2	Level 3	Total
Bonds	$-	$879.5	$-	$879.5
Collective trust fund	-	561.6	-	561.6
Other investments	-	-	2.7	2.7
Cash, other short-term investments and payables, net	1.7	20.7	-	22.4
Net assets measured at fair value	$1.7	$1,461.8	$2.7	$1,466.2
Investments measured at net asset value				63.5
Net assets				$1,529.7

RIP Level 3 assets remained relatively unchanged from December 31, 2017 to December 31, 2018, with the change in Level 3 assets during 2018 due primarily to fees, expenses and benefits paid.

The RIP has investments in alternative investment funds as of December 31, 2018 and December 31, 2017 which are reported at fair value. Certain investments that are measured at fair value using the net asset value ("NAV") per share (or its equivalent) practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in the tables above are intended to permit reconciliation of the fair value hierarchy to the total fair value of plan assets. We have concluded that the NAV reported by the underlying fund approximates the fair value of the investment. These investments are redeemable at NAV under agreements with the underlying funds. However, it is possible that these redemption rights may be restricted or eliminated by the funds in the future in accordance with the underlying fund agreements. Due to the nature of the investments held by the funds, changes in market conditions and the economic environment may significantly impact the NAV of the funds and, consequently, the fair value of the U.S. defined benefit pension plan asset's interest in the funds. Furthermore, changes to the liquidity provisions of the funds may significantly impact the fair value of the U.S. defined benefit pension plan asset's interest in the funds. As of December 31, 2018, there were no restrictions on redemption of these investments.

The following table sets forth a summary of the RIP's investments measured at NAV:

Description	Value at December 31, 2018 Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period

Real estate	$60.1	$ 2.2	Quarterly	45-90 Days
Other investments	3.9	0.8	None	None
Investments measured at net asset value	$64.0	$ 3.0		

Description	Value at December 31, 2017 Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Real estate	$59.9	$ 2.2	Quarterly	45-90 Days
Other investments	3.6	0.9	None	None
Investments measured at net asset value	$63.5	$ 3.1		

Following is a description of the valuation methodologies used for assets measured at fair value and at NAV.

Bonds: Consists of registered investment funds and common and collective trust funds investing in fixed income securities tailored to institutional investors. There are no readily available market quotations for registered investment company funds. The fair value of investment funds and common and collective trust funds have been classified as Level 2 assets above as their values were derived based on the underlying securities in the fund's portfolio which is typically the amount which the fund might reasonably expect to receive for the security upon a current sale. Investments in individual bonds were measured at fair value based on the closing price reported in the active market in which the bond is traded and investments in pooled funds traded in a non-active market were valued at bid price and classified as Level 2 assets above.

Collective trust fund: Represents collective trust and funds holding equity investments, fixed income securities, commodity futures contracts, cash and other short-term securities. The fair value of collective trust funds have been classified as Level 2 assets above as

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

their values were derived based on the underlying securities in the fund's portfolio which is typically the amount which the fund might reasonably expect to receive for the security upon a current sale.

Real estate: Consists of both open-end and closed-end funds. There are no readily available market quotations for these real estate funds. These investments were measured at fair value using the NAV practical expedient.

Other investments: Consists of investments in a group insurance annuity contract and a limited partnership. Investments in the group insurance annuity contract were classified as Level 3 assets and measured at fair value by discounting the related cash flows based on current yields of similar instruments with comparable durations while considering the credit-worthiness of the issuer. The investments in the limited partnership were measured at fair value using the NAV practical expedient.

Cash, other short-term investments and payables: Consist primarily of cash and cash equivalents, and plan receivables/payables. The carrying amounts of cash and cash equivalents and receivables/payables approximate fair value due to the short-term nature of these instruments. Other payable and receivables consist primarily of margin on an account for a fund, accrued fees and receivables related to investment positions liquidated for which proceeds had not been received as of December 31.

U.S. DEFINED BENEFIT RETIREE HEALTH AND LIFE INSURANCE PLANS

We fund postretirement benefits on a pay-as-you-go basis, with the retiree paying a portion of the cost for health care benefits by means of deductibles and contributions.

The following tables summarize the balance sheet impact of the U.S. postretirement benefit pension plan, as well as the related benefit obligations, funded status and rate assumptions. We use a December 31 measurement date for all our defined benefit postretirement benefit plans.

	2018	2017
U.S. defined benefit retiree health and life insurance plans		
Change in benefit obligation:		
Benefit obligation as of beginning of period	$86.6	$93.1
Service cost	0.2	0.4
Interest cost	2.6	3.0
Plan participants' contributions	2.9	2.8
Plan amendments	-	(1.1)
Actuarial (gain)	(15.7)	(1.3)
Benefits paid	(11.2)	(10.3)
Benefit obligation as of end of period	$65.4	$86.6

	2018	2017

Change in plan assets:		
Fair value of plan assets as of beginning of period	$-	$-
Employer contribution	8.3	7.5
Plan participants' contributions	2.9	2.8
Benefits paid	(11.2)	(10.3)
Fair value of plan assets as of end of period	$-	$-
Funded status of the plans	$(65.4)	$(86.6)

	2018	2017
U.S. defined benefit retiree health and life insurance plans		
Weighted-average discount rate used to determine benefit obligations at end of period	4.31%	3.60%
Weighted-average discount rate used to determine net periodic benefit cost for the period	3.60%	4.11%

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The components of postretirement benefit (credit) cost are as follows:

	2018	2017	2016
U.S. defined benefit retiree health and life insurance plans			
Service cost of benefits earned during the period	$0.2	$0.4	$0.4
Interest cost on accumulated postretirement benefit obligation	2.6	3.0	4.7
Amortization of prior service (credit)	(0.1)	-	(0.3)
Amortization of net actuarial gain	(5.7)	(3.6)	(6.1)
Net periodic postretirement benefit (credit)	$(3.0)	$(0.2)	$(1.3)
Less: Discontinued operations	-	-	(0.2)
Net periodic postretirement benefit (credit), continuing operations	$(3.0)	$(0.2)	$(1.1)

For measurement purposes, an average rate of annual increase in the per capita cost of covered health care benefits of 7.6% for pre-65 retirees and 8.7% to 11.1% for post-65 retirees (depending on plan type) was assumed for 2018, decreasing ratably to an ultimate rate of 4.5% in 2026. Assumed health care cost trend rates can have a significant effect on the amounts reported for the health care plans. A one percentage point change in assumed health care cost trend rates would have the following effects:

	One percentage point Increase	Decrease
U.S. defined benefit retiree health and life insurance benefits plans		
Effect on total service and interest cost components	$-	$ -
Effect on postretirement benefit obligation	(0.3)	0.3

Amounts recognized in assets (liabilities) on the consolidated balance sheets at year end consist of:

	U.S. Pension Plans		Non-U.S. Pension Plan		Retiree Health and Life Insurance Benefits	
	2018	2017	2018	2017	2018	2017
Prepaid pension costs	$52.8	$88.3	$-	$-	$-	$-
Accounts payable and accrued expenses	(4.3)	(4.1)	-	(0.1)	(6.6)	(7.4)

Postretirement benefit liabilities	-	-	-	-	(58.8)	(79.2)
Pension benefit liabilities	(47.8)	(54.6)	(2.5)	(2.6)	-	-
Net amount recognized	$0.7	$29.6	$(2.5)	$(2.7)	$(65.4)	$(86.6)

Pre-tax amounts recognized in accumulated other comprehensive (loss) income at year end consist of:

	U.S. Pension Plans		Non-U.S. Pension Plan		Retiree Health and Life Insurance Benefits	
	2018	2017	2018	2017	2018	2017
Net actuarial (loss) gain	$(577.3)	$(520.2)	$(3.7)	$(8.9)	$59.3	$49.5
Prior service (cost) credit	-	-	(1.6)	(0.5)	1.1	1.1
Accumulated other comprehensive (loss) income	$(577.3)	$(520.2)	$(5.3)	$(9.4)	$60.4	$50.6

For U.S. pension plans, we expect to amortize $19.9 million of previously unrecognized prior service cost and net actuarial losses into pension cost in 2019 and expect to contribute $4.3 million in 2019.

For our non-U.S. pension plan, we do not expect to amortize any previously unrecognized net actuarial losses or unrecognized prior service cost into pension cost in 2019 and do not expect to contribute any amounts in 2019.

For our U.S. postretirement benefit plans, we expect to amortize $7.2 million of previously unrecognized net actuarial gains and prior service credits into postretirement benefit cost in 2019 and expect to contribute $6.6 million in 2019.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid over the next ten years for our U.S. and non-U.S plans:

	U.S. Pension Benefits [1]	Non-U.S. Pension Benefits	Retiree Health and Life Insurance Benefits, Net
2019	$ 106.3	$ 0.1	$ 6.6
2020	105.2	0.1	6.2
2021	103.1	0.1	5.8
2022	102.3	0.1	5.5
2023	100.9	0.1	5.1
2024 - 2028	472.4	0.6	21.2

[1] We were not required and did not make contributions to the RIP during 2018, 2017 or 2016 as, based on guidelines established by the Pension Benefit Guaranty Corporation, the RIP had sufficient assets to fund its distribution obligations. Benefit payments to participants have been made directly from the RIP to participants from the assets of the plan.

As required by ASU 2017-07, “Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost,” the service cost component of net benefit cost has been presented in the Consolidated Statements of Earnings and Comprehensive Income within cost of goods sold and SG&A expenses for all periods presented, which are the same line items as other compensation costs arising from services rendered by the pertinent employees during the period. The other components of net benefit cost are presented in the Consolidated Statements of Earnings and Comprehensive Income separately from the service cost component within other non-operating (income) expense, net. The following table presents the components of net periodic pension and postretirement (credits) costs within our Consolidated Statement of Earnings and Comprehensive Income:

	2018	2017	2016
Service cost of benefits earned in cost of goods sold	$3.6	$5.5	$5.4

Service cost of benefits earned in SG&A expenses	2.3	3.5	3.6
Other non-operating (income) expense	(33.0)	(11.3)	7.0
Net periodic pension and postretirement (credit) cost	$(27.1)	$(2.3)	$16.0

NOTE 17. FINANCIAL INSTRUMENTS

We do not hold or issue financial instruments for trading purposes. The estimated fair values of our financial instruments are as follows:

	December 31, 2018		December 31, 2017	
	Carrying amount	Estimated fair value	Carrying amount	Estimated fair value
Assets/(Liabilities), net:				
Total debt, including current portion	$(819.8)	$ (811.3)	$(850.2)	$ (850.8)
Foreign currency contracts	-	-	(0.8)	(0.8)
Natural gas contracts	-	-	(0.6)	(0.6)
Interest rate swap contracts	3.5	3.5	8.9	8.9

The carrying amounts of cash and cash equivalents, receivables, accounts payable, accrued expenses, and short-term debt approximate fair value because of the short-term maturity of these instruments. The fair value estimates of long-term debt were primarily based upon quotes from a major financial institution of recently observed trading levels of our Term Loan A and Term Loan B debt. The fair value estimates of foreign currency contracts are estimated from market quotes provided by a well-recognized national market data provider. The fair value estimates of natural gas contracts are estimated using internal valuation models with verification by obtaining quotes from major financial institutions. For natural gas swap transactions, fair value is calculated using NYMEX market quotes provided by a well-recognized national market data provider. For natural gas option based strategies, fair value is calculated using an industry standard Black-Scholes model with market based inputs, including but not limited to, underlying asset price, strike price, implied volatility, discounted risk free rate and time to expiration, provided by a well-recognized national market data provider.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The fair value estimates for interest rate swap contracts are estimated by obtaining quotes from major financial institutions with verification by internal valuation models. Refer to Note 18 for a discussion of the fair value and the related inputs used to measure fair value.

The fair value measurement of assets and liabilities is summarized below:

	December 31, 2018		December 31, 2017	
	Fair value based on		Fair value based on	
	Quoted, active markets Level 1	Other observable inputs Level 2	Quoted, active markets Level 1	Other observable inputs Level 2
Assets/(Liabilities), net:				
Foreign currency contracts	$ -	$ -	$ (0.8)	$ -
Natural gas contracts	-	-	-	(0.6)
Interest rate swap contracts	-	3.5	-	8.9

We do not have any financial assets or liabilities that are valued using Level 3 (unobservable) inputs.

NOTE 18. DERIVATIVE FINANCIAL INSTRUMENTS

We are exposed to market risk from changes in foreign exchange rates, interest rates and commodity prices that could impact our results of operations, cash flows and financial condition. We use swaps to hedge some of these exposures. At inception, derivatives that we designate as hedging instruments are formally documented as either (1) a hedge of a forecasted transaction or “cash flow” hedge, or (2) a hedge of the fair value of a recognized liability or asset or “fair value” hedge. We also formally assess, both at inception and at least quarterly thereafter, whether the derivatives that are used in hedging transactions are highly effective in offsetting changes in either the fair value or cash flows of the hedged item. If it is determined that a derivative ceases to be a highly effective hedge, or if the anticipated transaction is no longer probable of occurring, we discontinue hedge accounting and any future mark-to-market adjustments are recognized in earnings. We use derivative financial instruments as risk management tools and not for speculative trading purposes.

Counterparty Risk

We only enter into derivative transactions with established counterparties having an investment-grade credit rating. We monitor counterparty credit default swap levels and credit ratings on a regular basis. All of our derivative transactions with counterparties are governed by master International Swap and Derivatives Association agreements ("ISDAs") with netting arrangements. These agreements can limit our exposure in situations where we have gain and loss positions outstanding with a single counterparty. We do not post nor do we receive cash collateral with any counterparty for our derivative transactions. These ISDAs do not have any credit contingent features; however, a default under our bank credit facility would trigger a default under these agreements. Exposure to individual counterparties is controlled, and thus we consider the risk of counterparty default to be negligible.

Commodity Price Risk

We purchase natural gas for use in the manufacturing process and to heat many of our facilities. As a result, we are exposed to fluctuations in the price of natural gas. However, in the third quarter of 2018, we decided that we will no longer enter into new natural gas derivatives as natural gas spending as a percentage of cost of goods sold and the lowered volatility of natural gas prices no longer merits hedging. As of December 31, 2018, there were no open natural gas hedge contracts. As of December 31, 2017, the notional amount of these hedges was $9.2 million.

Currency Rate Risk – Sales and Purchases

Upon completion of the sale of our EMEA and Pacific Rim businesses, and on a continuing operations basis as of December 31, 2018, our only major foreign currency exposure is to the Canadian dollar. We manage our Canadian cash flow exposures on a net basis. In the third quarter of 2018, we decided that we will no longer enter into new foreign currency derivatives as the risk associated with the net cash inflows and outflows between the U.S. and Canada no longer merits hedging. As of December 31, 2018, there were no open foreign exchange hedge contracts. As of December 31, 2017, the notional amount of these hedges was $18.9 million.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Interest Rate Risk

We utilize interest rate swaps to minimize the fluctuations in earnings caused by interest rate volatility. On November 28 2018, we entered into two swaps related to our Term Loan A: (1) a $200.0 million notional swap where we receive a 1-month LIBOR and pay a fixed rate interest beginning in 2018 and running through 2023 and (2) a $100.0 million notional forward starting swap, where we receive 1-month LIBOR and pay a fixed rate beginning in 2021 and running through 2025. As of December 31, 2018, these hedges were designated as cash flow hedges against changes in LIBOR for a portion of our existing and future variable rate debt. We recorded a $4.6 million loss in other operating expense (income) during the fourth quarter of 2018, representing the change in fair value of these two swaps between the date these swaps were entered into and the date the swaps were designated as cash flow hedges. Future changes in fair value for these two swaps will be recorded in accumulated other comprehensive income.

The following table summarizes our interest rate swaps as of December 31, 2018:

Trade Date	Notional Amount	Coverage Period	Risk Coverage
November 13, 2016	$ 200.0	November 2016 to March 2021	USD-LIBOR
April 1, 2016	$ 100.0	April 2016 to March 2023	USD-LIBOR
November 28, 2018	$ 200.0	November 2018 to November 2023	USD-LIBOR
November 28, 2018	$ 100.0	March 2021 to March 2025	USD-LIBOR

Under the terms of the April 2016 swap maturing in 2023, we receive the greater of 3-month LIBOR or a 0.75% LIBOR Floor and pay a fixed rate over the hedged period.

Under the terms of the November 2016 swap maturing in 2021, we receive 3-month LIBOR and pay a fixed rate over the hedged period, in addition to a basis rate swap to convert the floating rate risk under our November 2016 Swap from 3-month LIBOR to 1-month LIBOR. As a result, we receive 1-month LIBOR and pay a fixed rate over the hedged period.

Under the terms of the November 2018 swap maturing in 2023, we pay a fixed rate over the hedged amount and receive 1-month LIBOR. This includes a 0% floor.

Under the terms of the November 2018 swap maturing in 2025, we will pay a fixed rate monthly and receive 1-month LIBOR. This is inclusive of a 0% floor.

Financial Statement Impacts

The following tables detail amounts related to our derivatives as of December 31, 2018 and December 31, 2017. We did not have any derivative assets or liabilities not designated as hedging instruments for the years ended December 31, 2018 and 2017. The derivative asset and liability amounts below are shown in gross amounts; we have not netted assets with liabilities.

	Derivative Assets			Derivative Liabilities		
		Fair Value			Fair Value	
	Balance Sheet Location	December 31, 2018	December 31, 2017	Balance Sheet Location	December 31, 2018	December 31, 2017
Derivatives designated as hedging instruments						
Natural gas commodity contracts	Other current assets	$ -	$ -	Accounts payable and accrued expenses	$ -	$ 0.5
Foreign exchange contracts	Other current assets	-	-	Accounts payable and accrued expenses	-	0.7
Interest rate swap contracts	Other current assets	-	0.2	Accounts payable and accrued expenses	-	-
Natural gas commodity contracts	Other non-current assets	-	-	Other long-term liabilities	-	0.1
Foreign exchange contracts	Other non-current assets	-	-	Other long-term liabilities	-	0.1
Interest rate swap contracts	Other non-current assets	9.6	8.7	Other long-term liabilities	6.1	-
Total derivatives designated as hedging instruments		$ 9.6	$ 8.9		$ 6.1	$ 1.4

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

	Amount of (Loss) Gain Recognized in Accumulated Other Comprehensive Income ("AOCI") (Effective Portion)			Location of Gain (Loss) Reclassified from AOCI into Income (Effective Portion)	Gain (Loss) Reclassified from AOCI into Income (Effective Portion)		
	2018	2017	2016		2018	2017	2016
Derivatives in Cash Flow Hedging Relationships							
Natural gas commodity contracts	$ 0.7	$ (1.3)	$ 0.6	Cost of goods sold	$ 0.1	$ 0.3	$ (1.2)
Foreign exchange contracts – purchases	0.1	(0.5)	-	Cost of goods sold	-	-	-
Foreign exchange contracts – sales	0.7	(1.8)	(2.9)	Net sales	-	0.1	1.4
Interest rate swap contracts	(2.0)	2.2	6.8	Interest expense	(1.6)	(0.9)	(8.3)
Total	$ (0.5)	$ (1.4)	$ 4.5	Total gain (loss) from continuing operations	(1.5)	(0.5)	(8.1)
				Total (loss) gain from discontinued operations	-	(0.1)	0.2
				Total gain (loss)	$ (1.5)	$ (0.6)	$ (7.9)

As of December 31, 2018, the amount of existing losses in AOCI expected to be recognized in earnings over the next twelve months is $2.3 million.

NOTE 19. PRODUCT WARRANTIES

The following table summarizes the activity for the accrual of product warranties for December 31:

	2018	2017
Balance at beginning of period	$0.1	$0.2
Current year warranty accruals	4.2	3.2
Reductions for payments	(3.9)	(3.3)
Balance at end of period	$0.4	$0.1

NOTE 20. OTHER LONG-TERM LIABILITIES

	December 31, 2018	December 31, 2017
Long-term deferred compensation arrangements	$ 14.0	$ 15.3
Environmental liabilities	11.7	13.5
Fair value of derivative liabilities	6.1	0.2
Other	6.2	6.5
Total other long-term liabilities	$ 38.0	$ 35.5

NOTE 21. SHARE-BASED COMPENSATION PLANS

The 2016 Long-Term Incentive Plan (“2016 LTIP”) authorizes us to issue stock options, stock appreciation rights, restricted stock awards, stock units, performance-based awards and cash awards to officers and key employees and expires on July 8, 2026, after which time no further awards may be made. The 2016 LTIP authorizes us to issue up to 8,949,000 shares of common stock, which includes all shares that have been issued under the 2016 LTIP. As of December 31, 2018, 3,616,626 shares were available for future grants under the 2016 LTIP.

The 2016 Directors Stock Unit Plan (“2016 Director’s Plan”) authorizes us to issue stock units to non-employee directors until July 2026. The 2016 Director’s Plan authorizes us to issue up to 550,000 shares of common stock, which includes all shares that have been

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

issued under the 2016 Director's Plans. As of December 31, 2018, 189,477 shares were available for future grants under the 2016 Director's Plan.

The following table presents stock option activity for the year ended December 31, 2018:

	Number of shares (thousands)	Weighted-average exercise price	Weighted-average remaining contractual term (years)	Aggregate intrinsic value (millions)
Option shares outstanding, December 31, 2017	1,272.4	$ 34.23		
Option shares exercised	(669.9)	(27.51)		
Option shares outstanding, December 31, 2018	602.5	$ 41.71	2.9	$ 9.9
Option shares exercisable, vested and expected to vest,				
December 31, 2018	602.5	$ 41.71	2.9	$ 9.9

We have reserved sufficient authorized shares to allow us to issue new shares upon exercise of all outstanding options. Options generally become exercisable in three years and expire 10 years from the date of grant. When options are exercised, we may issue new shares, use treasury shares (if available), acquire shares held by investors, or a combination of these alternatives in order to satisfy the option exercises.

The following table presents information related to stock option exercises:

	2018	2017	2016
Total intrinsic value of stock options exercised	$23.7	$0.9	$0.4
Cash proceeds received from stock options exercised	$18.4	$3.3	$0.7
Tax deduction (expense) realized from stock options exercised	$6.1	$(0.2)	$(0.1)

The fair value of option grants was estimated on the date of grant using the Black-Scholes option pricing model. There were no option grants in 2018, 2017 or 2016.

Historically, we have also granted non-vested stock awards in the form of restricted stock, Restricted Stock Units ("RSUs"), performance restricted stock and Performance Stock Units ("PSUs"). As of December 31, 2017 and 2016, we have no outstanding restricted stock or performance restricted stock. A summary of the 2018 activity related to these

awards follows:

	Non-Vested Stock Awards			
	RSUs		PSUs	
	Number of shares (thousands)	Weighted-average fair value at grant date	Number of shares (thousands)	Weighted-average fair value at grant date
December 31, 2017	171.6	$ 45.27	379.7	$ 41.08
Granted	33.8	59.33	148.2	56.16
Vested	(97.7)	(45.72)	-	-
Forfeited	(7.4)	(50.00)	(24.7)	(50.82)
December 31, 2018	100.3	$ 48.69	503.2	$ 45.14

RSUs entitle the recipient to a specified number of shares of AWI's common stock provided the prescribed service period is fulfilled. PSUs entitle the recipient to a specified number of shares of AWI's common stock provided the defined financial targets are achieved at the end of the performance period. RSUs and PSUs generally had vesting periods of three years at the grant date. RSUs and PSUs earn dividends during the vesting period that are forfeitable if the awards do not vest.

The table above contains 5,680 and 8,354 RSUs as of December 31, 2018 and 2017, respectively, which are accounted for as liability awards as they are able to be settled in cash. There are no outstanding PSUs accounted for as liability awards as of December 31, 2018 and 2017, as none of the awards are able to be settled in cash. Employee liability awards outstanding for all periods represent awards to certain employees of our EMEA and Pacific Rim businesses. The underlying liability is reflected as a component of current liabilities from discontinued operations on our consolidated balance sheets.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

RSUs and PSUs with non-market based performance conditions are measured at fair value based on the closing price of our stock on the date of grant. In 2018 and 2017, we granted 69,669 and 69,769 PSUs with market based performance conditions that are valued through the use of a Monte Carlo simulation. The weighted average assumptions for PSUs measured at fair value through the use of a Monte Carlo simulation are presented in the table below.

	2018	2017
Weighted-average grant date fair value of market based PSUs granted (dollars per award)	$53.01	$43.29
Assumptions		
Risk free rate of return	2.4 %	1.5 %
Expected volatility	26.3 %	28.0 %
Expected term (in years)	3.1	3.1
Expected dividend yield	0.0 %	0.0 %

The risk free rate of return was determined based on the implied yield available on zero coupon U.S. Treasury bills at the time of grant with a remaining term equal to the expected term of the PSUs. The expected volatility was based on an average of the actual historical volatilities of the stock prices of AWI and a peer group of companies. We elected to not rely solely on AWI's actual historical stock price volatility due to the separation of AFI. The expected life represented the performance period on the underlying award. The expected dividend yield was assumed to be zero because, at the time of each grant, we had no plans to declare a dividend.

In addition to the equity awards described above, as of December 31, 2018 we had 11,773 fully-vested phantom shares outstanding for non-employee directors under the 2006 Phantom Stock Unit Plan not reflected in the non-vested stock awards table above. These awards are settled in cash and had vesting periods of one to three years. The awards are generally payable six months following the director's separation from service on the Board of Directors. The total liability recorded for these shares as of December 31, 2018 was $1.3 million which includes associated non-forfeitable dividends. The 2006 Phantom Stock Unit Plan is still in place; however, no additional shares will be granted under the plan.

As of December 31, 2018 and 2017, there were 163,564 and 191,725 RSUs, respectively, outstanding under the 2016 Directors Stock Unit Plan not reflected in the Non-Vested Stock Awards table above. In 2018 and 2017, we granted 13,058 and 22,433 restricted stock units, respectively, to non-employee directors. These awards generally have a vesting period of one year, and as of December 31, 2018 and 2017, 150,506 and 169,292 shares, respectively, were vested but not yet delivered. The awards are generally payable six months following the director's separation from service on the Board of Directors and earn dividends during the vesting period that are non-forfeitable.

We recognize share-based compensation expense on a straight-line basis over the vesting period. Share-based compensation cost was $12.9 million ($9.6 million net of tax benefit) in 2018, $9.8 million ($5.9 million net of tax

benefit) in 2017, and $11.0 million ($6.6 million net of tax benefit) in 2016.

As of December 31, 2018, there was $13.0 million of total unrecognized compensation cost related to non-vested share-based compensation arrangements. That cost is expected to be recognized over a weighted-average period of 1.4 years.

NOTE 22. EMPLOYEE COSTS

	2018	2017	2016
Wages, salaries and incentive compensation	$197.2	$191.0	$179.1
Payroll taxes	15.6	14.2	13.9
Defined contribution and defined benefit pension plan (credit) expense, net	(17.8)	4.1	22.7
Insurance and other benefit costs	22.3	24.0	21.4
Share-based compensation	12.9	9.8	11.0
Total	$230.2	$243.1	$248.1

As a result of our adoption of ASU 2017-07, defined contribution and defined benefit pension plan expense, net, included above includes non-service cost components of net periodic pension costs that are reflected as a component of other non-operating income

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

on the Consolidated Statements of Earnings and Comprehensive Income for all years presented. See Note 16 for details related to our components of net periodic pension costs.

NOTE 23. LEASES

We rent certain real estate and equipment. Several leases include options for renewal or purchase, and contain clauses for payment of real estate taxes and insurance. In most cases, management expects that in the normal course of business, leases will be renewed or replaced by other leases. Rent expense was $6.1 million in 2018, $6.7 million in 2017 and $5.2 million in 2016.

Future minimum payments at December 31, 2018 by year and in the aggregate, having non-cancelable lease terms in excess of one year are as follows:

	Total Minimum Lease Payments
Scheduled minimum lease payments	
2019	$ 5.3
2020	4.7
2021	4.2
2022	3.7
2023	2.2
Thereafter	4.7
Total	$ 24.8

NOTE 24. SHAREHOLDERS' EQUITY

Common Stock Repurchase Plan

On July 29, 2016, we announced that our Board of Directors had approved a share repurchase program pursuant to which the Company is authorized to repurchase up to $150.0 million of its outstanding shares of common stock through July 31, 2018 (the “Program”). On October 30, 2017, we announced that our Board of Directors had approved

an additional $250.0 million authorization to repurchase shares under the Program. The Program was also extended through October 31, 2020. On July 31, 2018, we announced that our Board of Directors had approved an additional $300.0 million authorization to repurchase shares, increasing the total authorized amount under the Program to $700.0 million.

Repurchases under the Program may be made through open market, block and privately-negotiated transactions, including Rule 10b5-1 plans, at times and in such amounts as management deems appropriate, subject to market and business conditions, regulatory requirements and other factors. The Program does not obligate the Company to repurchase any particular amount of common stock and may be suspended or discontinued at any time without notice.

On August 2, 2018, we entered into an accelerated share repurchase (“ASR”) agreement with Deutsche Bank AG under the Program. The ASR included a pre-payment of $150.0 million to Deutsche Bank, at which time we received 1,766,004 shares. The ASR terminated on October 8, 2018, with additional 389,825 shares returned on that day to complete the ASR.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

During 2018, including the ASR, we repurchased 4.7 million shares under the Program for a total cost of $306.5 million, or an average price of $64.74 per share. Since inception of the Program, including the ASR, we have repurchased 7.7 million shares under the Program for a total cost of $430.6 million, or an average price of $56.01 per share. During 2017, 1.8 million shares were repurchased under the Program for a total cost of $80.4 million, or an average price of $43.58 per share.

Accumulated Other Comprehensive (Loss)

The balance of each component of accumulated other comprehensive (loss), net of tax as of December 31, 2018 and 2017 is presented in the table below.

	December 31, 2018	December 31, 2017
Foreign currency translation adjustments	$ (74.7)	$ (47.1)
Derivative gain, net	5.3	3.5
Pension and postretirement adjustments	(390.2)	(302.3)
Accumulated other comprehensive (loss)	$ (459.6)	$ (345.9)

The amounts and related tax effects allocated to each component of other comprehensive income for 2018, 2017, and 2016 are presented in the table below.

	Pre-tax Amount	Tax Benefit	After-tax Amount
2018			
Foreign currency translation adjustments	$ (27.6)	$ -	$ (27.6)
Derivative gain, net	0.9	0.2	1.1
Pension and postretirement adjustments	(41.6)	8.7	(32.9)
Total other comprehensive income (loss)	$ (68.3)	$ 8.9	$ (59.4)

	Pre-tax Amount	Tax (Expense) Benefit	After-tax Amount
2017			
Foreign currency translation adjustments	$ 24.5	$ -	$ 24.5
Derivative (loss) gain, net	(0.8)	0.5	(0.3)
Pension and postretirement adjustments	50.4	(16.7)	33.7

Total other comprehensive income (loss)	$ 74.1	$ (16.2)	$ 57.9

	Pre-tax Amount	Tax Benefit	After-tax Amount
2016			
Foreign currency translation adjustments	$ (33.2)	$ -	$ (33.2)
Derivative gain (loss), net	11.9	(4.4)	7.5
Pension and postretirement adjustments	75.7	(26.4)	49.3
Total other comprehensive income (loss)	$ 54.4	$ (30.8)	$ 23.6

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The following table summarizes the activity, by component, related to the change in AOCI for December 31, 2018 and 2017:

	Foreign Currency Translation Adjustments [1]	Derivative (Loss) Gain [1]	Pension and Postretirement Adjustments [1]	Total Accumulated Other Comprehensive (Loss) [1]
Balance, December 31, 2016	$ (71.6)	$ 3.8	$ (336.0)	$ (403.8)
Other comprehensive income (loss) income before reclassifications, net of tax expense (benefit) of $ -, $0.8, ($3.6), and ($2.8)	24.5	(0.7)	9.3	33.1
Amounts reclassified from accumulated other comprehensive income	-	0.4	24.4	24.8
Net current period other comprehensive income (loss)	24.5	(0.3)	33.7	57.9
Balance, December 31, 2017	(47.1)	3.5	(302.3)	(345.9)
Impact of ASU 2018-02 adoption	-	0.7	(55.0)	(54.3)
Other comprehensive (loss) income before reclassifications, net of tax expense of $ -, $0.6, $11.3, and $11.9	(27.6)	-	(44.7)	(72.3)
Amounts reclassified from accumulated other comprehensive income	-	1.1	11.8	12.9
Net current period other comprehensive income (loss)	(27.6)	1.1	(32.9)	(59.4)
Balance, December 31, 2018	$ (74.7)	$ 5.3	$ (390.2)	$ (459.6)

[1] Amounts are net of tax

The amounts reclassified from AOCI and the affected line item of the Consolidated Statement of Earnings and Comprehensive Income are presented in the table below.

	Amounts Reclassified from Accumulated Other Comprehensive (Loss)(1)		Affected Line Item in the Consolidated Statement of Earnings and Comprehensive Income
	2018	2017	
Derivative Adjustments:			
Natural gas commodity contracts	$ (0.1)	$ (0.3)	Cost of goods sold
Foreign exchange contracts - purchases	-	0.1	Cost of goods sold
Foreign exchange contracts - sales	-	(0.1)	Net sales
Interest rate swap contracts	1.6	0.9	Interest expense
Total income, before tax	1.5	0.6	
Tax impact	(0.4)	(0.2)	Income tax expense
Total income net of tax	1.1	0.4	
Pension and Postretirement Adjustments:			
Prior service cost amortization	(0.1)	1.5	Other non-operating (income) expense
Amortization of net actuarial loss	14.9	15.2	Other non-operating (income) expense
Partial settlement	-	20.8	Other non-operating (income) expense
Total expense before tax	14.8	37.5	
Tax impact	(3.0)	(13.1)	Income tax expense
Total expense, net of tax	11.8	24.4	
Total reclassifications for the period	$ 12.9	$ 24.8	

(1) Includes activity from discontinued operations

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

NOTE 25. SUPPLEMENTAL FINANCIAL INFORMATION

	2018	2017	2016
Selected operating expense			
Maintenance and repair costs	$41.6	$42.5	$41.4
Research and development costs	16.3	17.4	17.8
Advertising costs	6.5	6.0	5.4
Other non-operating (income)/expense			
Interest income	$(4.3)	$(1.8)	$(1.0)
Foreign currency transaction (gain)/loss, net of hedging activity	0.4	(0.6)	(9.4)
Pension and post retirement benefit (credits)	(33.0)	(11.3)	7.0
Other	4.4	-	(0.8)
Total	$(32.5)	$(13.7)	$(4.2)

NOTE 26. RELATED PARTIES

In some markets, we purchase grid products from WAVE, our 50%-owned joint venture with Worthington Industries, for resale to customers. The total amount of these purchases was $22.5 million in 2018, $18.2 million in 2017 and $18.0 million in 2016. We also provide certain selling, promotional and administrative processing services to WAVE for which we receive reimbursement. Those services amounted to $15.8 million in 2018, $14.9 million in 2017, and $9.1 million in 2016. The net amount due to WAVE from us for all of our relationships was $3.0 million as of December 31, 2018 and $2.6 million as of December 31, 2017. See Note 10 to the Consolidated Financial Statements for additional information.

NOTE 27. LITIGATION AND RELATED MATTERS

ENVIRONMENTAL MATTERS

Environmental Compliance

Our manufacturing and research facilities are affected by various federal, state and local requirements relating to the discharge of materials and the protection of the environment. We make expenditures necessary for compliance with applicable environmental requirements at each of our operating facilities. These regulatory requirements continually

change, therefore we cannot predict with certainty future expenditures associated with compliance with environmental requirements.

Environmental Sites

Summary

We are actively involved in the investigation, closure and/or remediation of existing or potential environmental contamination under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and state Superfund and similar environmental laws at three domestically owned locations allegedly resulting from past industrial activity.

We are one of several potentially responsible parties in these matters and have agreed to jointly fund the required investigation and remediation, while preserving our defenses to the liability. We may also have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. We are currently pursuing coverage and recoveries under those policies with respect to certain of the sites, including the St. Helens, OR site, the Macon, GA site and the Elizabeth City, NC site, each of which is summarized below. These efforts include two active and independent litigation matters against legacy primary and excess policy insurance carriers for recovery of fees and costs incurred by us in connection with our investigation and remediation activities for such sites. Other than disclosed below, we are unable to predict the outcome of these matters or the timing of any recoveries, whether through settlement or otherwise. We are also unable to predict the extent to which any recoveries might cover our final share of investigation and remediation costs for these sites. Our final share of investigation and remediation costs may exceed any such recoveries, and such amounts net of insurance recoveries, may be material.

In 2017 we entered settlement agreements totaling $30.5 million with certain legacy insurance carriers to resolve ongoing litigation and recover fees and costs previously incurred by us in connection with certain environmental sites. These settlements were recorded

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

as a $11.2 million reduction to cost of goods sold and a $19.3 million reduction to SG&A expenses reflecting the same income statement categories where environmental expenditures were historically recorded. All of the 2017 cash settlements have been released to us from escrow, including $28.7 million received in the first six months of 2018. In the third quarter of 2018, we entered into settlement agreements totaling $7.0 million with additional legacy insurance carriers. The 2018 settlement proceeds will be released to us from escrow following court approval. We anticipate that we may enter into additional settlement agreements in the future, which may or may not be material, with other legacy insurers to obtain reimbursement or contribution for environmental site expenses.

Estimates of our future liability at the environmental sites are based on evaluations of currently available facts regarding each individual site. We consider factors such as our activities associated with the site, existing technology, presently enacted laws and regulations and prior company experience in remediating contaminated sites. Although current law imposes joint and several liability on all parties at Superfund sites, our contribution to the remediation of these sites is expected to be limited by the number of other companies potentially liable for site remediation. As a result, our estimated liability reflects only our expected share. In determining the probability of contribution, we consider the solvency of other parties, the site activities of other parties, whether liability is being disputed, the terms of any existing agreements and experience with similar matters, and the effect of our October 2006 Chapter 11 reorganization upon the validity of the claim, if any.

Specific Material Events

St Helens, OR

In August 2010, we entered into a Consent Order (the “Consent Order”) with the Oregon Department of Environmental Quality (“ODEQ”), along with Kaiser Gypsum Company, Inc. (“Kaiser”), and Owens Corning Sales LLC (“OC”), with respect to our St. Helens, OR facility, which was previously owned by Kaiser and then OC. The Consent Order requires that we and Kaiser complete a remedial investigation and feasibility study (“RI/FS”) on the portion of the site owned by us (“Owned Property”), which is comprised of Upland and Lowland areas. The Consent Order further requires us, Kaiser and OC to conduct an RI/FS in the In-Water area of the adjacent Scappoose Bay. Costs and responsibilities for investigation, including the current RI/FS, for the Owned Property have been shared with Kaiser pursuant to a cost sharing agreement with Kaiser. Costs and responsibilities for the investigation with respect to the in-water areas that we do not own have been shared with Kaiser and OC pursuant to a cost sharing agreement with Kaiser and OC.

On September 14, 2016, the parties submitted a Feasibility Study to the ODEQ proposing remedial action options for the Upland area. We have participated in the investigation phase for the Lowland area of the Owned Property and the Scappoose Bay and worked with the ODEQ, Kaiser and OC to finalize the reports to move to the Feasibility Study phase.

On September 30, 2016, Kaiser filed a voluntary petition for relief under Chapter 11 of the Bankruptcy Code in the U.S. Bankruptcy Court for the Western District of North Carolina (Case No. 16-31602) (the “Bankruptcy Court”). AWI, OC and the ODEQ have all been included on the master list of potential creditors filed with the Bankruptcy Court for notice purposes. By order dated October 14, 2016, the Bankruptcy Court formed a statutory committee of unsecured creditors, to which we were appointed to serve, along with OC and The Boeing Company.

The Committee is charged with, among other things, maximizing recovery of all unsecured creditor claims, including claims of AWI and ODEQ. Noticed parties submitted claims to the Bankruptcy Court on September 13, 2017. The Chapter 11 case impacts Kaiser's ongoing participation in the RI/FS process, as well as the ODEQ consent order and cost sharing agreements.

In November 2017, we participated in voluntary mediation with ODEQ, OC and Kaiser to negotiate a resolution that would discharge Potentially Responsible Parties ("PRPs") liability for the site. As a result of the mediation, on February 1, 2018, ODEQ issued a Public Notice and a proposed Consent Judgment recommending that, in exchange for a release from ODEQ for all contamination claims against AWI, we would pay $8.6 million to the State of Oregon and perform a previously scoped remedial action for the Upland area of the site. During the fourth quarter of 2017, we increased our reserve for environmental liabilities by $8.6 million as a result of this pending settlement with the State of Oregon.

On April 5, 2018, ODEQ issued Public Notice of the Remedial Action for the Upland Area and subsequently responded to public comments. On June 26, 2018 ODEQ published its Record of Decision confirming the selected remedial action required for the Upland Area. AWI will be responsible for performing the remedial action upon ODEQ's filing of the Consent Judgment with the court, pending appeal. The Consent Judgment remains subject to entry and approval by the Columbia County Circuit Court. Kaiser continues to assert that the Consent Judgement violates the stay imposed by its bankruptcy case. The Bankruptcy Court, however, ruled in favor

of ODEQ's position that the Consent Judgement does not violate the stay. In response to that ruling, on October 3, 2018, Kaiser filed a motion for stay pending appeal. A decision on that motion remains pending.

Kaiser has also filed objections to the ODEQ proof of claim and AWI's proof of claim and is seeking discovery related to the determination of costs incurred by the parties at the site. On November 26, 2018, Kaiser filed a complaint against AWI seeking money damages and declaratory relief including cost recovery and/or contributions from AWI in connection with the environmental costs incurred by Kaiser at St. Helens. We believe the Kaiser allegations are without merit and have moved to partially dismiss the complaint and withdraw the reference from the Bankruptcy Court to the District Court to adjudicate the remainder of the complaint and the objection to AWI's proof of claim.

Macon, GA

The U.S. Environmental Protection Agency ("EPA") has listed two landfills located on a portion of our facility in Macon, GA, along with the former Macon Naval Ordnance Plant landfill adjacent to our property, portions of Rocky Creek, and certain tributaries leading to Rocky Creek (collectively, the "Macon Site") as a Superfund site on the National Priorities List due to the presence of contaminants, most notably polychlorinated biphenyls ("PCBs").

In September 2010, we entered into an Administrative Order on Consent for a Removal Action with the EPA to investigate PCB contamination in one of the landfills on our property, the Wastewater Treatment Plant Landfill (the "WWTP Landfill," also known as "Operable Unit 1"). After completing an investigation of the WWTP Landfill and submitting our final Engineering Evaluation/Cost Analysis, the EPA issued an Action Memorandum in July 2013 selecting our recommended remedy for the Removal Action. The Operable Unit 1 response action for the WWTP Landfill is complete and the final report was submitted to the EPA on October 11, 2016. The EPA approved the final report on November 28, 2016, and a Post-Removal Control Plan (the "Plan") was submitted to the EPA on March 28, 2017. That Plan will monitor the effectiveness of the WWTP Landfill response action and our estimate of future liabilities includes these tasks.

It is probable that we will incur field investigation, engineering and oversight costs associated with a RI/FS with respect to the remainder of the Superfund site, which includes the other landfill on our property, as well as areas on and adjacent to AWI's property and Rocky Creek (the "Remaining Site," also known as "Operable Unit 2"). On September 25, 2015, AWI and other PRPs received a Special Notice Letter from the EPA under CERCLA inviting AWI and the PRPs to enter into the negotiation of an agreement to conduct an RI/FS of Operable Unit 2. We, along with the other PRPs, and the EPA entered into a Settlement Agreement effective September 18, 2018, in response to the Special Notice Letter to conduct the RI/FS. The PRPs are required to submit a complete RI/FS Work Plan by March 18, 2019. While the investigative work on this portion of the site has not yet commenced, we anticipate that the EPA will require significant investigative work for Operable Unit 2 and that we may ultimately incur costs in remediating any contamination discovered during the RI/FS. The current estimate of future liability at this site includes only our estimated share of the costs of the investigative work that, at this time, we anticipate the EPA will require the PRPs to perform. We are unable to reasonably estimate AWI's final share of the costs or the total costs associated with the investigation work or any resulting remediation therefrom, although such amounts may be material.

Elizabeth City, NC

This site is a former cabinet manufacturing facility that was operated by Triangle Pacific Corporation, now known as Armstrong Wood Products, Inc. (“Triangle Pacific”), from 1977 until 1996. The site was formerly owned by the U.S. Navy (“Navy”) and Westinghouse, now CBS Corporation (“CBS”). We assumed ownership of the site when we acquired the stock of Triangle Pacific in 1998. Prior to our acquisition, the NC Department of Environment and Natural Resources listed the site as a hazardous waste site. In 1997, Triangle Pacific entered into a cost sharing agreement with Westinghouse whereby the parties agreed to share equally in costs associated with investigation and potential remediation. In 2000, Triangle Pacific and CBS entered into an Administrative Order on Consent to conduct an RI/FS with the EPA for the site. In 2007, we and CBS entered into an agreement with the Navy whereby the Navy agreed to pay one third of defined past and future investigative costs up to a certain amount, which has now been exhausted. The EPA approved the RI/FS work plan in August 2011. In January 2014, we submitted the draft Remedial Investigation and Risk Assessment reports and conducted supplemental investigative work based upon agency comments to those reports. The EPA published an Interim Action Proposed Plan for the site in April 2018 seeking public comment through June 7, 2018. The EPA has evaluated comments, including ours, and has published its Interim Record Of Decision selecting an interim cleanup approach. On September 25, 2018, AWI and CBS received a Special Notice Letter from the EPA under CERCLA inviting AWI and CBS to enter into the negotiation of a settlement agreement to conduct or finance the response action at the site. During the third quarter of 2018, we increased our reserve for the cost of the interim cleanup, which we expect to be shared with CBS and the Navy.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

Summary of Financial Position

Liabilities of $12.4 million as of December 31, 2018 and $13.5 million as of December 31, 2017 were recorded for potential environmental liabilities that we consider probable and for which a reasonable estimate of the probable liability could be made. During 2018, we recorded $0.5 million of additional reserves for potential environmental liabilities. During 2017, we recorded reserves for potential environmental liabilities of $10.1 million including $8.6 million of reserves recorded in the fourth quarter for the St. Helens settlement. Where existing data is sufficient to estimate the liability, that estimate has been used; where only a range of probable liabilities is available and no amount within that range is more likely than any other, the lower end of the range has been used. As assessments and remediation activities progress at each site, these liabilities are reviewed to reflect new information as it becomes available, and adjusted to reflect amounts actually incurred and paid. These liabilities are undiscounted.

The estimated liabilities above do not take into account any claims for recoveries from insurance or third parties. It is our policy to record insurance recoveries when probable. For insurance recoveries that are reimbursements of prior environmental expenditures, the income statement impact is recorded within cost of goods sold and SG&A expenses, which are the same income statement categories where environmental expenditures were historically recorded. Insurance recoveries in excess of historical environmental spending, are recorded on the balance sheet as a part of other long-term liabilities and released as future environmental spending occurs or the liability is settled.

The estimated liabilities above do not take into account any claims for recoveries from insurance or third parties. It is our policy to record recoveries as assets in the Consolidated Balance Sheets. As of December 31, 2018, we have $6.5 million of receivables for insurance recoveries reflected within Accounts and Notes Receivable.

Actual costs to be incurred at identified sites may vary from our estimates. Based on our knowledge of the identified sites, it is not possible to reasonably estimate future costs in excess of amounts already recognized.

OTHER CLAIMS

On September 8, 2017, Roxul USA, Inc. (d/b/a Rockfon) filed litigation against us in the United States District Court for the District of Delaware alleging anticompetitive conduct seeking remedial measures and unspecified damages. Roxul USA, Inc. is a significant ceilings systems competitor with global headquarters in Europe and expanding operations in the Americas. We believe the allegations are without merit and intend to vigorously defend the matter. During the first quarter of 2018, the Court denied, in part, and granted, in part, our motion to dismiss, dismissing two of the claims brought by Roxul USA, Inc. We recently filed a motion seeking summary judgment on all of Rockfon’s remaining claims and have moved to exclude the testimony of Rockfon’s expert witness. Rockfon moved for partial summary judgment in its favor on a single claim of alleged liability only (not damages). We subsequently opposed that motion on numerous grounds. The date for determination of motions is not currently scheduled. A trial date is reserved, if necessary, for early in the second quarter of 2019. We continue to incur defense costs for the matter.

We are involved in other various lawsuits, claims, investigations and other legal matters from time to time that arise in the ordinary course of business, including matters involving our products, intellectual property, relationships with suppliers, relationships with distributors, relationships with competitors, employees and other matters. From time to

time, for example, we may be a party to litigation matters that involve product liability, tort liability and other claims under various allegations, including illness due to exposure to certain chemicals used in the workplace; or medical conditions arising from exposure to product ingredients or the presence of trace contaminants. Such allegations may involve multiple defendants and relate to legacy products that we and other defendants purportedly manufactured or sold. We believe that any current claims are without merit and intend to defend them vigorously. For these matters, we also may have rights of contribution or reimbursement from other parties or coverage under applicable insurance policies. When applicable and appropriate, we will pursue coverage and recoveries under those policies, but are unable to predict the outcome of those demands. While complete assurance cannot be given to the outcome of these proceedings, we do not believe that any current claims, individually or in the aggregate, will have a material adverse effect on our financial condition, liquidity or results of operations.

NOTE 28. EARNINGS PER SHARE

Earnings per share components may not add due to rounding.

Armstrong World Industries, Inc., and Subsidiaries

Notes to Consolidated Financial Statements

(dollar amounts in millions, except share data)

The following table is a reconciliation of net earnings to net earnings attributable to common shares used in our basic and diluted EPS calculations for the years ended December 31, 2018, 2017, and 2016:

	2018	2017	2016
Earnings from continuing operations	$189.6	$220.6	$99.3
Earnings allocated to participating non-vested share awards	(0.6)	(0.7)	(0.3)
Earnings from continuing operations attributable to common shares	$189.0	$219.9	$99.0

	2018	2017	2016
	(in millions)		
Basic shares outstanding	51.3	53.3	55.4
Dilutive effect of common stock equivalents	0.8	0.6	0.3
Diluted shares outstanding	52.1	53.9	55.7

There were no anti-dilutive stock options excluded from the computation of diluted EPS in 2018. Anti-dilutive options excluded from the computation of dilutive EPS for 2017 and 2016 were 319,836 and 632,799, respectively.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Our management, with the participation of our chief executive officer and our chief financial officer, performed an evaluation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934 ("Exchange Act")) as of December 31, 2018. Our chief executive officer and our chief financial officer have concluded that our disclosure controls and procedures were effective insofar as they are designed to provide reasonable assurance that information required to be disclosed by us in the reports we file or submit under the Exchange Act is (i) recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and (ii) accumulated and communicated to our management, including our principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. We believe that a controls system, no matter how well designed and operated, cannot provide absolute assurance that the objectives of the controls system are met, and no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within a company have been detected.

There have been no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2018 that have materially affected or are reasonably likely to materially affect our internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting and the Report of Independent Registered Public Accounting Firm are incorporated by reference to Item 8 to this Annual Report on Form 10-K.

ITEM 9B. OTHER INFORMATION

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Executive Officers of the Company (as of February 25, 2019):

Name	Age	Present Position and Business Experience During the Last Five Years*
Victor D. Grizzle	57	Armstrong World Industries, Inc.
		President & CEO, Director since April 2016
		Executive Vice President & CEO, Armstrong Building Products (2011 to April 2016)
Charles M. Chiappone	56	Armstrong World Industries, Inc.
		Senior Vice President, Ceiling and Wall Solutions since April 2018
		Senior Vice President, Ceiling Solutions (April 2016 to April 2018)
		Vice President of Global Marketing & Commercial Excellence,
		Armstrong Building Products (January 2012 to April 2016)
Mark A. Hershey	49	Armstrong World Industries, Inc.
		Senior Vice President, General Counsel since July 2011
		Chief Compliance Officer since February 2012
		Secretary (July 2011 to June 2014 and since April 2016)
Brian L. MacNeal	52	Armstrong World Industries, Inc.
		Senior Vice President, Chief Financial Officer since April 2016
		Vice President, Global Finance and CFO, Armstrong Building Products (2014 to April 2016)
		Heartland Energy Solutions
		Interim Chief Financial Officer (2013 to 2014)
		Campbell Soup Company

		Vice President of Finance (2011 to 2013)
Stephen F. McNamara	52	Armstrong World Industries, Inc. Vice President, Controller since July 2008
Ellen R. Romano	57	Armstrong World Industries, Inc. Senior Vice President, Human Resources since July 2013 Vice President, Human Resources, Armstrong Building Products (2009 to 2013)

* Information in parentheses regarding previously held positions indicates either the duration the Executive Officer held the position or the year in which service in the position began.

All executive officers are elected by the Board of Directors to serve in their respective capacities until their successors are elected and qualified or until their earlier resignation or removal.

Code of Ethics

We have adopted a Code of Business Conduct that applies to all employees, executives and directors, specifically including our Chief Executive Officer, our Chief Financial Officer and our Controller. We have also adopted a Code of Ethics for Financial Professionals (together with the Code of Business Conduct, the "Codes of Ethics") that applies to all professionals in our finance and accounting functions worldwide, including our Chief Financial Officer and our Controller.

The Codes of Ethics are intended to deter wrongdoing and to promote:

- honest and ethical conduct, including the ethical handling of actual or apparent conflicts of interest between personal and professional relationships;
- full, fair, accurate, timely and understandable public disclosures;
- compliance with applicable governmental laws, rules and regulations;

- the prompt internal reporting of violations of the Codes of Ethics; and
- accountability for compliance with the Codes of Ethics.

The Codes of Ethics are available at http://www.armstrongceilings.com/corporate/codes-policies.html and in print free of charge. Any waiver of the Company's Code of Business Conduct, particularly its conflicts-of-interest provisions, which may be proposed to apply to any director or executive officer, must be reviewed in advance by the Nominating and Governance Committee of the Board of Directors, which would be responsible for making a recommendation to the Board of Directors for approval or disapproval. The Board of Directors' decision on any such matter would be disclosed publicly in compliance with applicable legal standards and the rules of the New York Stock Exchange. We intend to satisfy these requirements by making disclosures concerning such matters available on the "For Investors" page of our website. There were no waivers or exemptions from the Code of Business Conduct in 2018 applicable to any director or executive officer.

Other information required by Item 10 is incorporated by reference to the sections entitled "Election of Directors," "Corporate Governance," and "Section 16(a) Beneficial Ownership Reporting Compliance" in the Company's proxy statement for its 2019 annual meeting of shareholders to be filed no later than April 30, 2019.

ITEM 11. EXECUTIVE COMPENSATION

The information required by Item 11 is incorporated by reference to the sections entitled "Compensation Discussion and Analysis," "Compensation Committee Report," "Summary Compensation Table," "Grants of Plan-Based Awards," "Outstanding Equity Awards at Fiscal Year-End," "Option Exercises and Stock Vested," "Pension Benefits," "Nonqualified Deferred Compensation," "Potential Payments Upon Termination or Change in Control," "Board of Directors – Board's Role in Risk Management Oversight," "Compensation Committee Interlocks and Insider Participation" and "Compensation of Directors" in the Company's proxy statement for its 2019 annual meeting of shareholders to be filed no later than April 30, 2019.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by Item 12 is incorporated by reference to the sections entitled "Security Ownership of Certain Beneficial Owners," "Security Ownership of Management," and "Equity Compensation Plan Information" in the Company's proxy statement for its 2019 annual meeting of shareholders to be filed no later than April 30, 2019.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by Item 13 is incorporated by reference to the sections entitled "Certain Relationships and Related Transactions" and "Director Independence" in the Company's proxy statement for its 2019 annual meeting of shareholders to be filed no later than April 30, 2019.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by Item 14 is incorporated by reference to the sections entitled "Audit Committee Report" and "Relationship with Independent Auditors" in the Company's proxy statement for its 2019 annual meeting of shareholders to be filed no later than April 30, 2019.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Listing of Documents

1. The financial statements and schedule of Armstrong World Industries, Inc. filed as a part of this 2018 Annual Report on Form 10-K is listed in the "Index to Financial Statements and Schedules" on Page 34.

2. The financial statements required to be filed pursuant to Item 15 of Form 10-K are:

Worthington Armstrong Venture consolidated financial statements for the years ended December 31, 2018, 2017, and 2016 (filed herewith as Exhibit 99.1).

3. The following exhibits are filed as part of this 2018 Annual Report on Form 10-K:

Exhibit No.	Description
2.1	Armstrong World Industries, Inc.'s Fourth Amended Plan of Reorganization dated May 23, 2003 (as modified by modifications filed with the Bankruptcy Court on October 17, 2003, November 10, 2003, December 3, 2004 and February 21, 2006) is incorporated by reference from the Annual Report on Form 10-K, filed on February 24, 2006, wherein it appeared as Exhibit 2.3.
2.2	Separation and Distribution Agreement, dated March 11, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on March 15, 2016, wherein it appeared as Exhibit 2.1.
2.3	Plan of Division, adopted by Armstrong World Industries, Inc. on March 11, 2016 is incorporated by reference from the Current Report on Form 8-K filed on March 15, 2016, wherein it appeared as Exhibit 2.2.
3.1	Amended and Restated Articles of Incorporation of Armstrong World Industries, Inc. is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 3.1.
3.2	Amended and Restated Bylaws of Armstrong World Industries, Inc., are incorporated by reference from the Current Report on Form 8-K filed on December 8, 2017, wherein it appeared as Exhibit 3.1.
10.1	Amended and Restated Credit Agreement, dated April 1, 2016, by and among Armstrong World Industries, Inc., as Borrower, certain subsidiaries of Armstrong World Industries, Inc. identified therein, as the Guarantors, Bank of America, N.A., as Administrative Agent and Collateral Agent, the other lenders party thereto, JPMorgan Chase Bank, N.A. and Citibank, N.A., as Co-Syndication Agents, Manufacturers and Traders Trust, The Bank of Nova Scotia, Fifth Third Bank, Citizens Bank of Pennsylvania, TD Bank National Association and Bank of Montreal, as Co-Documentation Agents, and Merrill Lynch, Pierce, Fenner & Smith Incorporated, JPMorgan Chase Bank, N.A. and Citibank, N.A., as joint lead arrangers and joint lead managers is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.8.
10.2	Amended and Restated Security Agreement, dated April 1, 2016, by and among Armstrong World Industries, Inc., the grantors named therein and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.2.
10.3	Amended and Restated Pledge Agreement dated, April 1, 2016, by and among Armstrong World Industries, Inc., the pledgors named therein and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.3.
10.4	Amended and Restated Canadian Pledge Agreement dated, April 1, 2016, by and among Armstrong World Industries, Inc. and Bank of America, N.A. is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2018, wherein it appeared as Exhibit 10.4.
10.5	

	Receivables Purchase Agreement dated as of December 10, 2010, by and among Armstrong World Industries, Inc., as initial servicer and collection agent, Armstrong Receivables Company LLC, as seller, Atlantic Asset Securitization LLC, as conduit purchaser, and Credit Agricole Corporate and Investment Bank, as administrative agent, an issuer of letters of credit and related committed purchaser, is incorporated by reference from the Current Report on Form 8-K filed on December 14, 2010, wherein it appeared as Exhibit 10.1.
10.6	Omnibus Amendment to Receivables Purchase Agreement and Purchase and Sale Agreement dated as of August 1, 2011, by and among Armstrong World Industries, Inc., Armstrong Receivables Company LLC, Armstrong Hardwood Flooring Company, Atlantic Asset Securitization LLC, and Credit Agricole Corporate and Investment Bank, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2012, wherein it appeared as Exhibit 10.9.

Exhibit No.	Description
10.7	Second Omnibus Amendment to Receivables Purchase Agreement and Purchase and Sale Agreement dated as of December 21, 2011, by and among Armstrong World Industries, Inc., Armstrong Receivables Company LLC, as seller, Armstrong Hardwood Flooring Company, as originator, Atlantic Asset Securitization LLC, as resigning conduit purchaser, Credit Agricole Corporate and Investment Bank, as resigning administrative agent, resigning related committed purchaser and resigning LC bank, The Bank of Nova Scotia, as successor administrative agent, successor related committed purchaser and successor LC bank, and Liberty Street Funding LLC, as successor conduit purchaser, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2012, wherein it appeared as Exhibit 10.10.
10.8	Third Omnibus Amendment Agreement, dated as of March 28, 2013, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., Armstrong Hardwood Flooring Company, The Bank of Nova Scotia, and Liberty Street Funding LLC, is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.1.
10.9	Fourth Amendment to the Receivables Purchase Agreement, dated as of December 18, 2014, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., The Bank of Nova Scotia, and Liberty Street Funding LLC, is incorporated by reference from the Annual Report on Form 10-K filed on February 23, 2015, wherein it appeared as Exhibit 10.10.
10.10	Fourth Omnibus Amendment Agreement, dated as of March 30, 2016, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., Armstrong Hardwood Flooring Company, The Bank of Nova Scotia, and Liberty Street Funding LLC, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2017, wherein it appeared as Exhibit 10.11.
10.11	Sixth Amendment to the Receivables Purchase Agreement, dated as of December 21, 2016, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., The Bank of Nova Scotia, and Liberty Street Funding LLC, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2017, wherein it appeared as Exhibit 10.12.
10.12	Seventh Amendment to Receivables Purchase Agreement, dated March 24, 2017, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., The Bank of Nova Scotia, and Liberty Street Funding LLC, is incorporated by reference from the Quarterly Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 10.1.
10.13	Eighth Amendment to Receivables Purchase Agreement, dated February 15, 2019, by and among Armstrong Receivables Company, LLC, Armstrong World Industries, Inc., The Bank of Nova Scotia, and Liberty Street Funding LLC, filed herewith. †
	Amended and Restated Joint Venture Agreement, dated February 22, 2016 between Armstrong Ventures, Inc. and Worthington Ventures, Inc., is incorporated by reference from the Annual Report on Form 10-K filed on February 22, 2016, wherein it appeared as Exhibit 10.12.
10.14	
10.15	Transition Services Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.1.
10.16	Tax Matters Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.2.

Exhibit No.	Description
10.17	Employee Matters Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.3.
10.18	Trademark License Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc., AWI Licensing LLC and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.4.
10.19	Transition Trademark License Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc., AFI Licensing LLC and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.5.
10.20	Campus Lease Agreement, dated as of April 1, 2016, by and between Armstrong World Industries, Inc. and Armstrong Flooring, Inc. is incorporated by reference from the Current Report on Form 8-K filed on April 4, 2016, wherein it appeared as Exhibit 10.6.
10.21	Share Purchase Agreement, dated November 17, 2017, by and between Armstrong World Industries, Inc. and Knauf International GmbH is incorporated by reference from the Current Report on Form 8-K filed on November 20, 2017, wherein it appeared as Exhibit 2.1.
10.22	Deed of Amendment to the Share Purchase Agreement dated as of July 18, 2018, by and between Armstrong World Industries, Inc. and Knauf International GmbH is incorporated by reference from the Current Report on Form 8-K filed on July 19, 2018, wherein it appeared as Exhibit 2.1.
10.23	2006 Long-Term Incentive Plan, as amended February 23, 2009, is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2009, wherein it appeared as Exhibit 10.13.*
10.24	Form of Stock Option Award under the 2006 Long-Term Incentive Plan is incorporated by reference from the Quarterly Report on Form 10-Q, filed on May 1, 2008, wherein it appeared as Exhibit 10.37.*
10.25	Form of Stock Option Award under the 2006 Long-Term Incentive Plan used in connection with award to Stephen F. McNamara is incorporated by reference from the Current Report on Form 8-K filed on April 6, 2010, wherein it appeared as Exhibit 10.2.*
10.26	Form of Stock Option and Restricted Stock Unit Award under the 2006 Long-Term Incentive Plan used in connection with awards to Victor D. Grizzle in connection with new hire grant, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2012, wherein it appeared as Exhibit 10.26.*
10.27	2011 Long-Term Incentive Plan, effective as of June 24, 2011, is incorporated by reference to Armstrong World Industries, Inc.'s Definitive Proxy Statement on Schedule 14A for the Armstrong World Industries, Inc 2011 Annual Meeting of Shareholders held on June 24, 2011 filed on April 28, 2011, wherein it appeared as Exhibit A.*
10.28	Form of 2011 Long-Term Incentive Plan Terms and Conditions (Grant of Nonqualified Stock Options — U.S. (Executive Officer)), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 30, 2012, wherein it appeared as Exhibit 10.1.*
10.29	Form of 2011 Long-Term Incentive Plan Terms and Conditions (Grant of Nonqualified Stock Options — U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 30, 2012, wherein it appeared as Exhibit 10.2.*
10.30	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2013 (Grant of Nonqualified Stock Options – U.S. (Executive Officer)), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.2.*
10.31	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2013 (Grant of Nonqualified Stock Options – U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.3.*
10.32	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2013 (Grant of Nonqualified Stock Options – Non-U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 29, 2013, wherein it appeared as Exhibit 10.4.*

10.33	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2014 (Grant of Nonqualified Stock Options – U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 28, 2014, wherein it appeared as Exhibit 10.1.*

Exhibit No.	Description
10.34	Form of 2011 Long-Term Incentive Plan Terms and Conditions, as amended for 2014 (Grant of Nonqualified Stock Options – Non-U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 28, 2014, wherein it appeared as Exhibit 10.2.*
10.35	Form of 2011 Long-Term Incentive Plan Terms and Conditions (Grant of Time-Based Restricted Stock Units – U.S.), is incorporated by reference from the Quarterly Report on Form 10-Q filed on April 30, 2015, wherein it appeared as Exhibit 10.1.*
10.36	Form of 2016 Award Agreement for Performance-Based Restricted Stock Unit Grant under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on April 14, 2016, wherein it appeared as Exhibit 10.1. *
10.37	Form of 2016 Long-Term Time-Based Restricted Stock Unit Grant under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.4.*
10.38	Form of 2016 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Absolute TSR for Tier I) for Senior Executives under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.5.*
10.39	Form of 2016 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Absolute TSR for Tier II) under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.6.*
10.40	Form of 2016 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Cumulative Free Cash Flow for Tier II) under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.7.*
10.41	Form of 2016 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Cumulative Free Cash Flow for Tier I) for Senior Executives under the 2011 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.8.*
10.42	Armstrong World Industries, Inc. 2016 Long-Term Incentive Plan, effective as of July 8, 2016 and amended and restated effective February 20, 2019, filed herewith.†
10.43	Form of 2017 and 2018 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Absolute TSR for Tier I) for Senior Executives under the 2016 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 10.2.*
10.44	Form of 2017 and 2018 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Absolute TSR for Tier II) for Senior Executives under the 2016 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 10.4.*
10.45	Form of 2017 and 2018 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Cumulative Free Cash Flow for Tier I) under the 2016 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 10.3.*
10.46	Form of 2017 and 2018 Long-Term Performance-Based Restricted Stock Unit Grant (Performance Goals Based on Cumulative Free Cash Flow for Tier II) under the 2016 Long-Term Incentive Plan is incorporated by reference from the Current Report on Form 10-Q filed on May 1, 2017, wherein it appeared as Exhibit 10.5.*
10.47	Nonqualified Deferred Compensation Plan effective January 2005, as amended July 23, 2010, is incorporated by reference from the Annual Report on Form 10-K, filed on February 28, 2011, wherein it appeared as Exhibit 10.4.*

10.48	Retirement Benefit Equity Plan, effective January 1, 2005, as amended October 29, 2007 and December 8, 2008, is incorporated by reference from the Annual Report on Form 10-K, filed on February 26, 2009, wherein it appeared as Exhibit 10.2.*
10.49	2006 Phantom Stock Unit Plan, as amended December 8, 2008, is incorporated by reference from the 2008 Annual Report on Form 10-K, filed on February 26, 2009, wherein it appeared as Exhibit 10.18.*
10.50	2006 Phantom Stock Unit Agreement is incorporated by reference from the Current Report on Form 8-K filed on October 26, 2006, wherein it appeared as Exhibit 10.3. A Schedule of Participating Directors is incorporated by reference from the 2006 Annual Report on Form 10-K, filed on March 30, 2007, wherein it appeared as Exhibit 10.36.*

Exhibit No.	Description
10.51	2007 Award Agreement under the 2006 Phantom Stock Unit Plan is incorporated by reference from the Current Report on Form 8-K filed on October 23, 2007, wherein it appeared as Exhibit 10.1.*
10.52	Schedule of Participating Directors, is incorporated by reference from the Current Report on Form 8-K filed on October 23, 2007, wherein it appeared as Exhibit 10.2.*
10.53	2008 Directors Stock Unit Plan, as amended December 8, 2008, November 30, 2010 and June 24, 2011 is incorporated by reference to the Current Report on Form 8-K filed on June 13, 2011, wherein it appeared as Exhibit 99.2.*
10.54	Form of 2009 and 2010 Award under the 2008 Directors Stock Unit Plan, as amended, is incorporated by reference from the Quarterly Report on Form 10-Q for the quarter ended September 30, 2009, filed on October 28, 2009, wherein it appeared as Exhibit 10.27.*
10.55	Form of 2011, 2012, 2013 and 2014 Award under the 2008 Directors Stock Unit Plan, as amended, is incorporated by reference from the Annual Report on Form 10-K filed on February 27, 2012, wherein it appeared as Exhibit 10.40.*
10.56	Armstrong World Industries, Inc. 2016 Directors Stock Unit Plan, is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.1.*
10.57	Form of 2016, 2017 and 2018 Stock Unit Grant Agreement under the Armstrong World Industries, Inc. 2016 Directors Stock Unit Plan, is incorporated by reference from the Current Report on Form 8-K filed on July 11, 2016, wherein it appeared as Exhibit 10.3.*
10.58	Offer Letter to Victor D. Grizzle dated January 4, 2011, is incorporated by reference from the Current Report on Form 8-K filed on January 10, 2011, wherein it appeared as Exhibit 99.2.*
10.59	Offer Letter to Mark A. Hershey dated April 21, 2011, is incorporated by reference from the Current Report on Form 8-K filed on April 27, 2011, wherein it appeared as Exhibit 99.1.*
10.60	Form of Indemnification Agreement for Officers and Directors of Armstrong World Industries, Inc. is incorporated by reference from the Report on Form 8-K filed on June 4, 2010, wherein it appeared as Exhibit 10.1.*
10.61	Form of Amended and Restated Severance Agreement with Certain Officers, approved for use on October 26, 2016 is incorporated by reference from the Report on Form 8-K filed on October 31, 2016, wherein it appeared as Exhibit 10.1.*
14	The Armstrong Code of Business Conduct, revised as of July 29, 2011, is incorporated by reference from the Current Report on Form 8-K filed on August 1, 2011, wherein it appeared as Exhibit 14.1.
21	Armstrong World Industries, Inc.'s Subsidiaries.†
23.1	Consent of Independent Registered Public Accounting Firm.†
23.2	Consent of Independent Auditors.†
31.1	Certification of Chief Executive Officer required by Rule 13a-15(e) or 15d-15(e) of the Securities Exchange Act.
31.2	Certification of Chief Financial Officer required by Rule 13a-15(e) or 15d-15(e) of the Securities Exchange Act.
32.1	Certification of Chief Executive Officer required by Rule 13a and 18 U.S.C. Section 1350 (furnished herewith).
32.2	Certification of Chief Financial Officer required by Rule 13a and 18 U.S.C. Section 1350 (furnished herewith).
99.1	Worthington Armstrong Venture consolidated financial statements as of December 31, 2018 and 2017 and for the years ended December 31, 2018, 2017 and 2016.†
99.2	Armstrong World Industries, Inc. Asbestos Personal Injury Settlement Trust Agreement dated as of October 2, 2006, by and among Armstrong World Industries, Inc. and trustees, is incorporated by reference from the Current Report on Form 8-K filed on October 2, 2006, wherein it appeared as Exhibit

	10.2.
99.3	Stockholder and Registration Rights Agreement, dated as of October 2, 2006, by and between Armstrong World Industries, Inc. and the Armstrong World Industries, Inc. Asbestos Personal Injury Settlement Trust is incorporated by reference from the Current Report on Form 8-K filed on October 2, 2006, wherein it appeared as Exhibit 10.3.
99.4	Nomination and Shareholder Agreement with the persons or entities identified on Schedule I attached thereto (collectively the "ValueAct Group" and each individually, a "member" of the ValueAct Group), and Gregory P. Spivy in his individual capacity and as a member of the ValueAct Group (the "ValueAct Designee"), is incorporated by reference from the Report on Form 8-K filed on December 15, 2014, wherein it appeared as Exhibit 99.1.
101	Interactive Data Files**

Exhibit No. Description

* Management Contract or Compensatory Plan.
† Filed herewith.
** XBRL – Information is furnished and not filed or a part of a registration statement or prospectus for purposes of Sections 11 or 12 of the Securities Act of 1933, as amended, is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and otherwise is not subject to liability under these sections.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

	ARMSTRONG WORLD INDUSTRIES, INC. (Registrant)
By:	/s/ Victor D. Grizzle Director, President and Chief Executive Officer
Date:	February 25, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Victor D. Grizzle Victor D. Grizzle	Director, President and Chief Executive Officer (Principal Executive Officer)	February 25, 2019
/s/ Brian L. MacNeal Brian L. MacNeal	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 25, 2019
/s/ Stephen F. McNamara Stephen F. McNamara	Vice President and Controller (Principal Accounting Officer)	February 25, 2019
/s/ Stanley A. Askren Stanley A. Askren	Director	February 25, 2019
/s/ Tao Huang Tao Huang	Director	February 25, 2019
/s/ Larry S. McWilliams Larry S. McWilliams	Director	February 25, 2019
/s/ James C. Melville James C. Melville	Director	February 25, 2019
/s/ John J. Roberts John J. Roberts	Director	February 25, 2019

/s/ Gregory P. Spivy Gregory P. Spivy	Director	February 25, 2019
/s/ Roy W. Templin Roy W. Templin	Director	February 25, 2019
/s/ Cherryl T. Thomas Cherryl T. Thomas	Director	February 25, 2019

SCHEDULE II

Armstrong World Industries, Inc., and Subsidiaries

Valuation and Qualifying Reserves

(amounts in millions)

	Balance at beginning of year	Additions charged to earnings	Deductions	Balance at end of year
2016				
Provision for bad debts	$ 1.1	$ -	$ (0.7)	$ 0.4
Provision for discounts	0.8	16.9	(16.4)	1.3
Provision for warranties	0.3	8.0	(8.1)	0.2
2017				
Provision for bad debts	$ 0.4	$ -	$ (0.1)	$ 0.3
Provision for discounts	1.3	17.6	(17.4)	1.5
Provision for warranties	0.2	3.2	(3.3)	0.1
2018				
Provision for bad debts	$ 0.3	$ 0.1	$ (0.1)	$ 0.3
Provision for discounts	1.5	19.2	(19.4)	1.3
Provision for warranties	0.1	4.2	(3.9)	0.4

99