

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, 2022

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 1-15885

MATERION CORPORATION

(Exact name of registrant as specified in its charter)

Ohio
(State or other jurisdiction of
incorporation or organization)

34-1919973
(I.R.S. Employer
Identification No.)

6070 Parkland Blvd., Mayfield Heights, Ohio 44124
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code
216-486-4200

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

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, no par value	MTRN	New York Stock Exchange

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

None
(Title of Class)

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 (or for such shorter period that the registrant was required to file such reports), 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 period that the registrant was required to submit such files). Yes No

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 Emerging growth company
Non-accelerated filer Smaller reporting 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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262 (b)) by the registered public accounting firm that prepared or issued its audit report.

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements.

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b).to §240.10D-1(b).

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 common shares, no par value, held by non-affiliates of the registrant (based upon the closing sale price on the New York Stock Exchange) on July 1, 2022 was \$1,488,381,335.

As of January 31, 2023, there were 20,543,518 common shares, no par value, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the 2023 Annual Meeting of Shareholders are incorporated by reference into Part III.

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Forward-looking Statements: Portions of the narrative set forth in this document that are not statements of historical or current facts are forward-looking statements. Our actual future performance may materially differ from that contemplated by the forward-looking statements as a result of a variety of factors. These factors include, in addition to those mentioned elsewhere herein: the ultimate impact of the COVID-19 pandemic on our business, results of operations, financial condition, and liquidity, including shut downs of our facilities; the global economy, including inflationary pressures, potential future recessionary conditions and the impact of tariffs and trade agreements; the impact of any U.S. Federal Government shutdowns or sequestrations; the condition of the markets which we serve, whether defined geographically or by segment; changes in product mix and the financial condition of customers; our success in developing and introducing new products and new product ramp-up rates; our success in passing through the costs of raw materials to customers or otherwise mitigating fluctuating prices for those materials, including the impact of fluctuating prices on inventory values; our success in identifying acquisition candidates and in acquiring and integrating such businesses, including the integration of the HCS-Electronic Materials business; the impact of the results of acquisitions on our ability to fully achieve the strategic and financial objectives related to these acquisitions; our success in implementing our strategic plans and the timely and successful start-up and completion of any capital projects; other financial and economic factors, including the cost and availability of raw materials (both base and precious metals), physical inventory valuations, metal consignment fees, tax rates, exchange rates, interest rates, pension costs and required cash contributions and other employee benefit costs, energy costs, regulatory compliance costs, the cost and availability of insurance, credit availability, and the impact of the Company's stock price on the cost of incentive compensation plans; the uncertainties related to the impact of war, terrorist activities, and acts of God; changes in government regulatory requirements and the enactment of new legislation that impacts our obligations and operations; the conclusion of pending litigation matters in accordance with our expectation that there will be no material adverse effects; the disruptions in operations from, and other effects of, catastrophic and other extraordinary events including the COVID-19 pandemic and the conflict between Russia and Ukraine; and the risk factors set forth in Part I, Item 1A of this Form 10-K.

Item 1. BUSINESS

THE COMPANY

Materion Corporation (referred to herein as the Company, our, we, or us), through its wholly owned subsidiaries, is an integrated producer of high-performance advanced engineered materials used in a variety of electrical, electronic, thermal, and structural applications with \$1.8 billion in net sales in 2022. The Company was incorporated in Ohio in 1931. Our products are sold into numerous end markets, including semiconductor, industrial, aerospace and defense, automotive, energy, consumer electronics, and telecom and data center.

SEGMENT INFORMATION

Our businesses are organized under four reportable segments: Performance Materials, Electronic Materials, Precision Optics, and Other. Our Other reportable segment includes unallocated corporate costs. Additional information regarding our segments and business is presented below.

Performance Materials

Performance Materials provides advanced engineered solutions comprised of beryllium and non-beryllium containing alloy systems and custom engineered parts in strip, bulk, rod, plate, bar, tube, and other customized shapes produced at manufacturing facilities located throughout the United States and Europe and sold through distribution global hubs. This segment operates the world's largest bertrandite ore mine and refinery, which is located in Utah, providing feedstock hydroxide for our beryllium businesses and external sale. In addition to the products described below, this segment globally provides engineering and product development services to help our customers and partners with product design, including delivering prototype parts and other data to demonstrate that the products will perform under the required design specifications. Performance Materials operates through three global product lines: Advanced Alloys, Specialty Materials, and Performance Solutions, as described below:

- *Advanced Alloys* manufactures and globally provides to our customers three upstream (primary) product lines: alloyed metals, high-performance beryllium products, and beryllium hydroxide. Alloyed metals are made with copper and/or nickel (with or without beryllium) in ingot, shot, billet, plate, rod, bar, tube forms, and customized shapes. Depending on the application, the materials may provide one or a combination of superior strength, specific strength, wear and corrosion resistance, thermal and electrical conductivity, tribological benefits, and machinability. Applications for alloyed metals products include oil & gas drilling and production components, bearings, bushings, welding electrodes, plastic injection or metal die casting mold tooling, and electrical or electronic connectors. Major end markets for alloyed metals include industrial, automotive, aerospace and defense, energy, and telecom and data center. Alloyed metals competes with companies around the world that produce alloys with similar properties. High performance beryllium products are primarily beryllium metal products, which may also be alloys or other mixtures with aluminum and may be beryllium oxide. The materials are manufactured in billet, ingot, plate, sheet, powder, and customized shape forms. These materials are used in applications that require high stiffness and/or low density or high thermal conductivity and/or high electrical resistance. The properties are provided from the unique combination of material properties, or in applications requiring specific interactions with sub-atomic, high-energy particles, or in applications requiring strong affinity for oxygen such as in the manufacture of primary aluminum and magnesium. Beryllium hydroxide is produced at our milling operations in Utah from our bertrandite ore mine and purchased beryl ore. The hydroxide is used primarily as a raw material input for beryllium-containing alloys and, to a lesser extent, beryllium products. Key competitors include NGK Insulators, IBC Advanced Alloys Corp., Ningxia Orient Tantalum Industry Co., Ltd., Le Bronze Alloys, Minotti Metals, SA, KME AG & Co. KG, Aurubis AG, MKM Mansfelder Kupfer und Messing GmbH, AMPCO Metal, Chuetsu Metal Works Ltd, American Beryllia Inc., CBL Ceramics Limited, CoorsTek, Inc., and Ulba Metallurgical.
- *Specialty Materials* produces and provides our customers various thicknesses of precision strip products as well as various diameters of rod and wire products. The strip, rod, and wire products are beryllium and non-beryllium containing alloys that are made primarily with copper and nickel to provide unique combinations of high conductivity, high reliability, and high formability for use as connectors, contacts, springs, switches, relays, shielding, and bearings. In addition, Specialty Materials also produces and provides unique engineered strip metal products, which incorporate clad inlay and overlay metals, including precious and base metal electroplated systems, electron beam welded systems, contour profiled systems, and solder-coated metal systems. These engineered strip metal products provide a variety of thermal, electrical, or mechanical properties from a surface area or particular section of the material. Our precision cladding and plating capabilities allow for precious metal or other base metals to be applied in continuous strip form, only where it is needed, reducing the material cost to our customers as well as providing design flexibility and

performance. Major end markets include consumer electronics, telecom and data center, automotive, aerospace and defense, industrial, and energy. Key competitors include NGK Insulators, Wieland Electric, Inc., Aurubis Stolberg GmbH, Diehl Metall Stiftung & Co. KG, Nippon Mining, Wickeder Group, Heraeus Inc., AMI Doduco, Inc., and other North American continuous strip and plating companies.

- *Performance Solutions* provides engineered end-product technologies to our customers, including near-net shape and finished machined beryllium containing and non-beryllium containing products. These products and materials are suitable for applications that require high stiffness and/or low density due to their unique combination of properties. Performance Solutions provides beryllium metal and beryllium alloy components mainly to the aerospace and defense and energy end markets. Beryllium foil products are provided for radiographic and acoustic applications, beryllium oxide ceramics are provided for a wide range of heat sink and high temperature industrial applications, and our copper beryllium products meet the demanding strength and corrosion resistance specifications required for sub-sea telecommunication equipment. In addition, our engineering teams have developed several innovative non-beryllium materials to meet demanding wear resistance or strength-to-weight applications used in a variety of industries. Our ToughMet™ alloys provide extended life for industrial bushings and bearings and tremendous wear resistance in oil and gas rig components. Our SupremEX™ products offer the industry's highest quality aluminum silicon carbide metal matrix composite formulation, well suited for a wide range of applications from high performance engine components and aerospace structural components to high-stiffness consumer electronic components. Direct competitors include IBC Advanced Alloys, NGK Metals, CBL Ceramics Limited, and CoorsTek, Inc.

Performance Material's products are primarily sold directly from its facilities throughout the United States, Asia, and Europe, as well as distributed internationally through a network of Company-owned service centers, outside distributors, and agents.

Electronic Materials

Electronic Materials produces advanced chemicals, microelectronics packaging, precious metal, non-precious metal, and specialty metal products, including vapor deposition targets, frame lid assemblies, clad and precious metal pre-forms, high temperature braze materials, and ultra-pure wire. These products are used in high-performance logic, advanced memory high-performance logic, advanced memory, micro-electromechanical systems and power management integrated circuits, radio frequency devices, data storage, display, architectural glass, solar, optical coating, and other applications within the semiconductor, energy, and industrial end markets. Electronic Materials also has metal recovery operations and in-house refining that allow for the recycling of precious metals. This business includes a portion of HCS-Electronic Materials. See Note B to the Consolidated Financial Statements for additional discussion regarding our acquisition of HCS-Electronic Materials.

Electronic Materials products are sold directly from its facilities throughout the United States, Asia, and Europe, as well as through direct sales offices and independent sales representatives throughout the world. Principal competition includes companies such as Honeywell International, Inc., Praxair, Inc., Solar Applied Materials Technology Corp., Grikon, Solaris, Ametek Electronic Components and Packaging, and Tanaka Holding Co., Ltd., as well as a number of smaller regional and national suppliers.

The majority of the sales into the semiconductor end market from this segment are vapor deposition targets, lids, wire, other related precious and non-precious metal products, advanced chemicals, and other microelectronic applications. These materials are used in wireless, light-emitting diode, handheld devices, and other applications, as well as in a number of applications within the energy and industrial end markets. Since we are an up-front material supplier, changes in our semiconductor sales levels do not necessarily correspond to changes in the end-use consumer demand in the same period due to down-stream inventory positions, the time to develop and deploy new products, and manufacturing lead times and scheduling. While our product and market development efforts allow us to capture new applications, we may lose existing applications and customers from time to time due to the rapid change in technologies and other factors.

Precision Optics

Precision Optics designs and produces precision thin film coatings, optical filters and assemblies. Headquartered in Westford, Massachusetts, the business has manufacturing facilities in Europe, Asia and the United States and its products are sold directly from these facilities, as well as through direct sales offices and independent sales representatives throughout the world. Principal competition includes Viavi Corporation, Coherent Corporation, MKS Newport Optics, Alluxa, and a number of smaller regional and national suppliers. While our product and market development efforts allow us to capture new applications, we may lose existing applications and customers from time to time due to the rapid change in technologies and other factors.

Other

The Other segment is comprised of unallocated corporate costs.

OTHER GENERAL INFORMATION

Products

We are committed to providing high-quality, innovative, and reliable products that will enable our customers' technologies and fuel their own technological breakthroughs and growth.

Our products include precious and non-precious specialty metals, inorganic chemicals and powders, specialty coatings, specialty engineered beryllium and copper-based alloys, beryllium composites, ceramics, and engineered clad and plated metal systems.

We are constantly looking ahead to realign product and service portfolios toward the latest market and technology trends so that we are able to provide customers with an even broader scope of products, services, and specialized expertise. We believe we are an established leader in our markets.

Approximately 800 customers purchase our products throughout the semiconductor, industrial, aerospace and defense, automotive, energy, consumer electronics, and telecom and data center end markets. No single customer accounted for more than 10% of our total net sales for 2022.

Availability of Raw Materials

The principal raw materials we use are beryllium, tantalum, aluminum, cobalt, copper, gold, nickel, palladium, platinum, ruthenium, silver, and tin. Ore reserve data can be found in Part II, Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations." The availability of these raw materials, as well as other materials used by us, is adequate and generally not dependent on any one supplier.

Patents and Licenses

We own patents, patent applications, and licenses relating to certain of our products and processes. While our rights under these patents and licenses are of some importance to our operations, our business is not materially dependent on any one patent or license or on all of our patents and licenses as a group.

Backlog

The backlog of unshipped orders as of December 31, 2022, 2021, and 2020 was \$576.2 million, \$541.1 million, and \$279.2 million, respectively. Backlog is generally represented by purchase orders that may be terminated under certain conditions. We expect that substantially all of our backlog of orders at December 31, 2022 will be filled over the next 18 months.

Acquisitions

On November 1, 2021, the Company acquired HCS-Electronic Materials for a purchase price of approximately \$395.9 million in cash, on a cash-free, debt-free basis, subject to a customary purchase price adjustment mechanism. This business operates within the Performance Materials and Electronic Materials segments, and the results of operations are included as of the date of acquisition. Refer to Note B to the Consolidated Financial Statements for additional detail on the acquisition of HCS-Electronic Materials.

Regulatory Matters

We are subject to a variety of laws that regulate the manufacturing, processing, use, handling, storage, transport, treatment, emission, release, and disposal of substances and wastes used or generated in manufacturing. For decades, we have operated our facilities under applicable standards of inplant and outplant emissions and releases. The inhalation of airborne beryllium particulate may present a health hazard to certain individuals.

On January 9, 2017, the U.S. Occupational Safety and Health Administration (OSHA) published a new standard for workplace exposure to beryllium that, among other things, lowered the permissible exposure by a factor of ten and established new requirements for respiratory protection, personal protective clothing and equipment, medical surveillance, hazard communication, and record-keeping. Materion was a participant in the development of the new standards, which fundamentally represent our current health and safety operating practices. On July 6, 2018, OSHA issued a Direct Final Rule that amended the text of the new standard to clarify OSHA's intent with respect to certain terms and provisions of the standard, and on December 11, 2018, OSHA issued a Notice of Proposed Rulemaking concerning additional modifications to the standard "to clarify certain provisions and to simplify or improve compliance." OSHA issued the final beryllium standard incorporating these additional modifications on July 14, 2020. Other government and standard-setting organizations are also reviewing beryllium-related worker safety rules and standards, and will likely make them more stringent. The development, proposal, or adoption of more stringent standards may affect the buying decisions of the users of beryllium-containing products. If the standards are made more stringent and/or our customers or other downstream users decide to reduce their use of beryllium-containing products, our results of operations, liquidity, and financial condition could be materially adversely affected. The impact of this potential adverse effect would depend on the nature and extent of the changes to the standards, the cost and ability to meet the new standards, the extent of any reduction in customer use, and other factors. The magnitude of this potential adverse effect cannot be estimated.

In addition to laws that regulate the manufacturing, processing, use, handling, storage, transport, treatment, emission, release, and disposal of substances and wastes used or generated in manufacturing, we are subject to various laws around the world. For example, trade regulations, including tariffs or other import or export restrictions, may increase the cost of some of our raw materials or cross-border shipments, and limit our ability to do business in certain countries or with certain individuals. We are also required to comply with increasingly complex and changing laws and regulations enacted to protect business and personal data in the United States and other jurisdictions regarding privacy, data protection and data security, including those related to the collection, storage, use, transmission and protection of personal information and other consumer, customer, vendor or employee data. With respect to the laws and regulations noted above, as well as other applicable laws and regulations, the Company's compliance programs may, under certain circumstances, involve material investments in the form of additional processes, training, personnel, information technology, and capital.

Human Capital Management

Materion employees are located throughout the world. Employee levels are managed to align with the pace of business and management believes it has sufficient human capital to operate its business successfully. We employed approximately 3,723 people globally as of December 31, 2022. Approximately 574 were in the Asia-Pacific region, 488 were in the Europe, the Middle East, and Africa (EMEA) region, and 2,661 were in the North America region. Among our total global employee population, approximately 2,336 were employed in manufacturing. Our strong employee base, along with their commitment to customer service excellence and uncompromising values, provides the foundation for our Company's success.

Our employees are responsible for upholding our core values, which include working safely and collaboratively, conducting all aspects of business with the highest standards of ethics and integrity, leveraging processes and data to drive continuous improvement, empowering individuals and teams, embracing change, attracting and developing diverse global talent, and partnering for the betterment of the communities where we live and operate.

Health and Safety

The health, safety, and well-being of our employees is our highest priority and is a Materion core value. We have a strong Environmental, Health, and Safety (EHS) program that focuses on implementing policies and training programs, as well as performing self-audits to ensure our colleagues leave their workplace safely, every day. We continue to invest in safety improvements such as capital improvements, new safety technology, safety controls, and engineering ergonomic solutions. On an annual basis, our corporate long-range strategies are reviewed and updated, improvement plans are developed for each global location, progress is tracked, and daily critical safety statistics and metrics are published internally. Our corporate intranet site is visible to all global employees, where we share detailed descriptions of serious injuries and near misses and their corrective actions, as well as other proactive measures to promote lessons learned and ensure worker safety. Safety awareness and employee engagement programs have been implemented at all global facilities. We also have onsite medical teams at two key manufacturing sites to provide medical testing for employees to determine any potential exposure to beryllium, of which Materion is a leading global supplier.

Diversity and Inclusion

As part of our human capital management initiatives to attract, develop, and retain diverse global talent, we track and report internally on key talent metrics including workforce demographics, critical role pipeline data, and diversity hiring analytics. This data-driven approach helps ensure that we stay aligned to our goal of creating a positive and dynamic global work environment where all employees can flourish. A truly innovative workforce needs to be diverse and leverage the skills and perspectives of a broad range of backgrounds and experiences. To attract a global workforce, we strive to create and embed a culture where employees can bring their whole selves to work.

Our employee resource groups (ERGs) are Company-sponsored groups of global employees that support and promote the specific mutual objectives of both the employees and the Company, with emphasis on the inclusion, diversity, and professional development of employees. The ERGs provide opportunities for employees to connect, develop, and grow together in a supportive environment. As of December 31, 2022, we had four ERGs: ELEVATE (Women); V.E.T. (veterans and allies of the military); LGBTQ+; and United Voices of Materion (all ethnic backgrounds). Our focus continues to be on the recruitment of diverse candidates as well as the development of our internal cadres of diverse leaders so that they can advance their careers and move into leadership positions throughout the Company.

Talent Development

We continue to prioritize professional development and training for all global employees. By providing employees with wide-ranging development programs, opportunities, and paths to success, we empower them to realize their full potential. Our development activities provide further opportunities to retain employees and build upon critical capabilities. We strongly encourage employees to build development plans in partnership with their managers and supervisors, providing both ongoing and specific opportunities for two-way communication and corresponding action. Apprenticeship programs have been implemented in some of our large plant sites, and we continue to introduce similar programs throughout the Company. Likewise, we have implemented career development programs in other key professional functional areas.

We are committed to identifying and developing the talents of our next generation of leaders. Our robust and fully integrated talent and succession-planning process supports the development of our talent pipeline for critical roles in operations management, commercial excellence and engineering. We have continued to grow our campus recruitment initiatives while building programs that develop and grow our early career talent. Additionally, Company development programs have been designed to target and accelerate key leadership and functional skill sets. On an annual basis, we conduct organizational reviews with our Chief Executive Officer and all business unit and function senior leaders to identify and evaluate our high potential, diverse talent and succession plans for our most critical roles.

Available Information

We are subject to the informational requirements of the Securities Exchange Act of 1934. Therefore, we file periodic reports, proxy statements, and other information with the Securities and Exchange Commission (SEC).

We use our investor relations website, <https://investor.materion.com/>, as a channel for routine distribution of important information, including news releases, analyst presentations, and financial information. As soon as reasonably practicable, we make all documents that we file with, or furnish to, the SEC, including our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and any amendments to these reports, available free of charge via this website. The content on any website referred to in this Form 10-K is not incorporated by reference into this Form 10-K unless expressly noted.

Executive Officers of the Registrant

Incorporated by reference from information with respect to executive officers of Materion Corporation set forth in Item 10 in Part III of this Form 10-K.

Item 1A. RISK FACTORS

Our business, financial condition, results of operations, and cash flows can be affected by a number of factors, including, but not limited to, those set forth below and elsewhere in this Form 10-K, any one of which could cause our actual results to vary materially from recent results or from our anticipated future results. Therefore, an investment in us involves some risks, including the risks described below. Although the risks are organized by headings, and each risk is discussed separately, many are interrelated. You should not interpret the disclosure of any risk factor to imply that the risk has not already materialized. The risks discussed below are not the only risks that we may experience. If any of the following risks occur, our business, results of operations, or financial condition could be negatively impacted.

Risks Relating to Economic Conditions

The businesses of many of our customers are subject to significant fluctuations as a result of the cyclical nature of their industries and their sensitivity to general economic conditions, which could adversely affect their demand for our products and reduce our sales and profitability.

A substantial number of our customers are in the semiconductor, industrial, aerospace and defense, automotive, energy, consumer electronics, and telecom and data center end markets. Each of these end markets is cyclical in nature, influenced by a combination of factors which could have a negative impact on our business, including, among other things, periods of economic growth or recession, inflation, rising interest rates and the strength or weakness of the U.S. dollar, the strength of the semiconductor, automotive electronics, and oil and gas industries, the rate of construction of telecommunications infrastructure equipment, and government spending on defense.

Also, in times when growth rates in our markets are lower, or negative, there may be temporary inventory adjustments by our customers that may negatively affect our business.

Risks Relating to the COVID-19 Pandemic

The COVID-19 pandemic has had, and may continue to have, an adverse impact on our business.

The worldwide spread of the COVID-19 virus resulted in a global slowdown of economic activity which could continue to impact demand for a broad variety of goods and services, including from the Company's customers, while also continuing to disrupt sales channels and marketing activities for an unknown period of time. New and potentially more contagious variants of the virus have emerged over the course of the pandemic, along with a surge in cases in several regions across the globe, including Europe and Asia, resulting in renewed shutdown, mandatory quarantines and shelter in place orders in certain regions. These events have led, at times, to slowdowns in our operations, including the temporary shutdown of the Company's Shanghai facility in the first half of 2022. Through continued economic challenges, there continue to be periodic shipping and logistics challenges and continued supply chain constraints, shortages and delays, along with inflationary pricing pressures.

As normal business operations resume, we continue to practice enhanced sanitation procedures, health checks and social distancing protocols, however, none of these measures can completely eliminate the risk of exposure or spread of COVID-19. There could be additional waves or spikes in infection, again causing widespread social, economic and operational impacts. Further, the lingering impacts of the COVID-19 pandemic may continue to adversely affect the economies and financial markets in many countries.

Any prolonged disruption of manufacturing or shipment of our products caused by the COVID-19 pandemic or any future pandemics could materially and adversely affect our results of operations and financial conditions. Surges in infection rate, new shutdowns or quarantines, emergence of new and potentially more contagious variants of the virus and staffing and labor supply challenges may impact our suppliers and our ability to source materials in a timely manner. Further, ongoing supply chain constraints and inflationary pressure could have a negative impact on our results.

Risks Relating to Our Business and Operations

Because we experience seasonal fluctuations in certain end-market sales, our quarterly results will fluctuate, and our annual performance will be affected by the fluctuations.

We expect seasonal patterns to continue, which may cause our quarterly results to fluctuate. If our revenue during any quarter were to fall below the expectations of investors or securities analysts, our share price could decline, perhaps significantly. Unfavorable economic conditions, lower than normal levels of demand, and other occurrences in any quarter could also harm our results of operations. For example, we have experienced customers building inventory in anticipation of increased demand, whereas in other periods, demand decreased because our customers had excess inventory.

A portion of our revenue is derived from the sale of defense-related products through various contracts and subcontracts. These contracts may be suspended, canceled, or delayed, which could have an adverse impact on our revenues.

In 2022, 16% of our value-added sales were to customers in the aerospace and defense end market. A portion of these customers operate under contracts with the U.S. Government, which are vulnerable to termination at any time, for convenience or default. Some of the reasons for cancellation include, but are not limited to, budgetary constraints or re-appropriation of government funds, timing of contract awards, violations of legal or regulatory requirements, and changes in political agenda. If cancellations were to occur, it would result in a reduction in our revenue. Furthermore, significant reductions to defense spending could occur over the next several years due to government spending cuts, which could have a significant adverse impact on us. For example, high-margin defense application delays and/or push-outs may adversely impact our results of operations, including quarterly earnings.

The markets for our products are experiencing rapid changes in technology.

We operate in markets driven by rapidly changing technology and evolving customer specifications and industry standards. Next-generation solutions may quickly render an existing product obsolete and unmarketable. For example, for many years thermal and mechanical performance have been at the forefront of device packaging for wireless communications infrastructure devices. In recent years, a tremendous effort has been put into developing disruptive thermal spreading materials which requires newer technology that replaces the traditional approach of building package. Our growth and future results of operations depend in part upon our ability to enhance existing products and processes which introduce newly developed products on a timely basis that conform to prevailing and evolving industry standards, meet or exceed technological advances in the marketplace, meet changing customer specifications, achieve market acceptance, and respond to our competitors' products.

The process of developing new products can be technologically challenging and requires the accurate anticipation of technological and market trends. We may not be able to introduce new products successfully or do so on a timely basis. If we fail to develop new products that are appealing to our customers or fail to develop products on time and within budgeted amounts, we may lose customers or otherwise be unable to recover our research and development costs, which could adversely affect our margins and profitability.

The availability of competitive substitute materials for beryllium-containing products may reduce our customers' demand for these products and reduce our sales.

In certain product applications, we compete with manufacturers of non-beryllium-containing products, including organic composites, metal alloys or composites, titanium, and aluminum. Our customers may choose to use substitutes for beryllium-containing products in their products for a variety of reasons, including, among other things, the lower costs of those substitutes, the health and safety concerns relating to these products (despite numerous studies affirming the safety of beryllium in these products), and the risk of litigation relating to beryllium-containing products. If our customers use substitutes for beryllium-containing materials in their products, the demand for beryllium-containing products may decrease, which could reduce our sales.

Our long and variable sales and development cycle makes it difficult for us to predict if and when a new product will be sold to customers.

Our sales and development cycle, which is the period from the generation of a sales lead or new product idea through the development of the product and the recording of sales, may typically take several years, making it very difficult to forecast sales and results of operations. Our inability to accurately predict the timing and magnitude of sales of our products, especially newly introduced products, could affect our ability to meet our customers' product delivery requirements or cause our results of operations to suffer if we incur expenses in a particular period that do not translate into sales during that period, or at all. In addition, these failures would make it difficult to plan future capital expenditure needs and could cause us to fail to meet our cash flow requirements.

The availability and prices of some raw materials we use in our manufacturing operations fluctuate, and increases in raw material costs can adversely affect our operating results and our financial condition.

We manufacture advanced engineered materials using various precious and non-precious metals, including beryllium, tantalum, aluminum, cobalt, copper, gold, nickel, palladium, platinum, ruthenium, silver, tin, iridium, rhodium, niobium, hafnium, and tungsten. The availability of, and prices for, these raw materials are volatile and are influenced by worldwide economic conditions, speculative action, world supply and demand balances, inventory levels, availability of substitute metals, the U.S. dollar exchange rate, production costs of U.S. and foreign competitors, anticipated or perceived shortages, and other factors. Prices for precious metal and certain non-precious metals including tantalum, nickel, iridium, rhodium, niobium, hafnium and tungsten have fluctuated significantly in recent years. Additionally, geopolitical instability and the inflationary environment

have added to the volatility. Higher prices can cause adjustments to our inventory carrying values, whether as a result of quantity discrepancies, normal manufacturing losses, differences in scrap rates, theft or other factors, which could have a negative impact on our profitability and cash flows. Also, the price of our products will generally increase in tandem with rising metal prices, as a result of changes in precious metal prices that are passed through to our customers, which could deter them from purchasing our products and adversely affect our net sales and operating profit.

Further, we maintain some precious metals and copper on a consigned inventory basis. The owners of the precious metals and copper charge a fee that fluctuates based on the market price of those metals and other factors. A significant increase in the market price or the consignment fee of precious metals and/or copper would increase our costs, negatively impacting our operating profit.

We are not dependent on any one supplier for our primary raw materials, but the business could be impacted by supply constraints. If, in the future, we are unable to obtain sufficient amounts of metals on a timely basis, we may not be able to obtain metals from alternate sources at competitive prices. In addition, interruptions or reductions in our supply of metals could make it difficult to satisfy our customers' delivery requirements, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Utilizing precious metals in the manufacturing process creates challenges in physical inventory valuations that may impact earnings.

We manufacture precious, non-precious, and specialty metal products and also have metal cleaning operations and in-house refineries that allow for the reclaim of precious metals from internally generated or customer scrap. We refine that scrap through our internal operations and externally through outside vendors.

When taking periodic physical inventories in our refinery operations, we reconcile the actual precious metals to what was estimated prior to the physical inventory count. Those estimates are based in part on assays or samples of precious metals taken during the refining process. If those estimates are inaccurate, we may have an inventory long (more physical precious metal than what we had estimated) or short (less physical precious metal than what we had estimated). These fluctuations could have a material impact on our financial statements and may impact earnings. In the past, our gross margin has been reduced by a net quarterly physical inventory adjustment. Higher precious metal prices may magnify the value of any potential inventory long or short.

Because we maintain a significant inventory of precious metals, we may experience losses due to theft or employee error.

Because we manufacture products that contain precious metals, we maintain a significant amount of precious metals at certain of our manufacturing facilities. Accordingly, we are subject to the risk of precious metal shortages resulting from employee error or theft. In the past, we have had precious metal shortages resulting from theft and employee error, which could reoccur in the future.

While we maintain controls to prevent theft, including physical security measures, if our controls do not operate effectively or are designed ineffectively, our profitability could be adversely affected, including any charges that we might incur as a result of the shortage of our inventory and by costs associated with increased security, preventative measures, and insurance. Additionally, while we maintain insurance to cover the theft of our inventory, such coverage may not sufficiently cover any loss.

Access to consigned metals may restrict our operations

We use gold and other precious metals in the production of some of our products. We obtain most precious metals from consignors under consignment agreements. The consignors retain ownership of the precious metals and charge us fees based on the amounts we consign and the period of consignment. Because we do not control the consigned inventory, we may not be able to access the inventory to meet our forecasted needs, which could adversely impact our results of operations.

We have a limited number of manufacturing facilities, and damage to those facilities, or to critical pieces of equipment in these facilities, could interrupt our operations, increase our costs of doing business, and impair our ability to deliver our products on a timely basis.

Some of our facilities are interdependent. For instance, our manufacturing facility in Elmore, Ohio relies on our mining operation for its supply of beryllium hydroxide used in production of most of its beryllium-containing materials. Additionally, our Reading, Pennsylvania and Tucson, Arizona manufacturing facilities are dependent on materials produced by our Elmore, Ohio manufacturing facility, and our Wheatfield, New York manufacturing facility is dependent on our Buffalo, New York manufacturing facility. The destruction or closure of our mine, any of our manufacturing facilities, or to critical pieces of equipment within these facilities for a significant period of time as a result of harsh weather (including that caused by climate change), fire, explosion, act of war or terrorism, or other natural disaster or unexpected event may interrupt our manufacturing

capabilities, increase our capital expenditures and our costs of doing business, and impair our ability to deliver our products on a timely basis. In addition, many of our manufacturing facilities depend on one source for electric power and natural gas, which could be interrupted due to equipment failures, terrorism, or another cause.

If such events occur, we may need to resort to an alternative source of manufacturing or to delay production, which could increase our costs of doing business and/or result in lost sales. Our property damage and business interruption insurance may not cover all of our potential losses and may not continue to be available to us on acceptable terms, if at all.

A security breach of customer, employee, supplier, or Company information may have a material adverse effect on our business, financial condition, and results of operations.

In the conduct of our business, we collect, use, transmit, store, and report data on information systems and interact with customers, vendors, and employees. Increased global information technology (IT) security threats and more sophisticated and targeted computer crime pose a risk to the security of our systems and networks and the confidentiality, availability, and integrity of our data. We protect our sensitive information and confidential personal data, our facilities, and information technology systems, but we may be vulnerable to future security breaches. Despite our security measures, our IT systems and infrastructure may be vulnerable to customer viruses, cyber-attacks, security breaches caused by employee error or malfeasance, or other disruptions. Any such threat could compromise our networks and the information stored there could be accessed, publicly disclosed, lost, or stolen. A security breach of our computer systems could interrupt or damage our operations or harm our reputation, resulting in a loss of sales, operating profits, and assets. The Company has taken steps to protect our computer systems however there is always a risk of undetected successful intrusions. The Company requires employees to complete information security training programs multiple times a year to reinforce the importance of protecting company information and assets. Materion has not experienced a known information security breach to our systems, however intrusions could pose a risk of undetected data loss or theft that could later be used to harm the Company. There have been no financial penalties or settlements associated with an information security breach within the last three years.

Similar security threats exist with respect to the IT systems of our lenders, suppliers, consultants, advisers, and other third parties with whom we conduct business. A security breach of those computer systems could result in the loss, theft, or disclosure of confidential information and could also interrupt or damage our operations, harm our reputation, and subject us to legal claims.

Data privacy breaches and the evolving global governmental regulation relating to data privacy could adversely affect our results of operations and profitability.

We collect, store, access and otherwise process certain confidential or sensitive data, including proprietary customer and business information, personal data or other information that is subject to privacy and security laws, regulations and customer-imposed requirements. The data privacy laws of the specific jurisdictions in which we operate may vary and potentially conflict. As such, we cannot predict the cost of compliance with future data privacy laws, regulations and standards, future interpretations of current laws, regulations and standards, or the potential effects on our business.

Government enforcement actions can be costly and interrupt the regular operation of our business, and a violation of data privacy laws or a security breach involving personal data can result in fines, reputational damage and civil lawsuits, any of which may adversely affect our results of operations and profitability.

Our defined benefit pension plans and other post-employment benefit plans are subject to financial market risks that could adversely impact our financial performance.

In 2019, the Company's Board of Directors approved changes to the U.S. defined benefit pension plan. The Company froze the pay and service amounts used to calculate the pension benefits for active participants as of January 1, 2020. The Company has defined benefit pension plans in other non-U.S. locations. Our pension expense and our required contributions to our pension plans are directly affected by the value of plan assets, the projected rate of return on plan assets, the actual rate of return on plan assets, and the actuarial assumptions we use to measure our defined benefit pension plan obligations, including the rate at which future obligations are discounted to a present value, or the discount rate. Significant changes in market interest rates and decreases in the fair value of plan assets and investment losses on plan assets would increase funding requirements and expenses and may adversely impact our results of operations.

We provide post-employment health benefits to eligible employees. Our retiree health expense is directly affected by the assumptions we use to measure our retiree health plan obligations, including the assumed rate at which health care costs will increase and the discount rate used to calculate future obligations. For retiree health accounting purposes, we have used a graded assumption schedule to assume the rate at which health care costs will increase. We cannot predict whether changing

market or economic conditions, regulatory changes, or other factors will further increase our retiree health care expenses or obligations, diverting funds we would otherwise apply elsewhere.

Unexpected events and natural disasters at our mine or manufacturing facilities could increase the cost of operating our business.

A portion of our production costs at our mine are fixed regardless of current operating levels. Our operating levels are subject to conditions beyond our control that may increase the cost of mining for varying lengths of time. These conditions include, among other things, weather (including severe weather caused by climate change), fire, natural disasters, pit wall failures, and ore processing changes. Our operations also involve the handling and production of potentially explosive materials. It is possible that an explosion at our mine or other manufacturing facilities could result in death or injuries to employees and others and material property damage to third parties and us. Any explosion could expose us to adverse publicity or liability for damages and materially adversely affect our operations. Any of these events could increase our cost of operations.

Tax increases and changes in tax rules may adversely affect our financial results

As a company conducting business on a global basis with material operations throughout the United States, we are exposed, both directly and indirectly, to the effects of changes in U.S., state, local, and foreign tax rules. Taxes for financial reporting purposes and cash tax liabilities in the future may be adversely affected by changes in such tax rules. Such changes may put us at a competitive disadvantage compared to some of our major competitors, to the extent we are unable to pass the tax costs through to our customers.

The Biden administration has announced in 2021 and 2022, and in certain cases has enacted, a number of tax proposals to fund new government investments in infrastructure, healthcare, and education, among other things. Certain of these proposals involve an increase in the domestic corporate tax rate, which if implemented could have a material impact on our future results of operations and cash flows.

Economic and geopolitical instability including as a result of military conflict could have a material adverse effect on our operating results, financial condition, and cash flows

Geopolitical conflict may have a global impact on our operations, customers, or suppliers. Conflicts may result in various sanctions, including asset freezes and prohibitions on transactions. These sanctions could have a larger impact that expands into other geographies where we do business, including our supply chain, business partners, and customers in those markets, which could result in lost sales, supply shortages, commodity price fluctuations, increased manufacturing costs, transportation logistics challenges, customer credit and liquidity issues, and lost efficiencies.

Risks Related to Legal, Compliance and Regulatory Matters

We conduct our sales and distribution operations on a worldwide basis and are subject to the risks associated with doing business outside the United States.

We sell to customers outside of the United States from our domestic and international operations. Revenue from international operations (principally Europe and Asia) accounted for approximately 51% in 2022, 47% in 2021, and 45% in 2020 of Net sales. We anticipate that international shipments will account for a significant portion of our sales for the foreseeable future. There are a number of risks associated with international business activities, including:

- burdens to comply with multiple and potentially conflicting foreign laws and regulations, including export requirements, tariffs and other barriers, environmental health and safety requirements, increasingly complex requirements concerning privacy and data security, including the European Union's General Data Protection Regulation, and unexpected changes in any of these factors;
- difficulty in obtaining export licenses from the U.S. Government;
- political and economic instability and disruptions, including terrorist attacks;
- disadvantages of competing against companies from countries that are not subject to U.S. laws and regulations, including the Foreign Corrupt Practices Act (FCPA);
- potentially adverse tax consequences due to overlapping or differing tax structures;
- fluctuations in currency exchange rates; and

- disruptions in our business or the businesses of our suppliers or customers due to cyber security incidents, public health concerns (including viral outbreaks, such as COVID-19), the ongoing conflict between Russia and Ukraine or natural disasters.

Any of these risks could have an adverse effect on our international operations by reducing the demand for our products or reducing the prices at which we can sell our products, which could result in an adverse effect on our business, financial position, results of operations, or cash flows. We may hedge our currency transactions to mitigate the impact of currency price volatility on our earnings; however, hedging activities may not be successful. For example, hedging activities may not cover the Company's net euro and yen exposure, which could have an unfavorable impact on our results of operations.

In addition, we could be adversely affected by violations of the FCPA and similar worldwide anti-bribery laws. The FCPA and similar anti-bribery laws in other jurisdictions generally prohibit companies and their intermediaries from making improper payments to non-U.S. officials for the purpose of obtaining or retaining business. While policies mandate compliance with these anti-bribery laws, we operate in many parts of the world that have experienced governmental corruption to some degree and, in certain circumstances, strict compliance with anti-bribery laws may conflict with local customs and practices. We cannot assure that our internal controls and procedures will always protect us from the reckless or criminal acts committed by our employees or agents. If we are found to be liable for FCPA violations or other anti-bribery laws, we could suffer from criminal or civil penalties or other sanctions, which could have a material adverse effect on our business.

Changes in laws or regulations or the manner of their interpretation or enforcement could adversely impact our financial performance and restrict our ability to operate our business or execute our strategies.

New laws or regulations, or changes in existing laws or regulations, or the manner of their interpretation or enforcement, could increase our cost of doing business and restrict our ability to operate our business or execute our strategies. In particular, there may be significant changes in U.S. laws and regulations and international trade agreements that could affect a wide variety of industries and businesses, including those businesses we own and operate.

We may be exposed to certain regulatory and financial risks related to climate change.

Growing concerns about climate change may result in the imposition of additional regulations or restrictions to which we may become subject. A number of governments or governmental bodies have introduced or are contemplating regulatory changes in response to climate change, including regulating greenhouse gas emissions. The outcome of new legislation or regulation in the U.S. and other jurisdictions in which we operate may result in new or additional requirements, additional charges to fund energy efficiency activities, and fees or restrictions on certain activities. Compliance with these climate change initiatives may also result in additional costs to us, including, among other things, increased production costs, additional taxes, reduced emission allowances or additional restrictions on production or operations. Any adopted future climate change regulations could also negatively impact our ability to compete with companies situated in areas not subject to such limitations. Even without such regulation, increased public awareness and adverse publicity about potential impacts on climate change emanating from us or our industry could harm us. We may not be able to recover the cost of compliance with new or more stringent laws and regulations, which could adversely affect our results of operations, financial position or cash flows.

We are exposed to lawsuits in the normal course of business, which could harm our business.

During the ordinary conduct of our business, we may become involved in certain legal proceedings, including those involving product liability claims, third-party lawsuits relating to exposure to beryllium, claims against us of infringement of intellectual property rights of third parties, or other litigation matters. Due to the uncertainties of litigation, we can give no assurance that we will prevail in the resolution of future claims. Certain of these matters involve types of claims that, if they result in an adverse ruling to us, could give rise to substantial liability, which could have a material adverse effect on our business, operating results, or financial condition.

Although we have insurance which may be applicable in certain circumstances, some jurisdictions preclude insurance coverage for punitive damage awards. Accordingly, our profitability could be adversely affected if any current or future claimants obtain judgments for any uninsured compensatory or punitive damages. Further, an unfavorable outcome or settlement of a pending beryllium case or adverse media coverage could encourage the commencement of additional similar litigation.

Health issues, litigation, and government regulations relating to our beryllium operations could significantly reduce demand for our products, limit our ability to operate, and adversely affect our profitability.

If exposed to respirable beryllium fumes, dusts, or powder, some individuals may demonstrate an allergic reaction and may later develop a chronic lung disease known as chronic beryllium disease (CBD). Severe cases of CBD can cause disability or death.

Further, some scientists claim there is evidence of an association between beryllium exposure and lung cancer, and certain standard-setting organizations have classified beryllium and beryllium compounds as human carcinogens.

The health risks relating to exposure to beryllium have been, and will continue to be, a significant issue confronting the beryllium-containing products industry. The health risks associated with beryllium have resulted in product liability claims, employee, and third-party lawsuits. As of December 31, 2022, we had one CBD case outstanding.

The increased levels of scrutiny by federal, state, foreign, and international regulatory authorities could lead to regulatory decisions relating to the approval or prohibition of the use of beryllium-containing materials for various uses. Concerns over CBD and other potential adverse health effects relating to beryllium, as well as concerns regarding potential liability from the use of beryllium, may discourage our customers' use of our beryllium-containing products and significantly reduce demand for our products. In addition, adverse media coverage relating to our beryllium-containing products could damage our reputation or cause a decrease in demand for beryllium-containing products, which could adversely affect our profitability.

Additionally we, as well as our customers, are subject to laws regulating worker exposure to beryllium. OSHA has published a new standard for workplace exposure to beryllium that, among other things, lowered the permissible exposure by a factor of ten and established new requirements for respiratory protection, personal protective clothing and equipment, medical surveillance, hazard communication, and recordkeeping. Materion was a participant in the development of the new standards, which fundamentally represent our current health and safety operating practices. Other government and standard-setting organizations are also reviewing beryllium-related worker safety rules and standards, and will likely make them more stringent. The development, proposal, or adoption of more stringent standards may affect buying decisions by the users of beryllium-containing products. If the standards are made more stringent and/or our customers or other downstream users decide to reduce their use of beryllium-containing products, our results of operations, liquidity, and financial condition could be materially adversely affected. The impact of this potential adverse effect would depend on the nature and extent of the changes to the standards, the cost and ability to meet the new standards, the extent of any reduction in customer use, and other factors. The magnitude of this potential adverse effect cannot be estimated.

Our bertrandite ore mining and manufacturing operations are subject to extensive environmental regulations that impose, and will continue to impose, significant costs and liabilities on us, and future regulation could increase these costs and liabilities or prevent production of beryllium-containing products.

We are subject to a variety of governmental regulations relating to the environment, including those relating to our handling of hazardous materials and air and wastewater emissions. Some environmental laws impose substantial penalties for non-compliance. Others, such as the federal Comprehensive Environmental Response, Compensation, and Liability Act, impose strict, retroactive, and joint and several liability upon entities responsible for releases of hazardous substances. Bertrandite ore mining is also subject to extensive governmental regulation on matters such as permitting and licensing requirements, plant and wildlife protection, reclamation and restoration of mining properties, the discharge of materials into the environment, and the effects that mining has on groundwater quality and availability. Future requirements could impose on us significant additional costs or obligations with respect to our extraction, milling, and processing of ore. If we fail to comply with present and future environmental laws and regulations, we could be subject to liabilities or our operations could be interrupted. In addition, future environmental laws and regulations could restrict our ability to expand our facilities or extract our bertrandite ore deposits. These environmental laws and regulations could also require us to acquire costly equipment, obtain additional financial assurance, or incur other significant expenses in connection with our business, which would increase our costs of production.

Expectations relating to environmental, social and governance considerations expose us to potential liabilities, increased costs and other adverse effects on our business.

Many governments, regulators, investors, employees, customers and other stakeholders are increasingly focused on environmental, social and governance considerations relating to businesses, including climate change and greenhouse gas emissions, human capital and diversity, equity and inclusion. The Company is committed to ensuring that our organization's governance and operations are fully aligned with environmentally and socially responsible practices. We make statements about our environmental, social and governance goals and initiatives through information provided on our website and other communications. Responding to these environmental, social and governance considerations and implementation of these goals and initiatives involves risks and uncertainties, requires investments, which could be material, and are impacted by factors that may be outside our control. In addition, some stakeholders may disagree with our goals and initiatives and the focus of stakeholders may change and evolve over time. Stakeholders also may have very different views on where environmental, social and governance focus should be placed, including differing views of regulators in various jurisdictions in which we operate. Any failure, or perceived failure, by us to achieve our goals, further our initiatives, adhere to our public statements, comply with federal, state or international environmental, social and governance laws and regulations, or meet evolving and varied stakeholder expectations and standards could result in legal and regulatory proceedings against us and materially adversely affect our business, reputation, results of operations, financial condition and stock price.

Risks Related to Our Debt

A major portion of our bank debt consists of variable-rate obligations, which subjects us to interest rate fluctuations.

Our credit facilities are secured by substantially all of our assets (other than non-mining real property and certain other assets). Our working capital line of credit includes variable-rate obligations, which expose us to interest rate risks. If interest rates increase, our debt service obligations on our variable-rate indebtedness would increase even if the amount borrowed remained the same, resulting in a decrease in our net income. Additional information regarding our market risks is contained in Item 7A "Quantitative and Qualitative Disclosures About Market Risk."

Our failure to comply with the covenants contained in the terms of our indebtedness could result in an event of default, which could materially and adversely affect our operating results and our financial condition.

The terms of our credit facilities require us to comply with various covenants, including financial covenants. A global economic downturn could have a material adverse impact on our earnings and cash flow, which could adversely affect our ability to comply with our financial covenants and could limit our borrowing capacity. Our ability to comply with these covenants depends, in part, on factors over which we may have no control. A breach of any of these covenants could result in an event of default under one or more of the agreements governing our indebtedness which, if not cured or waived, could give the holders of the defaulted indebtedness the right to terminate commitments to lend and cause all amounts outstanding with respect to the indebtedness to be due and payable immediately. Acceleration of any of our indebtedness could result in cross-defaults under our other debt instruments. Our assets and cash flow may be insufficient to fully repay borrowings under all of our outstanding debt instruments if some or all of these instruments are accelerated upon an event of default, in which case we may be required to seek legal protection from our creditors.

The terms and amount of our indebtedness may restrict our operations, including our ability to pursue our growth and acquisition strategies.

The terms of our credit facilities contain a number of restrictive covenants, including restrictions in our ability to, among other things, borrow and make investments, acquire other businesses, and consign additional precious metals. These covenants could adversely affect our business by limiting our ability to plan for or react to market conditions or to meet our capital needs, as well as adversely affect our ability to pursue our growth and acquisition strategies, and other strategic initiatives.

Adverse business conditions could impact our ability to generate cash and service our indebtedness.

Our ability to pay interest on our debt and to satisfy our other debt obligations depends in part upon our future financial and operating performance and that of our subsidiaries, and upon our ability to renew or refinance borrowings. Prevailing economic conditions and financial, business, competitive, legislative, regulatory and other factors, many of which are beyond our control, affect our ability to make these payments. While we believe that cash flow from our current level of operations, available cash and available borrowings under our revolving credit facility provide adequate sources of liquidity, a significant drop in operating cash flow resulting from economic conditions, competition or other uncertainties beyond our control could create the need for alternative sources of liquidity. If we are unable to generate sufficient cash flow to meet our debt service obligations, we will have to pursue one or more alternatives, such as reducing or delaying capital or other expenditures, refinancing debt, selling assets, or raising equity capital.

Risks Related to the Execution of Our Strategy

We may not be able to complete our acquisition strategy or successfully integrate acquired businesses.

We are active in pursuing acquisitions. We intend to continue to consider further growth opportunities through the acquisition of assets or companies and routinely review acquisition opportunities. We cannot predict whether we will be successful in pursuing any acquisition opportunities or whether we will be able to achieve the strategic and other objectives related to any acquisitions, including our recent acquisition of HCS-Electronic Materials, including the achievement of any expected synergies. Future acquisitions may involve the expenditure of significant funds and management time. Depending upon the nature, size, and timing of future acquisitions, we may be required to raise additional financing, which may not be available to us on acceptable terms, or at all. Further, we may not be able to successfully integrate any acquired business with our existing businesses or recognize any expected advantages from any completed acquisition.

In addition, there may be liabilities that we fail, or are unable, to discover in the course of performing due diligence investigations on the assets or companies we have already acquired or may acquire in the future. We cannot assure that rights to indemnification by the sellers of these assets or companies to us, even if obtained, or applicable representation and warranty insurance, will be enforceable, collectible, or sufficient in amount, scope, or duration to fully offset the possible liabilities

associated with the business or property acquired. Any such liabilities, individually or in the aggregate, could have a materially adverse effect on our business, financial condition, and results of operations.

Our products are deployed in complex applications and may have errors or defects that we find only after deployment.

Our products are highly complex, designed to be deployed in complicated applications, and may contain undetected defects, errors, or failures. Although our products are generally tested during manufacturing, prior to deployment, they can only be fully tested when deployed in specific applications. For example, we sell beryllium-copper alloy strip products in a coil form to some customers, who then stamp the alloy for its specific purpose. On occasion, it is not until such customer stamps the alloy that a defect in the alloy is detected. Consequently, our customers may discover errors after the products have been deployed. The occurrence of any defects, errors, or failures could result in installation delays, product returns, termination of contracts with our customers, diversion of our resources, increased service and warranty costs, and other losses to our customers, end users, or to us. Any of these occurrences could also result in the loss of, or delay in, market acceptance of our products, and could damage our reputation, which could reduce our sales.

In addition to the risk of unanticipated warranty or recall expenses, our customer contracts may contain provisions that could cause us to incur penalties, be liable for damages, including liquidated damages, or incur other expenses, if we experience difficulties with respect to the functionality, deployment, operation, and availability of our products and services. In the event of late deliveries, late or improper installations or operations, failure to meet product or performance specifications or other product defects, or interruptions or delays in our managed service offerings, our customer contracts may expose us to penalties, liquidated damages, and other liabilities. In the event we were to incur contractual penalties, such as liquidated damages or other related costs that exceed our expectations, our business, financial condition, and operating results could be materially and adversely affected.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

We operate manufacturing plants, service and distribution centers, and other facilities throughout the world. During 2022, we made effective use of our productive capacities at our principal facilities. We believe that the quality and production capacity of our facilities is sufficient to maintain our competitive position for the foreseeable future. Information as of December 31, 2022, with respect to our facilities that are owned or leased, and the respective segments in which they are included, is set forth below:

<u>Location</u>	<u>Owned or Leased</u>	<u>Approximate Number of Square Feet</u>
Corporate and Administrative Offices		
Mayfield Heights, Ohio ⁽¹⁾⁽²⁾	Leased	79,100
Manufacturing Facilities		
Albuquerque, New Mexico ⁽²⁾	Owned/Leased	13,000/63,200
Alzenau, Germany ⁽²⁾	Leased	136,400
Balzers, Lichtenstein ⁽³⁾	Leased	83,400
Brewster, New York ⁽²⁾	Leased	75,000
Buffalo, New York ⁽²⁾	Owned	110,000
Delta, Utah ⁽¹⁾	Owned	100,800
Elmore, Ohio ⁽¹⁾	Owned/Leased	681,000/191,000
Farnborough, England ⁽¹⁾	Leased	10,000
Jena, Germany ⁽³⁾	Owned	25,800
Limerick, Ireland ⁽²⁾	Leased	23,000
Lincoln, Rhode Island ⁽¹⁾	Owned/Leased	166,500/27,100
Lorain, Ohio ⁽¹⁾	Owned	55,000
Milwaukee, Wisconsin ⁽²⁾	Owned/Leased	106,000/150,000
Newton, MA ^(1,2)	Owned/Leased	125,000/69,900
Penang, Malaysia ⁽³⁾	Leased	68,000
Reading, Pennsylvania ⁽¹⁾	Owned/Leased	128,800/287,000
Santa Clara, California ⁽²⁾	Leased	5,800
Shanghai, China ⁽³⁾	Leased	101,400
Singapore ⁽¹⁾⁽²⁾	Leased	24,500
Subic Bay, Philippines ⁽²⁾	Leased	5,000
Suzhou, China ⁽²⁾	Leased	21,700
Taoyuan City, Taiwan ⁽²⁾	Leased	32,500
Tucson, Arizona ⁽¹⁾	Owned	53,000
Tyngsboro, Massachusetts ⁽³⁾	Leased	38,000
Westford, Massachusetts ⁽³⁾	Leased	78,000
Wheatfield, New York ⁽²⁾	Owned	35,000
Service, Sales, and Distribution Centers		
Elmhurst, Illinois ⁽¹⁾	Leased	28,000
Eschborn, Germany ⁽³⁾	Leased	500
Seoul, Korea ⁽²⁾	Leased	2,200
Shanghai, China ⁽¹⁾	Leased	5,000
Stuttgart, Germany ⁽¹⁾	Leased	49,000
Tokyo, Japan ⁽¹⁾	Leased	5,400
Tyngsboro, Massachusetts ⁽³⁾	Leased	4,200

⁽¹⁾ Performance Materials

⁽²⁾ Electronic Materials

⁽³⁾ Precision Optics

Mine Property

The Company holds certain mineral rights on 7,443.5 acres at the Spor Mountain Mining Properties in Juab County, Utah, from which the beryllium-bearing ore, bertrandite, is mined by the open pit method. The Spor Mountain Mining Properties are a part of the Spor Mountain Mine that is owned by Materion. The Spor Mountain Mining Properties are in Juab County, Utah, west of the Thomas Mountain Range, approximately 47 miles northwest of the Spor Mountain Mill, which is 11.5 miles northeast of Delta, Utah, in Millard County. The land surface of the mining areas is owned by Materion. The mineral rights, exclusive of oil and gas, are held by Materion and the State of Utah through the School and Institutional Trust Lands Administration (TLA). TLA beryllium rights are leased by Materion in nine leasing arrangements with varying acreage and expiration dates ranging from 2025 through 2046. The leases have historically been renewed prior to the expiration dates. Several former owners are paid royalties as part of legacy agreements.

Ore resource and reserve data for the Spor Mountain Mine can be found in Part II, Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations". In addition, a Technical Report Summary (TRS) for the Spor Mountain Mine was prepared in 2021, in accordance with Items 1300-1305 of Regulations S-K by qualified persons who have no affiliation with the Company. The TRS, which was filed as Exhibit 96 to our Annual Report on Form 10-K for the year ended December 31, 2021, provides additional details regarding the Spor Mountain Mine, including the technical information and assumptions to support the estimates of mineral resources and mineral reserves.

In accordance with Item 1302 of Regulation S-K, a registrant is required to file a TRS as an exhibit to its Annual Report on Form 10-K when disclosing for the first time ore reserves or resources or when ore reserves or resources have changed materially since the last TRS was filed for the property. Because there have been no material changes to the Company's reserves or resources in 2022, it is not filing a TRS as an exhibit to this Form 10-K.

Mine Exploration Status

The Spor Mountain Mine has been in production since 1968. Over the years, seven different mining areas have been identified. Development drilling was performed across the site for over 30 years and completed in 2000. Additional details can be found in the TRS.

Item 3. LEGAL PROCEEDINGS

Our subsidiaries and our holding company are subject, from time to time, to a variety of civil and administrative proceedings arising out of our normal operations, including, without limitation, product liability claims, health, safety, and environmental claims, and employment-related actions. Among such proceedings are cases alleging that plaintiffs have contracted, or have been placed at risk of contracting, beryllium sensitization or CBD or other lung conditions as a result of exposure to beryllium (beryllium cases). The plaintiffs in beryllium cases seek recovery under negligence and various other legal theories and demand compensatory and often punitive damages, in many cases of an unspecified sum. Spouses of some plaintiffs claim loss of consortium.

Beryllium Claims

As of December 31, 2022, our subsidiary, Materion Brush Inc., was a defendant in one beryllium case. In Richard Miller v. Dolphin, Inc. et al., case number CV2020-005163, filed in the Superior Court of Arizona, Maricopa County, the Company is one of six named defendants in addition to 100 John/Jane Doe defendants. The plaintiff alleges that he contracted beryllium disease from exposures to beryllium-containing products supplied to his employer, Karsten Manufacturing Corporation, where he was a production worker, and asserts claims for negligence, strict liability – failure to warn, strict liability – design defect, and fraudulent concealment. The plaintiff seeks general damages, medical expenses, loss of earnings, consequential damages, and punitive damages, and his wife claims loss of consortium. A co-defendant, Dolphin, Inc., filed a cross-claim against the Company for indemnification. On August 12, 2020, the Company moved to dismiss the cross-claim for failure to state a claim upon which relief can be granted. The court denied the motion on October 23, 2020. On December 7, 2020, the Company filed a Petition for Special Action in the Court of Appeals seeking to appeal the motion to dismiss the cross-claim. The Court of Appeals declined to accept jurisdiction on December 30, 2020. The court entered a scheduling order on September 14, 2021 that did not set a date for trial. Amended scheduling orders were entered on April 8, 2022, August 4, 2022, and November 1, 2022, that likewise did not set a trial date. The Company believes that it has substantive defenses and intends to vigorously defend itself against this suit.

During 2022, one beryllium case was resolved.

No beryllium cases were filed in 2022.

The Company has insurance coverage, which may respond, subject to an annual deductible.

Other Claims

On October 14, 2020, Garett Lucyk, et al. v. Materion Brush Inc., et al., case number 20CV0234, a wage and hour purported collective and class action lawsuit, was filed in the Northern District of Ohio against the Company and its subsidiary, Materion Brush Inc. (collectively, the Company). Plaintiff, a former hourly production employee at the Company's Elmore, Ohio facility, alleges that he and other similarly situated employees are not paid for all time they spend donning and doffing personal protective equipment in violation of the Fair Labor Standards Act and Ohio law. Plaintiff filed a motion for conditional certification, which the Company opposed. On August 2, 2022, the Court conditionally certified a class of employees at the Company's Elmore facility only and rejected certification of a class across the Company's other facilities.

In November 2022, the parties reached a settlement for an immaterial amount. The settlement is pending court approval.

Item 4. MINE SAFETY DISCLOSURES

Information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K (17 CFR 229.104) is included in Exhibit 95 to this Form 10-K.

PART II

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

Market Information

The Company's common shares are listed on the New York Stock Exchange under the symbol "MTRN". As of January 31, 2023, there were 652 shareholders of record.

Share Repurchases

The following table presents information with respect to repurchases of common stock made by us during the three months ended December 31, 2022.

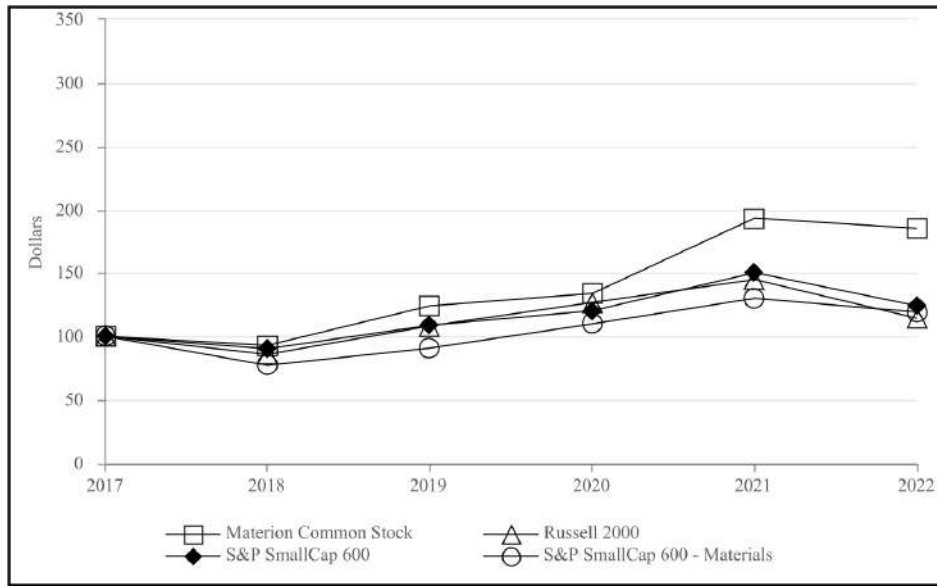
Period	Total Number of Shares Purchased (1)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (2)	Maximum Dollar Value that May Yet Be Purchased Under the Plans or Programs (2)
October 1 through November 4, 2022	5,021	\$ 84.64	—	\$ 8,316,239
November 5 through December 2, 2022	1,403	\$ 80.17	—	8,316,239
December 3 through December 31, 2022	—	—	—	8,316,239
Total	6,424	\$ —	—	\$ 8,316,239

(1) Represents shares surrendered to the Company by employees to satisfy tax withholding obligations on stock appreciation rights issued under the Company's stock incentive plan.

(2) On January 14, 2014, we announced that our Board of Directors authorized the repurchase of up to \$50.0 million of our common stock; this Board authorization does not have an expiration date. During the three months ended December 31, 2022, we did not repurchase any shares under this program.

Performance Graph

The following graph sets forth the cumulative shareholder return on our common shares as compared to the cumulative total return of the Russell 2000 Index, the S&P SmallCap 600 Index, and the S&P SmallCap 600 Materials Index, as Materion Corporation is a component of these indices.



	2018	2019	2020	2021	2022
Materion Corporation	\$ 93	\$ 124	\$ 134	\$ 193	\$ 185
Russell 2000	86	108	127	145	114
S&P SmallCap 600	90	109	120	150	124
S&P SmallCap 600 - Materials	77	91	110	130	119

The above graph assumes that the value of our common shares and each index was \$100 on December 31, 2017 and that all applicable dividends were reinvested.

Item 6. [RESERVED]

Reserved.

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

OVERVIEW

We are an integrated producer of high-performance advanced engineered materials used in a variety of electrical, electronic, thermal, and structural applications. Our products are sold into numerous end markets, including semiconductor, industrial, aerospace and defense, automotive, energy, consumer electronics, and telecom and data center.

RESULTS OF OPERATIONS

(Thousands except per share data)

	2022	2021	2020
Net sales	\$ 1,757,109	\$ 1,510,644	\$ 1,176,274
Value-added sales	1,143,638	859,700	665,125
Gross margin	343,880	283,762	192,633
Gross margin as a % of Value-added sales	30 %	33 %	29 %
Selling, general, and administrative (SG&A) expense	169,338	163,777	133,963
SG&A expense as a % of Value-added sales	15 %	19 %	20 %
Research and development (R&D) expense	28,977	26,575	20,283
R&D expense as a % of Value-added sales	3 %	3 %	3 %
Goodwill impairment charges	—	—	9,053
Asset impairment charges	—	—	1,419
Restructuring expense	1,573	(438)	11,237
Other — net	24,237	16,737	8,463
Operating profit	119,755	77,111	8,215
Other non-operating (income) expense — net	(5,250)	(5,115)	(3,939)
Interest expense — net	21,905	4,901	3,879
Income before income taxes	103,100	77,325	8,275
Income tax expense (benefit)	17,110	4,851	(7,187)
Net income	85,990	72,474	15,462
Diluted earnings per share	4.14	3.50	0.75

2022 Compared to 2021

Net sales of \$1,757.1 million in 2022 increased \$246.5 million from \$1,510.6 million in 2021. Increased net sales in the Performance Materials and Electronic Materials segments were partially offset by a net sales decrease in the Precision Optics segment. Incremental sales from the full year of HCS-Electronic Materials accounted for \$153.3 million of the net sales increase, most of which were sales into the semiconductor end market. Additionally, volume and price increases drove organic growth in our industrial (15%), energy (19%) and aerospace and defense (13%) end markets when compared to last year. See Note C to the Consolidated Financial Statements for additional details on the year over year changes in our net sales by segment and market.

The change in precious metal and copper prices, which are passed on to the customer as discussed in the value-added sales section below, unfavorably impacted net sales by \$9.2 million in 2022 compared to 2021. This impact was partially offset by an increase in the volume of raw material beryllium hydroxide sales in 2022 of \$4.0 million.

Value-added sales is a non-GAAP financial measure that removes the impact of pass-through metal costs and allows for analysis without the distortion of the movement or volatility in metal prices and changes in mix due to customer-supplied material. Internally, we manage our business on this basis, and a reconciliation of net sales, the most directly comparable GAAP financial measure, to value-added sales is included herein. Value-added sales of \$1,143.6 million in 2022 were up 33% compared to 2021. Incremental sales from the full year of HCS-Electronic materials accounted for \$153.3 million of the value-

added sales increase, most of which were sales into the semiconductor end market. Additionally, volume and price increases drove organic growth in our industrial (15%), semi-conductor (11%), energy (43%) and aerospace and defense (8%) end markets. These increases were partially offset by foreign currency headwinds.

Gross margin was \$343.9 in 2022, a 21% increase from the \$283.8 million gross margin recorded in 2021. Gross margin expressed as a percentage of value-added sales decreased to 30% in 2022 from 33% in 2021 mainly due to lower gross margin on the HCS-Electronic Materials business and the precision clad strip project.

SG&A expense totaled \$169.3 million in 2022 as compared to \$163.8 million in 2021. The increase in SG&A expense for 2022 was primarily due to incremental HCS-Electronic Materials SG&A expense of \$4.8 million. Expressed as a percentage of value-added sales, SG&A expense decreased 400 basis points in 2022 to 15% compared to 19% in 2021.

R&D expense consists primarily of direct personnel costs for pre-production evaluation and testing of new products, prototypes, and applications. R&D expense was \$29.0 million in 2022, an increase of 9% compared to 2021. R&D costs as a percentage of value-added sales remained at 3%.

Restructuring expense consists primarily of cost reduction actions taken in order to reduce our fixed cost structure. In 2022, we recorded a combined total of \$1.6 million of restructuring charges in our Precision Optics, Electronic Materials and Other segments.

Other-net totaled expense of \$24.2 million and \$16.7 million in 2022 and 2021, respectively. The increase in Other-net was driven by an increase in acquisition amortization due to a full year of intangible amortization from the HCS-Electronic Materials acquisition and higher metal consignment fees partially offset by foreign exchange gains in 2022 compared to losses in the prior year. Refer to Note E to the Consolidated Financial Statements for the major components within Other-net.

Other non-operating (income) expense-net includes components of pension and post-retirement income other than service costs. Refer to Note O of the Consolidated Financial Statements for details of the components of net periodic benefit costs.

Interest expense - net was \$21.9 million in 2022 and \$4.9 million in 2021. The increase in interest expense in 2022 compared to 2021 was primarily due to borrowings under our term loan facility and under our revolving credit facility incurred in the fourth quarter of 2021 used to finance the HCS-Electronic Materials acquisition.

Income tax expense (benefit) for 2022 was \$17.1 million of expense compared to \$4.9 million of benefit in 2021. The effects of percentage depletion, foreign derived intangible income deduction, and the impacts of research and development credits were the primary factors for the difference between the effective and statutory tax rates in 2022. Refer to Note G to the Consolidated Financial Statements for further details on income taxes.

See the Management Discussion and Analysis section of our Annual Report on Form 10-K for the year ended December 31, 2021 for a discussion of our results for 2021 compared to 2020.

Segment Disclosures

The Company has four reportable segments: Performance Materials, Electronic Materials, Precision Optics, and Other. The Other reportable segment includes unallocated corporate costs.

Performance Materials

(Thousands)	2022	2021	2020
Net sales	\$ 671,525	\$ 511,874	\$ 394,195
Value-added sales	589,587	440,432	345,335
EBITDA	125,227	89,028	38,745

2022 Compared to 2021

Net sales from the Performance Materials segment of \$671.5 million in 2022 increased 31% compared to 2021. The increase in sales was due to higher organic volume in industrial, aerospace and defense, energy and telecom end markets as well as an increase in the volume of raw material beryllium hydroxide sales in the 2022 of \$4 million. In addition, sales from HCS-Electronic Materials increased sales in this segment by \$27.1 million and incremental sales from the clad strip project increased sales by \$54.5 million. These impacts were slightly offset by a decrease in automotive market sales as a result of the global chip shortage impacting the timing of demand and foreign currency headwinds.

Value-added sales of \$589.6 million in 2022 were 34% higher than value-added sales of \$440.4 million in 2021. The increase in value-added sales was driven by the same factors driving the increase in net sales.

EBITDA for the Performance Materials segment was \$125.2 million in 2022 compared to \$89.0 million in 2021. The increase in EBITDA was primarily due to the same factors driving the increase in net sales, partially offset by incremental acquisition and integration costs of \$1.1 million, primarily related to purchase accounting inventory step up charges, \$9.8 million of incremental start up costs and \$4.1 million of additional resource costs and scrap for the new wide area precision strip clad facility.

Electronic Materials

(Thousands)	2022	2021	2020
Net sales	\$ 971,902	\$ 866,816	\$ 670,867
Value-added sales	441,955	289,119	220,516
EBITDA	67,806	44,852	30,127

2022 Compared to 2021

Net sales from the Electronic Materials segment of \$971.9 million in 2022 were 12% higher than net sales of \$866.8 million in 2021. The increase in net sales was primarily due to \$126.2 million in net sales from the HCS-Electronic Materials acquisition. The net sales increase from HCS-Electronic Materials was offset by lower precious metal prices impacting net sales by \$9.9 million and foreign currency headwinds. In addition, there was an increase in customer-supplied precious metal transactions in 2022, which does not impact value-added sales but would reduce net sales when compared to 2021.

Value-added sales of \$442.0 million increased 53% compared to value-added sales of \$289.1 million in 2021. The increase was primarily driven by \$126.2 million in value-added sales from the HCS-Electronic Materials acquisition and an increase in value-added sales in the semiconductor end market. The impact of these items were partially offset by foreign currency headwinds.

EBITDA for the Electronic Materials segment was \$67.8 million in 2022 compared to \$44.9 million in 2021. The increase in EBITDA was primarily due to incremental EBITDA from HCS-Electronic Materials.

Precision Optics

(Thousands)	2022	2021	2020
Net sales	\$ 113,682	\$ 131,954	\$ 111,212
Value-added sales	113,580	131,815	101,878
EBITDA	13,753	25,854	2,470

2022 Compared to 2021

Net sales from the Precision Optics segment were \$113.7 million in 2022, a decrease of 14% compared to net sales of \$132.0 million in 2021. The change was primarily driven by a reduction in sales related to COVID-19 PCR testing programs, the discontinuation of a consumer electronic application and foreign currency headwinds.

Value-added sales of \$113.6 million in 2022 decreased 14% compared to value-added sales of \$131.8 million in 2021. The decrease in value-added sales was due to the same factors driving the decrease in net sales.

EBITDA for the Precision Optics segment was \$13.8 million in 2022 compared to \$25.9 million in 2021. The decrease in EBITDA was driven by decreased volumes, the temporary shut down of the Shanghai facility in the first and second quarters of 2022, related unabsorbed costs and restructuring charges incurred during 2022.

Other

(Thousands)	2022	2021	2020
Net sales	\$ —	\$ —	\$ —
Value-added sales	(1,483)	(1,666)	(2,604)
EBITDA	(28,345)	(33,371)	(16,804)

2022 Compared to 2021

The Other reportable segment in total includes unallocated corporate costs. Corporate costs of \$28.3 million in 2022 decreased \$5.1 million as compared to \$33.4 million in 2021. Corporate costs were 2% of total Company value-added sales in 2022 compared to 4% in 2021. The decrease in corporate costs in 2022 compared to 2021 was primarily due to a \$7.3 million decrease in general and administrative expense, primarily related to a decrease in merger and acquisition costs, primarily related to the HCS-Electronic Materials acquisition in 2021.

Value-Added Sales - Reconciliation of Non-GAAP Financial Measure

A reconciliation of net sales to value-added sales, a non-GAAP financial measure, for each reportable segment and for the Company in total for 2022, 2021, and 2020 is as follows:

(Thousands)	2022	2021	2020
Net sales			
Performance Materials	\$ 671,525	\$ 511,874	\$ 394,195
Electronic Materials	\$ 971,902	866,816	\$ 670,867
Precision Optics	113,682	131,954	\$ 111,212
Other	—	—	—
Total	\$ 1,757,109	\$ 1,510,644	\$ 1,176,274
Less: pass-through metal costs			
Performance Materials	\$ 81,938	\$ 71,442	\$ 48,860
Electronic Materials	529,947	577,697	450,351
Precision Optics	102	139	9,334
Other	1,483	1,666	2,604
Total	\$ 613,470	\$ 650,944	\$ 511,149
Value-added sales			
Performance Materials	589,587	440,432	345,335
Electronic Materials	441,955	289,119	220,516
Precision Optics	113,580	131,815	101,878
Other	(1,483)	(1,666)	(2,604)
Total	\$ 1,143,639	\$ 859,700	\$ 665,125

The cost of gold, silver, platinum, palladium, copper, ruthenium, iridium, rhodium, rhenium, and osmium can be quite volatile. Our pricing policy is to directly pass the cost of these metals on to the customer in order to mitigate the impact of metal price volatility on our results from operations. Trends and comparisons of net sales are affected by movements in the market prices of these metals, but changes in net sales due to metal price movements may not have a proportionate impact on our profitability.

Internally, management reviews net sales on a value-added basis. Value-added sales is a non-GAAP financial measure that deducts the value of the pass-through metal costs from net sales. Value-added sales allow management to assess the impact of differences in net sales between periods, segments, or markets, and analyze the resulting margins and profitability without the distortion of movements in pass-through metal costs. The dollar amount of gross margin and operating profit is not affected by the value-added sales calculation. We sell other metals and materials that are not considered direct pass-throughs, and these costs are not deducted from net sales when calculating value-added sales.

Our net sales are also affected by changes in the use of customer-supplied metal. When we manufacture a precious metal product, the customer may purchase metal from us or may elect to provide its own metal, in which case we process the metal on a toll basis, and the metal value does not flow through net sales or cost of sales. In either case, we generally earn our margin based upon our fabrication efforts. The relationship of this margin to net sales can change depending upon whether or not the product was made from our metal or the customer's metal. The use of value-added sales removes the potential distortion in the comparison of net sales caused by changes in the level of customer-supplied metal.

By presenting information on net sales and value-added sales, it is our intention to allow users of our financial statements to review our net sales with and without the impact of the pass-through metals.

FINANCIAL POSITION

Cash Flow

A summary of cash flows provided by (used in) operating, investing, and financing activities is as follows:

(Thousands)	2022	2021	2020
Net cash provided by operating activities	\$ 115,958	\$ 90,241	\$ 101,057
Net cash (used in) investing activities	(79,729)	(494,269)	(194,707)
Net cash provided by (used in) financing activities	(35,558)	393,006	(7,091)
Effects of exchange rate changes	(2,032)	(394)	1,612
Net change in cash and cash equivalents	\$ (1,361)	\$ (11,416)	\$ (99,129)

Net cash provided by operating activities totaled \$116.0 million in 2022 versus \$90.2 million in 2021. Operating cash flow increased primarily due to net income increase of \$13.5 million, despite an increase in depreciation and amortization of \$9.3 million, customer prepayments increase of \$8.2 million and favorable impact of deferred taxes of \$14.7 million compared to the prior year. This was partially offset by an increase in working capital outflow, from \$33.7 million in 2021 to \$58.6 million in 2022. The increase in working capital outflow was primarily driven by an increase in inventory levels to support higher sales as well as increases in the price of raw materials.

Net cash used in investing activities was \$79.7 million in 2022 compared to \$494.3 million in 2021. The decrease was due to a \$392.2 million payment, net of cash acquired, for the HCS-Electronic Materials acquisition in 2021. In addition, capital expenditures decreased by \$25.3 million in 2022, compared to 2021, due to increased investments in new equipment funded in part by customer prepayments in 2021 compared to 2022, primarily related to the precision clad strip project. See Notes B and K to the Consolidated Financial Statements for additional discussion.

Net cash provided by (used in) financing activities decreased \$428.6 million from 2021. In 2021, the Company entered into the \$300 million term loan and incurred \$100 million of incremental borrowings under the revolving credit facility used to fund the acquisition of HCS-Electronic Materials. In 2022, the Company began repaying the incurred debt from 2021 and the net amount due under the revolving credit facility and term loan decreased by \$28.3 million.

Dividends per common share increased 4% to \$0.495 per share in 2022. Total dividend payments to common shareholders were \$10.2 million in 2022 and \$9.7 million in 2021. In May 2022, the Board of Directors declared an increase in our quarterly dividend from \$0.12 to \$0.125 per share. We intend to pay a quarterly dividend on an ongoing basis, subject to a continuing strong capital structure and a determination that the dividend remains in the best interest of our shareholders.

Liquidity

We believe that cash flow from operations plus available borrowing capacity and our current cash balance are adequate to support operating requirements, capital expenditures, projected pension plan contributions, the current dividend and share repurchase programs, environmental remediation projects, and strategic acquisitions for at least the next 12 months and the foreseeable future thereafter. At December 31, 2022, cash and cash equivalents held by our foreign operations totaled \$11.7 million. We do not expect restrictions on repatriation of cash held outside of the United States to have a material effect on our overall liquidity, financial condition, or the results of operations for the foreseeable future.

A summary of key data relative to our liquidity, including the outstanding debt, cash balances, and available borrowing capacity, as of December 31, 2022 and December 31, 2021 is as follows:

(Thousands)	December 31,	
	2022	2021
Cash and cash equivalents	\$ 13,101	\$ 14,462
Total outstanding debt	431,981	449,747
Net (debt) cash	(418,880)	(435,285)
Available borrowing capacity	\$ 185,294	\$ 176,419

Net (debt) cash is a non-GAAP financial measure. We are providing this information because we believe it is more indicative of our overall financial position. It is also a measure our management uses to assess financing and other decisions. We believe that based on our typical cash flow generated from operations, we can support a higher leverage ratio in future periods.

The available borrowing capacity in the table above represents the additional amounts that could be borrowed under our revolving credit facility and other secured lines existing as of the end of each year depicted. The applicable debt covenants have been taken into account when determining the available borrowing capacity, including the covenant that restricts

borrowing capacity to a multiple of the twelve-month trailing earnings before interest, income taxes, depreciation and amortization, and other adjustments.

In January 2023, we amended the agreement governing our \$375.0 million revolving credit facility (Credit Agreement). Pursuant to the amendment, we transition U.S. dollar denominated borrowings from LIBOR to the Secured Overnight Financial Rate (SOFR) for both the revolving credit agreement and the term loan and increased the cap on precious metals facilities from \$600 million to \$615 million.

The Company had previously amended and restated the Credit Agreement in connection with the HCS-Electronic Materials acquisition in November 2021. A \$300 million delayed draw term loan facility was added to the Credit Agreement and the maturity date of the Credit Agreement was extended from 2024 to 2026. Moreover, the Credit Agreement also provides for an uncommitted incremental facility whereby, under certain conditions, the Company may be able to borrow additional term loans in an aggregate amount not to exceed \$150.0 million. The Credit Agreement provides the Company and its subsidiaries with additional capacity to enter into facilities for the consignment of precious metals and copper, and provides enhanced flexibility to finance acquisitions and other strategic initiatives. Borrowings under the Credit Agreement are secured by substantially all of the assets of the Company and its direct subsidiaries, with the exception of non-mining real property, precious metal, copper and certain other assets.

The Credit Agreement allows the Company to borrow money at a premium over SOFR, following the January 2023 amendment, or prime rate and at varying maturities. The premium resets quarterly according to the terms and conditions stipulated in the agreement. The Credit Agreement includes restrictive covenants relating to restrictions on additional indebtedness, acquisitions, dividends, and stock repurchases. In addition, the Credit Agreement includes covenants that limit the Company to a maximum leverage ratio and a minimum interest coverage ratio. We were in compliance with all of our debt covenants as of December 31, 2022 and December 31, 2021. Cash on hand up to \$25 million can benefit the covenants and may benefit the borrowing capacity under the Credit Agreement.

In November 2021, we completed the acquisition of HCS-Electronic Materials. The Company financed the purchase price for the HCS-Electronic Materials acquisition with a new \$300 million five-year term loan pursuant to its delayed draw term loan facility under the Credit Agreement and \$103 million of borrowings under its amended revolving credit facility. The interest rate for the term loan is based on SOFR, following the January 2023 amendment, plus a tiered rate determined by the Company's quarterly leverage ratio.

Portions of our business utilize off-balance sheet consignment arrangements allowing us to use metal owned by precious metal consignors as we manufacture product for our customers. Metal is purchased from the precious metal consignor and sold to our customer at the time of product shipment. Expansion of business volumes and/or higher metal prices can put pressure on the consignment line limitations from time to time. In August 2022, we entered into a precious metals consignment agreement, maturing on August 31, 2025, which replaced the consignment agreements that would have matured on August 27, 2022. The available and unused capacity under the metal consignment agreements expiring in August 2025 totaled approximately \$241.9 million as of December 31, 2022, compared to \$69.8 million as of December 31, 2021 under the metal consignment agreements that expired on August 27, 2022. The availability is determined by Board approved levels and actual capacity. The availability is determined by Board approved levels and actual capacity.

In January 2014, our Board of Directors approved a plan to repurchase up to \$50.0 million of our common stock. The timing of the share repurchases will depend on several factors, including market and business conditions, our cash flow, debt levels, and other investment opportunities. There is no minimum number of common shares required to be repurchased in a given year, and the repurchases may be discontinued at any time. We did not repurchase any shares in 2021 or 2022. Since the approval of the repurchase plan, we have purchased 1,254,264 shares at a total cost of \$41.7 million, or an average of \$33.23 per share.

Material Future Cash Obligations

The following table summarizes our material future obligations with respect to debt and associated interest as of December 31, 2022. In addition to the amounts below, the Company anticipates incurring costs related to its finance lease obligations and non-cancelable lease payments for operating leases with an initial lease term in excess of one year. These obligations are further detailed in Note L.

(Millions)	2023	2024	2025	2026	2027	There- after	Total
Debt ⁽¹⁾	21.1	30.3	30.3	353.5	0.2	0.3	435.7
Interest payments on debt ⁽²⁾	17.3	15.9	14.1	10.3	—	—	57.6
Total	\$ 38.4	\$ 46.2	\$ 44.4	\$ 363.8	\$ 0.2	\$ 0.3	\$ 493.3

(1) Refer to Note O to the Consolidated Financial Statements.

(2) These amounts represent future interest payments related to our total debt, excluding any interest payments to be made on borrowings under our Credit Agreement.

Off-balance Sheet Obligations

We maintain the majority of the precious metals and copper we use in production on a consignment basis in order to reduce our exposure to metal price movements and to reduce our working capital investment. Refer to Item 7A "Quantitative and Qualitative Disclosures about Market Risk." The notional value of off-balance sheet precious metals and copper was \$373.1 million as of December 31, 2022 versus \$480.2 million as of December 31, 2021. We were in compliance with all of the covenants contained in the consignment agreements as of December 31, 2022 and December 31, 2021. Refer to Note I for additional information.

ORE RESERVES

The following information concerning our mining properties has been prepared in accordance with the requirements of subpart 1300 of Regulation S-K, which first became applicable to us for the year ended December 31, 2021. These requirements differ significantly from the previously applicable disclosure requirements of SEC Industry Guide 7. Among other differences, subpart 1300 of Regulation S-K requires us to disclose our mineral resources, in addition to our mineral reserves, as of the end of our most recently completed fiscal year.

As used in this Form 10-K, the terms "mineral resource," "measured mineral resource," "indicated mineral resource," "inferred mineral resource," "mineral reserve," "proven mineral reserve" and "probable mineral reserve" are defined and used in accordance with subpart 1300 of Regulation S-K. Under subpart 1300 of Regulation S-K, mineral resources may not be classified as "mineral reserves" unless the determination has been made by a qualified person that the mineral resources can be the basis of an economically viable project. You are specifically cautioned not to assume that any part or all of the mineral resources in these categories will ever be converted into mineral reserves, as defined by the SEC. We rely on estimates of our ore resources and recoverable reserves, which estimation is complex due to geological characteristics of the properties and the number of assumptions made.

You are cautioned that, except for that portion of mineral resources classified as mineral reserves, mineral resources do not have demonstrated economic value. Inferred mineral resources are estimates based on limited geological evidence and sampling and have a too high of a degree of uncertainty as to their existence to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Estimates of inferred mineral resources may not be converted to a mineral reserve. It cannot be assumed that all or any part of an inferred mineral resource will ever be upgraded to a higher category. A significant amount of additional work must be completed in order to determine whether an inferred mineral resource may be upgraded to a higher category. Therefore, you are cautioned not to assume that all or any part of an inferred mineral resource exists, that it can be the basis of an economically viable project, or that it will ever be upgraded to a higher category. Likewise, you are cautioned not to assume that all or any part of measured or indicated mineral resources will ever be converted to mineral reserves.

The information that follows relating to the Spor Mountain Mine is derived, for the most part, from the TRS, which was prepared in compliance with Item 601(b)(96) and subpart 1300 of Regulation S-K. Portions of the following information are based on assumptions, qualifications and procedures that are not fully described herein. Reference should be made to the full text of the TRS, which is filed as Exhibit 96 to this Form 10-K and is incorporated by reference herein.

Mineral Resources

A mineral resource is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed justifiable technical and economic conditions, is likely to, in whole or part, become economically extractable.

The term "measured mineral resource" is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling.

The term "indicated resources" means resources for which quantity and grade or quality can be estimated on the basis of adequate geological evidence and sampling.

The term “inferred resources” means resources for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling.

The following represents our indicated and inferred ore mineral resources, exclusive of mineral reserves, as of December 31, 2022 and December 31, 2021:

	Indicated	Inferred
As of December 31, 2022		
Tonnage (in thousands)	1,504	2,630
Grade (% beryllium)	0.128 %	0.345 %
Beryllium pounds (in millions)	38.38	18.12
As of December 31, 2021		
Tonnage (in thousands)	1,504	2,630
Grade (% beryllium)	0.128 %	0.345 %
Beryllium pounds (in millions)	38.38	18.12

Mineral Reserves

A mineral reserve is an estimate of tonnage and grade, or quality, of indicated and measured mineral resources that, in the opinion of a qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or Indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.

Proven mineral reserves are the economically mineable part of a measured mineral resource and can only result from conversion of a measured mineral resource. Probable mineral reserves are the economically mineable part of an indicated and, in some cases, a measured mineral resource. All mineral reserves are classified as proven or probable and are supported by life-of-mine plans. All mineral reserve estimates were reviewed and validated by the Qualified Persons.

The following represents our ore mineral reserves:

	Proven	Probable	Total
As of December 31, 2022			
Tonnage (in thousands)	7,678	962	8,640
Grade (% beryllium)	0.245 %	0.258 %	0.246 %
Beryllium pounds (in millions)	37.57	4.97	42.54
As of December 31, 2021			
Tonnage (in thousands)	7,739	962	8,701
Grade (% beryllium)	0.245 %	0.258 %	0.246 %
Beryllium pounds (in millions)	37.92	4.97	42.89

Internal Controls Disclosure

Under subpart 1305 of Regulation S-K, management has included information regarding the internal controls that the Company used in determining the mineral resource and reserve estimation efforts. There is no disclosure required regarding exploration procedures as the Company completed development drilling on all areas at the Spor Mountain Mine in 2000, and no future exploration is planned at this time. As it relates to estimating mineral resources and reserves, the Company incorporates the following items into the control process:

- a. All samples are tested with a beryllometer.
- b. The beryllometer calibration procedures are verified through comparison with the beryllium production from the mill for the same ores.
- c. The lab and field beryllometers are calibrated on site each shift.
- d. Materion follows industry standard procedures for calibrating its field and laboratory beryllometers each shift that they are utilized.
- e. Resource models are reconciled to production data regularly.
- f. Materion has been producing ore at the Spor Mountain Mine for over 45 years and has mined and processed materials from a range of pits from the property. It is considered that Materion has adequate data to support its milling practices.

The Qualified Persons have assessed that the Company's control procedures, including redundant testing at various operational points, the quality control and quality assurance measures, the calibration measures, the extensive cataloging of sample duplicates, and the reconciliation with recovered beryllium, are sufficient.

Based upon average production levels in recent years and our near-term production forecasts, proven reserves would last a minimum of seventy-five years. The table below details our production of beryllium at our Utah location.

<u>(Thousands of Pounds of Beryllium)</u>	2022	2021	2020
Domestic ore	382	386	367
Purchased ore	—	—	—
Unyielded total	382	386	367
Annual yield	90 %	91 %	90 %
Beryllium produced	344	353	334
% of mill capacity	53 %	55 %	52 %

CRITICAL ACCOUNTING POLICIES

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires the inherent use of estimates and management's judgment in establishing those estimates. The following policies are considered by management to be critical because adherence to these policies relies significantly upon our judgment.

Revenue Recognition

Net sales consist primarily of revenue from the sale of precious and non-precious specialty metals, beryllium and copper-based alloys, beryllium composites, and other products into numerous end markets. The Company requires an agreement with a customer that creates enforceable rights and performance obligations. We recognize revenue, in an amount that reflects the consideration to which the Company expects to be entitled, when we satisfy a performance obligation by transferring control of a product to the customer. The core principle of the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 606 is supported by five steps which are outlined below with management's judgment in applying each.

1) Identify the contract with a customer

A contract with a customer exists when the Company enters into an enforceable contract with a customer that identifies each party's rights regarding the products to be transferred or services to be rendered and the related payment terms, the contract has commercial substance, and the Company determines that collection of substantially all consideration for products that are transferred is probable based on the customer's intent and ability to pay.

Management exercises judgment in its assessment that it is probable that the Company will collect substantially all of the payments attributed to products or services that will be transferred to our customers. We regularly review the creditworthiness of our customers considering such factors as the macroeconomic environment, current market conditions, geographic considerations, historical collection experience, a customer's current credit standing, and the age of outstanding accounts receivable balances that may affect a customer's ability to pay. If, after we have recognized revenue, the collectability of an account receivable becomes doubtful, we establish appropriate allowances and reserves against accounts receivable with respect to the previously recognized revenue that remains uncollected. Allowances and reserves against accounts receivable are maintained for estimated probable losses and are sufficient enough to ensure that accounts receivable are stated at amounts that are considered collectible.

If management forms a judgment that a particular customer's financial condition has deteriorated but decides to deliver products or services to the customer, we will defer recognizing revenue relating to products sold to that customer until it is probable that we will collect substantially all of the consideration to which we are entitled, which typically coincides with the collection of cash.

2) Identify the performance obligations in the contract

Performance obligations promised in a contract are identified based on the products that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the product either on its own or together with other resources that are readily available from third parties or from the Company, and are distinct in the context of the contract, whereby the transfer of the product is separately identifiable from other promises in the contract.

Certain of the Company's contracts with customers may contain multiple performance obligations. As a result, management utilizes judgment to determine the appropriate accounting, including whether multiple promised products or services in a

contract should be accounted for separately or as a group, how the consideration should be allocated among the performance obligations, and when to recognize revenue upon satisfaction of the performance obligations.

3) Determine the transaction price

The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring products or services to the customer. The vast majority of our contracts contain fixed consideration terms. However, the Company also has contracts with customers that include variable consideration. Volume discounts and rebates are offered as an incentive to encourage additional purchases and customer loyalty. Volume discounts and rebates typically require a customer to purchase a specified quantity of products, after which the price of additional products decreases. These contracts include variable consideration because the total amount to be paid by the customer is not known at contract inception and is affected by the quantity of products ultimately purchased. As a result, management applies judgment to estimate the volume discounts based on experience with similar contracts, customers, and current sales forecasts. Also, the Company has contracts, primarily relating to its precious metal products, where the transaction price includes variable consideration at contract inception because it is calculated based on a commodity index at a specified date. Management exercises judgment to determine the minimum amount to be included in the transaction price. Variable consideration is included in the transaction price if, in the Company's judgment, it is probable that a significant future reversal of cumulative revenue under the contract will not occur.

4) Allocate the transaction price to performance obligations in the contract

If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. Contracts that contain multiple performance obligations require an allocation of the transaction price to each performance obligation based on the relative standalone selling price. The Company typically determines standalone selling price based on the price at which the performance obligation is sold separately. If the standalone selling price is not observable through past transactions, management uses judgment to estimate the standalone selling price taking into account available information such as market conditions and internally approved pricing guidelines related to the performance obligations.

5) Recognize revenue when or as the Company satisfies a performance obligation

Management applies the principle of control to determine whether the customer obtains control of a product as it is created and if revenue should be recognized over time. The vast majority of the Company's performance obligations are satisfied at a point in time when control of the product transfers to the customer. Control of the product is generally transferred to the customer when the Company has a present right to payment, the customer has legal title, the customer has physical possession, the customer has the significant risks and rewards of ownership, and the customer has accepted the product.

However, for certain contracts, particularly relating to the U.S. government and relating to specialized products with no alternative use, we generally recognize revenue over time as we procure the product because of continuous transfer of control to the customer. This continuous transfer of control to the customer is supported by a termination for convenience clause in the contract that allows the customer to unilaterally terminate the contract, pay the Company for costs incurred plus a reasonable profit, and take control of any work in process. We generally use the cost-to-cost measure of progress for these contracts because it best depicts the transfer of control to the customer which occurs as we incur costs on the related contracts. Under the cost-to-cost measure of progress, the extent of progress towards completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. Therefore, revenue is recognized proportionally as costs are incurred for these contracts.

The Company recognizes revenue net of reserves for price adjustments, returns, and prompt payment discounts. Management generally estimates these amounts using the expected value method. The Company has sufficient historical experience with our customers that provides predictive value to support that the reserves recorded are appropriate.

Other considerations

We receive payment from customers equal to the invoice price for most of our sales transactions.

Returned products are generally not accepted unless the customer notifies the Company in writing, and we authorize the product return by the customer.

Unearned revenue is recorded cash consideration from customers in advance of the shipment of the goods, which is a liability on our Consolidated Balance Sheets. This contract liability is subsequently reversed and the revenue, cost of sales, and gross margin are recorded when the Company has transferred control of the product to the customer. The related inventory also remains on our balance sheet until the revenue recognition criteria are met. Advanced billings are typically made in association with products with long manufacturing times and/or products relating to contracts with the government. Billings in advance of the shipments allow us to collect cash earlier than billing at the time of the shipment and, therefore, the collected cash can be used to reduce our investment in working capital. Refer to Note D of the Consolidated Financial Statements for additional details on our contract balances.

Pensions

The annual net periodic expense and benefit obligations related to the Company's defined benefit plans are determined on an actuarial basis. This determination requires critical assumptions regarding the discount rate, long-term rate of return on plan assets, increases in compensation levels, and amortization periods for actuarial gains and losses. Assumptions are determined based on Company data and appropriate market indicators and are evaluated each year as of the plans' measurement date. Changes in the assumptions to reflect actual experience, as well as the amortization of actuarial gains and losses, could result in a material change in the annual net periodic expense and benefit obligations reported in the financial statements.

The Company uses a spot-rate approach to estimate the service and interest cost components of net periodic benefit cost for its defined benefit pension plans. The spot-rate approach applies separate discount rates (along the yield curve) for each projected benefit payment in the calculation.

Our pension plan investment strategies are governed by a policy adopted by the Board of Directors. A senior management team oversees a group of outside investment analysts and brokerage firms that implement these strategies. The future return on pension assets is dependent upon the plan's asset allocation, which changes from time to time, and the performance of the underlying investments. Consistent with December 31, 2021, we used an expected rate of return on domestic plan assets assumption of 5.25% at December 31, 2022. This assumption is reflective of management's view of the long-term returns in the marketplace, as well as changes in risk profiles and available investments. Should the assets earn an average return less than the expected return assumption over time, in all likelihood the future pension expense would increase.

The impact of a change in the discount rate or expected rate of return assumption on domestic pension expense can vary from year to year depending upon the undiscounted liability level, the current discount rate, the asset balance, other changes to the plan, and other factors. A 0.25 percentage point decrease to the discount rate would increase the 2023 projected pension expense approximately \$0.1 million. A 0.25 percentage point decrease in the expected rate of return assumption would increase the 2023 projected pension expense by approximately \$0.4 million.

Refer to Note P of the Consolidated Financial Statements for additional details on our pension and other post-employment benefit plans.

Deferred Taxes

We record deferred tax assets and liabilities based upon the temporary difference between the financial reporting and tax basis of assets and liabilities. If it is more likely than not that some portion or all of the deferred tax assets will not be realized, a valuation allowance is established. All available evidence, both positive and negative, is considered to determine whether a valuation allowance is needed. We review the expiration dates of certain deferred tax assets against projected income levels to determine if a valuation allowance is needed. Certain deferred tax assets do not have an expiration date. We also evaluate deferred tax assets for realizability due to cumulative operating losses by jurisdiction and record a valuation allowance as warranted. A valuation allowance may increase tax expense and reduce net income in the period it is recorded. If a valuation allowance is no longer required, it will reduce tax expense and increase net income in the period in which it is reversed.

We had valuation allowances of \$4.9 million and \$5.0 million associated with certain federal, state, and foreign deferred tax assets as of year-end 2022 and 2021, respectively, primarily for net operating loss, capital loss carryforwards and state tax credits.

Refer to Note G of the Consolidated Financial Statements for additional deferred tax details.

Precious Metal Physical Inventory Counts

We take and record the results of a physical inventory count of our precious metals on a quarterly basis. Our precious metal operations include a refinery that processes precious metal-containing scrap and other materials from our customers, as well as our own internally generated scrap. We also outsource portions of our refining requirements to other vendors, particularly for those materials with longer processing times. The precious metal content within these various refine streams may be in solutions, sludges, and other non-homogeneous forms and can vary over time based upon the input materials, yield rates, and other process parameters. The determination of the weight of the precious metal content within the refine streams as part of a physical inventory count requires the use of estimates and calculations based upon assays, assumed recovery percentages developed from actual historical data and other analyses, the total estimated volumes of solutions and other materials within the refinery, data from our refine vendors, and other factors. The resulting calculated weight of the precious metals in our refine operations may differ, in either direction, from what our records indicate that we should have on hand, which would then result in an adjustment to our pre-tax income in the period when the physical inventory was taken, and the related estimates were made.

Goodwill and Other Intangible Assets

We use the acquisition method of accounting to allocate costs of acquired businesses to the assets acquired and liabilities assumed based on their estimated fair values at the dates of acquisition. The excess costs of acquired businesses over the fair values of the assets acquired and liabilities assumed are recognized as goodwill. The valuations of the acquired assets and liabilities will impact the determination of future operating results. Determining the fair value of assets acquired and liabilities assumed requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, revenue growth rates, discount rates, customer attrition rates, royalty rates, asset lives, contributory asset charges, and market multiples, among other items. We determine the fair values of intangible assets acquired generally in consultation with third-party valuation advisors.

Intangible assets other than goodwill are recognized if the benefit of the intangible asset is obtained through contractual or other legal rights, or if the intangible asset can be sold, transferred, licensed or exchanged, regardless of the Company's intent to do so. Goodwill represents the excess purchase price over the fair value of the tangible net assets and intangible assets acquired in a business combination and is reviewed annually for impairment or more frequently if impairment indicators arise. Finite-lived intangible assets are reviewed for impairment if facts and circumstances warrant. There were no indicators during interim periods that required the performance of an interim impairment assessment. The Company conducted its annual impairment assessment as of the first day of the fourth quarter.

Goodwill is assigned to the reporting unit, which is the operating segment level or one level below the operating segment. Goodwill within the Electronic Materials segment totaled \$206.7 million as of December 31, 2022. Within the Precision Optics segment, goodwill totaled \$86.7 million. The remaining \$26.2 million is related to the Performance Materials segment.

For the purpose of the annual goodwill impairment assessment, we have the option to perform a qualitative assessment (commonly referred to as "step zero") to determine whether further quantitative analysis for impairment of goodwill is necessary. In performing step zero for our impairment test, we are required to make assumptions and judgments including, but not limited to, macroeconomic conditions as related to our business, current and future financial performance of our reporting units, industry and market considerations, and cost factors such as changes in raw materials, labor, or other costs. If the step zero analysis indicates that it is more likely than not that the fair value of a reporting unit is less than its respective carrying value including goodwill, then we would perform an additional quantitative analysis. The next step compares the fair value of the reporting unit to its carrying value, including goodwill. An impairment charge is recognized for the amount the carrying value of the reporting unit exceeds its fair value.

The Company notes that reporting units with goodwill due to recent acquisitions are likely to have fair values to the proximity of the carrying value due to the shorter period of time for fair value from the recent acquisition to have changed. The Precision Optics reporting unit includes the 2020 goodwill of \$70.6 million related to the Optics Balzers acquisition and the Performance Materials and Electronic Materials segments include \$24.3 million and \$157.0 million, respectively, of goodwill related to the HCS-Electronic Materials acquisition. As a result of the timing of the recent acquisitions over the past few years, the Company elected to bypass the qualitative assessment and perform a quantitative assessment of the Performance Materials, Electronic Materials and Precision Optics reporting units' goodwill balances.

The quantitative analysis compares estimated fair value of the reporting unit, using an income approach (a discounted cash flow model), as well as a market approach, with its carrying value. The income approach and market approach are weighted in arriving at fair value based on the relative merits of the methods used and the quantity and quality of collected data to arrive at the indicated fair value.

The income approach requires several assumptions including future sales growth, EBITDA margins and capital expenditures. The Company's reporting units each provide their forecast of results for the next five years. These forecasts form the basis for the information used in the discounted cash flow model. The discounted cash flow model also requires the use of a discount rate and a terminal revenue growth rate (the revenue growth rate for the period beyond the five years forecast by the reporting units), as well as projections of future operating margins (for the period beyond the forecast five years). The Company used a discount rate in the mid-teens and a terminal growth rate of low single digits.

The market approach requires several assumptions including sales and EBITDA multiples for comparable companies that operate in the same markets as the reporting unit. During the fourth quarter of 2022, the Company considered sales multiples in the low single digits and EBITDA multiples in the range high single digits to low double digits.

Based on the quantitative assessment performed for the Precision Optics reporting unit, the fair value exceeded the carrying value by less than 10%, but by a sufficient amount to support no indicators of impairment as of October 1, 2022. As of October 1, 2022, based on the quantitative assessments for the other reporting units, the estimated fair value was substantially in excess of the carrying value for the remaining reporting units.

Management believes the future sales growth and EBITDA margins in the long range plan, terminal growth rate and the discount rate used in the valuations requires significant use of judgment. If any of our reporting units do not meet our long range plan estimates or our discount rate increase significantly, we could be required to perform an interim goodwill impairment analysis or recognize charges in future periods. Any impairment charges that the Company may take in the future could be material to its consolidated results of operations and financial condition. The assumptions used for the reporting units

and indefinite-lived intangibles with fair values exceeding carrying values of less than 10% are more sensitive to future performance and will be monitored accordingly.

We also compared our market capitalization as of October 1, 2022 to the carrying value of our equity and considering an implied control premium, we noted no impairment indicators or triggering events.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to precious metal and commodity price, interest rate, foreign exchange rate, and utility cost differences. While the degree of exposure varies from year to year, our methods and policies designed to manage these exposures have remained fairly consistent over time. Generally, we attempt to minimize the effects of these exposures on our pre-tax income and cash flows through the use of natural hedges, which include pricing strategies, borrowings denominated in the same terms as the exposed asset, off-balance sheet financing arrangements, and other methods. Where we cannot use a natural hedge, we may use derivative financial instruments to minimize the effects of these exposures when practical and cost efficient. The use of off-balance sheet financing arrangements and derivative financial instruments is subject to policies approved by the Audit Committee of the Board of Directors with oversight provided by a group of senior financial managers at our corporate office.

Precious metals. We use gold and other precious metals in manufacturing various products. To reduce the exposure to market price changes, the majority of our precious metal requirements are maintained on a consigned inventory basis. We purchase the metal out of consignment from our suppliers when it is ready to ship to a customer as a finished product. Our purchase price forms the basis for the price charged to the customer for the precious metal content and, therefore, the current cost is matched to the selling price, and the price exposure is minimized.

We are charged a consignment fee by the precious metal consignors that own the precious metals. This fee is a function of the market price of the metal, the quantity of metal we have on hand, and the rate charged by the institution. Because of market forces and competition, the fee can only be charged to customers in a limited case-by-case basis. Should the market price of precious metals that we have on consignment increase by 20% from the prices on December 31, 2022, the additional pre-tax cost to us as a result of an increase in the consignment fee would be approximately \$2.2 million on an annual basis. This calculation assumes no changes in the quantity of metal held on consignment or the underlying fee and that none of the additional fees are charged to customers.

To further limit price and financing rate exposures, under some circumstances, we will require customers to furnish their own metal for processing. Customers may also elect to provide their own material for us to process on a toll basis as opposed to purchasing our material.

The available capacity of our existing consignment lines to consign precious metals is a function of the quantity and price of the metals on hand. As prices increase, a given quantity of metal will utilize a larger proportion of the existing consignment lines. A significant prolonged increase in metal prices could result in our consignment lines being fully utilized, and, absent securing additional consignment line capacity from precious metal consignors, could require us to purchase precious metals rather than consign them, require customers to supply their own metal, and/or force us to turn down additional business opportunities. If we were in a significant precious metal ownership position, we might elect to use derivative financial instruments to hedge the potential price exposure. The cost to finance and potentially hedge the purchased inventory may also be higher than the consignment fee. The financial statement impact of the risk from rising metal prices impacting our consignment availability cannot be estimated at the present time.

In certain circumstances, we may elect to fix the price of precious metals for a customer for a stated quantity over a specified period of time. In those cases, we may secure hedge contracts with terms that match the terms in the agreement with our customer so that the gain or loss on the contract with the customer due to subsequent movements in the precious metal price will generally be offset by a gain or loss on the hedge contract. At December 31, 2022, we did not have a material amount of such hedge contracts outstanding.

Copper. We also use copper in our production processes. When possible, fluctuations in the purchase price of copper are passed on to customers in the form of price adders or reductions. While over time our price exposure to copper is generally in balance, there can be a lag between the change in our cost and the pass-through to our customers, resulting in higher or lower margins in a given period. To mitigate this impact, we hedge a portion of this pricing risk.

We consign the majority of our copper inventory requirements. As with precious metals, the available capacity under the existing lines is a function of the quantity and price of metal on hand. Should the market cost of copper increase by 20% from the price as of December 31, 2022, the additional pre-tax cost to us as a result of an increase in the consignment fee would be approximately \$0.5 million on an annual basis. This calculation assumes no changes in the quantity of inventory or the underlying fee and that none of the additional fees are charged to customers.

Lower of cost or net realizable value. In our manufacturing processes, we use various metals that are not widely used by others or actively traded and, therefore, there is no established efficient market for derivative financial instruments that could be used to effectively hedge the related price exposures. For certain applications, our pricing practice with respect to these metals is to establish the selling price based upon our cost to purchase the material, limiting our price exposure. However, the inventory carrying value may be exposed to market fluctuations. The inventory value is maintained at the lower of cost or net realizable value and if the market value were to drop below the carrying value, the inventory would have to be reduced accordingly and a charge recorded against cost of sales. This risk is mainly associated with long manufacturing lead-time items and with sludges and scrap materials, which generally have longer processing times to be refined or processed into a usable form for further manufacturing and are typically not covered by specific sales orders from customers. We did not record any material lower of cost or net realizable value charges in 2022, 2021, or 2020 as a result of market price fluctuations of metals in our inventories.

Interest rates. We are exposed to changes in interest rates on our cash balances and borrowings under our Credit Agreement. We may manage this interest rate exposure by maintaining a combination of short-term and long-term debt and variable and fixed rate instruments. We may also use interest rate swaps to fix the interest rate on variable rate obligations, as we deem appropriate. As of December 31, 2022 the fair value of our interest rate swap asset was \$7.9 million. In February 2023 we amended the terms of the interest rate swap to hedge the change in 1-month USD-SOFR. See Note R for further discussion. Excess cash is typically invested in high quality instruments that mature in 90 days or less. Investments are made in compliance with policies approved by the Board of Directors.

Foreign currencies. Portions of our international operations sell products priced in foreign currencies, mainly the euro and yen, while the majority of these products' costs are incurred in U.S. dollars. We are exposed to currency movements in that if the U.S. dollar strengthens, the translated value of the foreign currency sale and the resulting margin on that sale will be reduced. To minimize this exposure, we may purchase foreign currency forward contracts, options, and collars in compliance with approved policies. If the dollar strengthened, the decline in the translated value of our margins would be at least partially offset by a gain on the hedge contract. A decrease in the value of the dollar would result in larger margins but potentially a loss on the contract, depending upon the method used to hedge the exposure. Our current policy limits our hedges to 80% or less of the forecasted exposure.

The notional value of outstanding currency contracts was \$55.8 million as of December 31, 2022. If the dollar weakened 10% against the currencies we have hedged from the December 31, 2022 exchange rates, the reduced gain and/or increased loss on the outstanding contracts as of December 31, 2022 would reduce 2022 pre-tax profits by approximately \$2.6 million. This reduction in profits would be primarily offset with the foreign currency gain from the 10% movement in the exchange rates with effective hedges.

Utilities. The cost of natural gas and electricity used in our operations may vary from year to year and from season to season. We attempt to minimize these fluctuations and the exposure to higher costs by utilizing fixed price agreements of set durations, when deemed appropriate, obtaining competitive bidding between regional energy suppliers, and other methods.

Economy. We are exposed to changes in global economic conditions and the potential impact those changes may have on various facets of our business. We have a program in place to closely monitor the credit worthiness and financial condition of our key providers of financial services, including our bank group and insurance carriers, as well as the credit worthiness of customers and vendors, and have various contingency plans in place.

Our bank lines are established with a number of different banks in order to mitigate our exposure to any one financial institution. All of the banks in our bank group had credit in good standing as of December 31, 2022. The financial statement impact from the risk of one or more of the banks in our bank group reducing our lines due to their insolvency or other causes cannot be estimated at the present time.

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Management's Report on Internal Control over Financial Reporting

The management of Materion Corporation and subsidiaries is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Materion Corporation and subsidiaries' internal control system was designed to provide reasonable assurance to the Company's management and Board of Directors regarding the preparation and fair presentation of published financial statements. All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation.

Materion Corporation and subsidiaries' management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2022. In making this assessment, it used the framework set forth by the Committee of Sponsoring Organizations of the Treadway Commission (the COSO criteria) in Internal Control - Integrated Framework (2013).

Based on our assessment we believe that, as of December 31, 2022, the Company's internal control over financial reporting is effective.

The effectiveness of our internal control over financial reporting as of December 31, 2022 has been audited by Ernst & Young LLP, an independent registered public accounting firm, as stated in their report.

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Materion Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Materion Corporation and subsidiaries (the Company) as of December 31, 2022 and 2021, the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2022, and the related notes and financial statement schedule listed in the Index at Item 15(a) (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, 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, 2022, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 16, 2023 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's 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 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 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 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Description of the matter

Reconciliation of Precious Metals Consignment Inventory

At December 31, 2022, the notional value of the Company's off-balance sheet precious metals was \$373.1 million. As discussed in Note I to the consolidated financial statements, the Company uses estimates to measure the precious metal content within various refinement streams which can vary over time based upon the input materials, yield rates, and other process parameters.

Auditing the reconciliation of precious metals consignment inventory is complex due to the highly detailed nature of the inventory reconciliation and the amount of information that is obtained from third parties. A physical inventory is performed by the Company on a quarterly basis to verify the existence of inventory. The precious metals inventory reconciliation includes estimates based on assays, assumed recovery percentages developed from actual historical data and other analyses, the total estimated volume of solutions and other materials within the refinery, data from refine vendors, and other factors. The reconciliation of precious metals consignment inventory presents the resulting calculated weight of the precious metals generated from these estimates within the Company's refine operations. This calculated weight may differ from what the Company's records indicate should be on hand, which would then result in an adjustment to pre-tax income.

How we addressed the matter in our audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's reconciliation of the precious metals consignment inventory process. This included controls over management's review of the significant inputs into and underlying the reconciliation.

To test the Company's reconciliation of the precious metals physical consignment inventory, our procedures included, among others, evaluating the significant assumptions and data used to estimate the total value of the precious metal, which was identified through the physical inventory. We observed the physical inventory process, tested inventory activity from the date of observation through December 31, 2022, evaluated the underlying data used in the reconciliation, and confirmed certain consigned inventory held with the third parties. We assessed the historical accuracy of management's estimates, which are based on assays, assumed recovery percentages developed from actual historical data and other analyses, the total estimated volume of solutions and other materials within the refinery, data from their refine vendors, and other factors and assessed the historical accuracy of management's analysis to evaluate the assumptions that were most significant to the calculated weight of the precious metal inventory.

Precision Optics Goodwill Impairment Evaluation

Description of the matter

At December 31, 2022, the Company had goodwill of \$319.5 million, of which, \$86.7 million related to the Precision Optics reporting unit. As discussed in Notes A and M to the consolidated financial statements, due to recent acquisitions, the Company elected to perform a quantitative annual impairment assessment of its Precision Optics reporting unit's goodwill as of October 1, 2022, and concluded that there was no impairment, but the estimated fair value of the Precision Optics reporting unit exceeded the carrying value by less than 10%.

Auditing the Company's Precision Optics reporting unit's goodwill impairment assessment was complex and highly judgmental due to the significant estimation required in determining the fair value of the reporting unit. In particular, the fair value estimate was sensitive to significant assumptions, such as the discount rate, revenue growth rates, terminal growth rate and EBITDA margins, which are affected by expectations about future market or economic conditions.

How we addressed the matter in our audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's Precision Optics reporting unit goodwill impairment process, including controls over the significant assumptions discussed above. We also tested management's controls over the completeness and accuracy of the underlying data used in its analysis.

To test the estimated fair value of the Company's Precision Optics reporting unit, our audit procedures included, among others, assessing fair value methodologies and testing the significant assumptions discussed above and the underlying data used by the Company in its analysis. For example, we compared the significant assumptions used by management to current industry and economic trends, recent historical performance, and other relevant factors. We also assessed the historical accuracy of management's estimates and performed sensitivity analyses of significant assumptions to evaluate the changes in fair value that would result from changes in the assumptions. In addition, we involved our valuation specialists to assist with our evaluation of the methodology and significant assumptions used by the Company in the determination of the fair value for the Company's Precision Optics reporting unit.

/s/ Ernst & Young LLP

We have served as the Company's auditor since at least 1958, but we are unable to determine the specific year.

Cleveland, Ohio

February 16, 2023

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Materion Corporation

Opinion on Internal Control over Financial Reporting

We have audited Materion Corporation and subsidiaries' internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Materion Corporation and subsidiaries (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of Materion Corporation and subsidiaries as of December 31, 2022 and 2021, the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2022, and the related notes and financial statement schedule listed in the Index at Item 15(a) and our report dated February 16, 2023 expressed an unqualified opinion thereon.

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 included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and 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/ Ernst & Young LLP
Cleveland, Ohio
February 16, 2023

Materion Corporation and Subsidiaries
Years Ended December 31, 2022, 2021, & 2020

Consolidated Statements of Income

(Thousands except per share amounts)	2022	2021	2020
Net sales	\$ 1,757,109	\$ 1,510,644	\$ 1,176,274
Cost of sales	1,413,229	1,226,882	983,641
Gross margin	343,880	283,762	192,633
Selling, general, and administrative expense	169,338	163,777	133,963
Research and development expense	28,977	26,575	20,283
Goodwill impairment charges (Note M)	—	—	9,053
Asset impairment charges (Note M)	—	—	1,419
Restructuring expense (income)	1,573	(438)	11,237
Other — net (Note E)	24,237	16,737	8,463
Operating profit	119,755	77,111	8,215
Other non-operating (income) expense — net (Note O)	(5,250)	(5,115)	(3,939)
Interest expense — net (Note F)	21,905	4,901	3,879
Income before income taxes	103,100	77,325	8,275
Income tax expense (benefit) (Note G)	17,110	4,851	(7,187)
Net income	\$ 85,990	\$ 72,474	\$ 15,462
Basic earnings per share:			
Net income per share of common stock	\$ 4.19	\$ 3.55	\$ 0.76
Diluted earnings per share:			
Net income per share of common stock	\$ 4.14	\$ 3.50	\$ 0.75
Weighted-average number of shares of common stock outstanding:			
Basic	20,511	20,422	20,338
Diluted	20,760	20,689	20,603

The accompanying notes are an integral part of the consolidated financial statements.

Materion Corporation and Subsidiaries
Years Ended December 31, 2022, 2021, and 2020
Consolidated Statements of Comprehensive Income

(Thousands)	2022	2021	2020
Net income	\$ 85,990	\$ 72,474	\$ 15,462
Other comprehensive income:			
Foreign currency translation adjustment	(5,869)	(6,904)	9,030
Derivative and hedging activity, net of tax expense (benefit) of \$1,387, \$482, and \$(28), respectively	4,655	1,603	(80)
Pension and post-employment benefit adjustment, net of tax expense (benefit) of \$518, \$1,094 and \$(651), respectively	(526)	3,771	(2,127)
Other comprehensive income (loss)	(1,740)	(1,530)	6,823
Comprehensive income	\$ 84,250	\$ 70,944	\$ 22,285

The accompanying notes are an integral part of the consolidated financial statements.

Materion Corporation and Subsidiaries
Years Ended December 31, 2022, 2021, and 2020

Consolidated Statements of Cash Flows

(Thousands)	2022	2021	2020
Cash flows from operating activities:			
Net income	\$ 85,990	\$ 72,474	\$ 15,462
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation, depletion, and amortization	53,436	44,137	42,384
Amortization of deferred financing costs in interest expense	1,734	967	790
Stock-based compensation expense (non-cash)	8,813	6,517	5,528
Amortization of pension and post-retirement costs	(146)	437	(151)
Loss (gain) on sale of property, plant, and equipment	14	(282)	466
Deferred income tax (benefit) expense	1,733	(12,957)	(9,850)
Impairment charges	—	—	10,472
Net pension curtailments and settlements	(551)	—	94
Changes in assets and liabilities, net of acquired assets and liabilities:			
Decrease (increase) in accounts receivable	(4,377)	(30,490)	(707)
Decrease (increase) in inventory	(63,986)	(43,458)	(1,288)
Decrease (increase) in prepaid and other current assets	(1,604)	(3,855)	2,475
Increase (decrease) in accounts payable and accrued expenses	12,860	40,219	(21,877)
Increase (decrease) in unearned revenue	207	106	2,935
Increase (decrease) in interest and taxes payable	154	(220)	(157)
Increase (decrease) in unearned income due to customer prepayments	21,942	13,752	54,103
Other — net	(261)	2,894	378
Net cash provided by operating activities	115,958	90,241	101,057
Cash flows from investing activities:			
Payments for acquisition, net of cash acquired	(2,971)	(392,240)	(130,715)
Payments for purchase of property, plant, and equipment	(77,608)	(102,910)	(67,274)
Proceeds from settlement of currency exchange contract	—	—	3,249
Proceeds from sale of property, plant, and equipment	850	881	33
Net cash used in investing activities	(79,729)	(494,269)	(194,707)
Cash flows from financing activities:			
Proceeds from (repayments of) borrowings under revolving credit agreement, net	(9,046)	118,297	34,000
Proceeds from issuance of debt	9,276	300,000	—
Repayment of debt	(19,299)	(2,054)	(20,634)
Principal payments under finance lease obligations	(2,736)	(2,819)	(2,213)
Cash dividends paid	(10,160)	(9,697)	(9,257)
Deferred financing costs	—	(7,403)	—
Repurchase of common stock	—	—	(6,766)
Payments of withholding taxes for stock-based compensation awards	(3,593)	(3,318)	(2,221)
Net cash provided by (used in) financing activities	(35,558)	393,006	(7,091)
Effects of exchange rate changes	(2,032)	(394)	1,612
Net change in cash and cash equivalents	(1,361)	(11,416)	(99,129)
Cash and cash equivalents at beginning of period	14,462	25,878	125,007
Cash and cash equivalents at end of period	\$ 13,101	\$ 14,462	\$ 25,878

The accompanying notes are an integral part of the consolidated financial statements.

Materion Corporation and Subsidiaries
December 31, 2022 and 2021
Consolidated Balance Sheets

(Thousands)	2022	2021
Assets		
Current assets		
Cash and cash equivalents (Note A)	\$ 13,101	\$ 14,462
Accounts receivable (Note A)	215,211	213,819
Inventories, net (Notes A and I)	423,080	361,115
Prepaid and other current assets	39,056	37,856
Total current assets	<u>690,448</u>	<u>627,252</u>
Deferred income taxes (Notes A and G)	3,265	5,431
Property, plant, and equipment (Notes A and J)	1,209,205	1,132,223
Less allowances for depreciation, depletion, and amortization	<u>(760,440)</u>	<u>(723,248)</u>
Property, plant, and equipment — net	448,765	408,975
Operating lease, right-of-use asset (Note L)	64,249	63,096
Intangible assets (Notes A and M)	143,219	156,736
Other assets (Note O)	22,535	27,369
Goodwill (Notes A and M)	<u>319,498</u>	<u>318,620</u>
Total Assets	<u>\$ 1,691,979</u>	<u>\$ 1,607,479</u>
Liabilities and Shareholders' Equity		
Current liabilities		
Short-term debt (Note N)	\$ 21,105	\$ 15,359
Accounts payable	107,899	86,243
Salaries and wages	35,543	37,544
Other liabilities and accrued items	54,993	53,388
Income taxes (Notes A and G)	3,928	4,205
Unearned revenue (Note D)	<u>15,496</u>	<u>7,770</u>
Total current liabilities	238,964	204,509
Other long-term liabilities	12,181	14,954
Operating lease liabilities (Note L)	59,055	57,099
Finance lease liabilities (Note L)	13,876	16,327
Retirement and post-employment benefits (Note O)	20,422	33,394
Unearned income (Notes A and K)	107,736	97,962
Long-term income taxes (Notes A and G)	665	1,190
Deferred income taxes (Notes A and G)	28,214	27,216
Long-term debt (Note N)	410,876	434,388
Shareholders' equity		
Serial preferred stock (no par value; 5,000 authorized shares, none issued)	—	—
Common stock (no par value; 60,000 authorized shares, issued shares of 27,148 for both 2022 and 2021)	288,100	271,978
Retained earnings	769,418	693,756
Common stock in treasury (6,605 shares for 2022 and 6,700 shares for 2021)	<u>(220,864)</u>	<u>(209,920)</u>
Accumulated other comprehensive loss (Note P)	(41,909)	(40,169)
Other equity	<u>5,245</u>	<u>4,795</u>
Total shareholders' equity	<u>799,990</u>	<u>720,440</u>
Total Liabilities and Shareholders' Equity	<u>\$ 1,691,979</u>	<u>\$ 1,607,479</u>

The accompanying notes are an integral part of the consolidated financial statements.

Materion Corporation and Subsidiaries
Years Ended December 31, 2022, 2021, and 2020

Consolidated Statements of Shareholders' Equity

(Thousands)	Common Shares		Shareholders' Equity					Total
	Common Shares	Common Shares Held in Treasury	Common Stock	Retained Earnings	Common Stock In Treasury	Accumulated Other Comprehensive Income (Loss)	Other Equity	
Balance at December 31, 2019	20,404	6,744	\$ 249,674	\$ 624,954	\$ (186,845)	\$ (45,462)	\$ 3,422	\$ 645,743
Net income	—	—	—	15,462	—	—	—	15,462
Other comprehensive income	—	—	—	—	—	6,729	—	6,729
Net pension curtailments and settlements	—	—	—	—	—	94	—	94
Cumulative effect of accounting change	—	—	—	—	—	—	—	—
Cash dividends declared (\$0.455 per share)	—	—	—	(9,257)	—	—	—	(9,257)
Stock-based compensation activity	117	(117)	8,867	(101)	(3,147)	—	—	5,619
Payments for withholding taxes for stock-based compensation awards	(39)	39	—	—	(2,221)	—	—	(2,221)
Repurchase of shares	(158)	158	—	—	(6,766)	—	—	(6,766)
Directors' deferred compensation	4	(4)	101	—	(208)	—	334	227
Balance at December 31, 2020	20,328	6,820	\$ 258,642	\$ 631,058	\$ (199,187)	\$ (38,639)	\$ 3,756	\$ 655,630
Net income	—	—	—	72,474	—	—	—	72,474
Other comprehensive income	—	—	—	—	—	(1,530)	—	(1,530)
Cash dividends declared (\$0.475 per share)	—	—	—	(9,697)	—	—	—	(9,697)
Stock-based compensation activity	164	(164)	13,142	(79)	(6,546)	—	—	6,517
Payments for withholding taxes for stock-based compensation awards	(49)	49	—	—	(3,318)	—	—	(3,318)
Directors' deferred compensation	5	(5)	194	—	(869)	—	1,039	364
Balance at December 31, 2021	20,448	6,700	\$ 271,978	\$ 693,756	\$ (209,920)	\$ (40,169)	\$ 4,795	\$ 720,440
Net income	—	—	—	85,990	—	—	—	85,990
Other comprehensive income	—	—	—	—	—	(1,740)	—	(1,740)
Cash dividends declared (\$0.495 per share)	—	—	—	(10,160)	—	—	—	(10,160)
Stock-based compensation activity	135	(135)	15,977	(168)	(6,996)	—	—	8,813
Payments for withholding taxes for stock-based compensation awards	(43)	43	—	—	(3,593)	—	—	(3,593)
Directors' deferred compensation	3	(3)	145	—	(355)	—	450	240
Balance at December 31, 2022	20,543	6,605	\$ 288,100	\$ 769,418	\$ (220,864)	\$ (41,909)	\$ 5,245	\$ 799,990

The accompanying notes are an integral part of the consolidated financial statements.

Materion Corporation and Subsidiaries
Notes to Consolidated Financial Statements

Note A — Significant Accounting Policies

Organization: Materion Corporation (the Company) is a holding company with subsidiaries that have operations in the United States, Europe, and Asia. These operations manufacture advanced engineered materials used in a variety of end markets, including semiconductor, industrial, aerospace and defense, automotive, energy, consumer electronics, and telecom and data center. The Company has four reportable segments: Performance Materials, Electronic Materials, Precision Optics, and Other. Other includes unallocated corporate costs.

Refer to Note C for additional segment details. The Company distributes its products through a combination of company-owned facilities and independent distributors and agents.

Business Combinations: The Company records assets acquired and liabilities assumed at the date of acquisition at their respective fair values. Intangible assets acquired in a business combination are recognized and reported apart from goodwill. Goodwill represents the excess purchase price over the fair value of the tangible net assets and intangible assets acquired in a business combination. Acquisition-related expenses are recognized separately from the business combination and are expensed as incurred.

See Note B for further discussion of the acquisition of HCS-Electronic Materials which was completed on November 1, 2021.

Use of Estimates: The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results may differ from those estimates.

Consolidation: The Consolidated Financial Statements include the accounts of Materion Corporation and its subsidiaries. All of the Company's subsidiaries were wholly owned as of December 31, 2022. Intercompany accounts and transactions are eliminated in consolidation.

Cash Equivalents: All highly liquid investments with a maturity of three months or less when purchased are considered to be cash equivalents.

Accounts Receivable: An allowance for doubtful accounts is maintained for the expected losses resulting from the inability of customers to pay amounts due. The Company considers the current market conditions and credit losses related to the Company's trade receivables based on the macroeconomic environment, geographic considerations, and other expected market trends. Additionally, the allowance is based upon identified delinquent accounts, customer payment patterns, and other analyses of historical data and trends. Accounts receivable were net of an allowance for credit losses of \$0.6 million and \$0.5 million at December 31, 2022 and December 31, 2021, respectively. The change in the allowance for credit losses includes expense and net write-offs, neither of which were material. The Company extends credit to customers based upon their financial condition, and collateral is not generally required.

Inventories: Inventories are stated at net realizable value. The associated inventory reserve was \$0.4 million and \$0.3 million at December 31, 2022 and 2021, respectively. All of the Company's inventories, except for its bertrandite ore mine which values inventory using a weighted average cost method, including raw materials, manufacturing supplies inventory as well as international (outside the U.S.) inventories, have been valued using the first-in, first-out (FIFO) method as of December 31, 2022 and 2021.

Property, Plant, and Equipment: Property, plant, and equipment is stated on the basis of cost. Depreciation is computed principally by the straight-line method, except certain assets for which depreciation may be computed by the units-of-production method. The depreciable lives that are used in computing the annual provision for depreciation by class of asset are primarily as follows:

	<u>Years</u>
Land improvements	10 to 20
Buildings	20 to 40
Leasehold improvements	Life of lease
Machinery and equipment	3 to 15
Furniture and fixtures	4 to 10
Automobiles and trucks	3 to 8
Research equipment	3 to 10
Computer hardware	3 to 10
Computer software	3 to 10

An asset acquired under a finance lease will be recorded at the lesser of the present value of the projected lease payments or the fair value of the asset and will be depreciated in accordance with the above schedule. Leasehold improvements will be depreciated over the life of the improvement if it is shorter than the life of the lease. Repair and maintenance costs are expensed as incurred.

Mineral Resources and Mine Development: Property acquisition costs are capitalized as mineral resources on the balance sheet and are depleted using the units-of-production method based upon total estimated recoverable proven reserves of the beryllium-bearing bertrandite ore body. The Company uses beryllium pounds as the unit of accounting measure, and depletion expense is recorded on a pro-rata basis based upon the amount of beryllium pounds extracted as a percentage of total estimated beryllium pounds contained in the ore body.

Mine development costs at our open pit surface mines include drilling, infrastructure, other related costs to delineate an ore body and the removal of overburden to initially expose an ore body. Costs incurred before mineralization is classified as proven and probable reserves are expensed and classified as exploration expense. Capitalization of mine development project costs, that meet the definition of an asset, begins once mineralization is classified as proven and probable reserves.

In 2020, the Company expanded a mine to further develop an ore body. Since the pre-production phase ended when ore was first extracted from this mine, the Company recognized approximately \$12.9 million of mine development costs in 2020 as a component of cost of sales. This expansion is expected to benefit future periods.

The cost of removing overburden and waste materials to access the ore body at an open-pit mine prior to the production phase is capitalized during the development of an open-pit mine and are capitalized at each pit. These costs are amortized as the ore is extracted using the units-of-production method based upon total estimated recoverable proven reserves for the individual pit. The Company uses beryllium pounds as the unit of accounting measure for recording amortization.

To the extent that the aforementioned costs benefit an entire ore body, the costs are amortized over the estimated useful life of the ore body. Costs incurred to access specific ore blocks or areas that only provide benefit over the life of that area are amortized over the estimated life of that specific ore block area.

Drilling costs incurred during the production phase for operational ore control are allocated to inventory costs and then included as a component of costs applicable to sales. All other drilling and related costs are expensed as incurred.

Goodwill and Other Intangible Assets: Goodwill is reviewed annually for impairment or more frequently if impairment indicators arise. The Company conducts its annual goodwill impairment assessment as of the first day of the fourth quarter, or more frequently under certain circumstances. For the purpose of the goodwill impairment assessment, the Company has the option to perform a qualitative assessment (commonly referred to as "step zero") to determine whether further quantitative analysis of impairment of goodwill is necessary or a quantitative assessment ("step one") where the Company estimates the fair value of each reporting unit using a discounted cash flow method (income approach). Goodwill is assigned to the reporting unit, which is the operating segment level or one level below the operating segment. Intangible assets with finite lives are amortized using the straight-line method or effective interest method, as applicable, over the periods estimated to be benefited, which is generally 20 years or less. Finite-lived intangible assets are also reviewed for impairment if facts and circumstances warrant.

Long-Lived Asset Impairment: Management performs impairment tests of long-lived assets, including property and equipment, whenever an event occurs or circumstances change that indicate that the carrying value may not be recoverable or the useful life

of the asset has changed. Upon indications of impairment, assets and liabilities are grouped at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. The asset group would be considered impaired when the estimated future undiscounted cash flows generated by the asset group are less than its carrying value. If such undiscounted cash flows indicate that the carrying value of the asset group is not recoverable, impairment losses are measured by comparing the estimated fair value of the asset group to its carrying amount.

Derivatives: The Company recognizes all derivatives on the balance sheet at fair value. If the derivative is designated and effective as a cash flow hedge, changes in the fair value of the derivative are recognized in other comprehensive income, a component of shareholders' equity, until the hedged item is recognized in earnings. If the derivative is designated as a fair value hedge, changes in fair value are offset against the change in the fair value of the hedged asset, liability, or commitment through earnings. The ineffective portion of a derivative's change in fair value, if any, is recognized in earnings immediately. If a derivative is not a hedge, changes in its fair value are adjusted through the income statement.

Asset Retirement Obligation: The Company records a liability to recognize the legal obligation to remove an asset at the time the asset is acquired or when the legal liability arises. The liability is recorded for the present value of the ultimate obligation by discounting the estimated future cash flows using a credit-adjusted risk-free interest rate. The liability is accreted over time, with the accretion charged to expense. An asset equal to the fair value of the liability is recorded concurrent with the liability and depreciated over the life of the underlying asset.

Unearned Income: Expenditures for capital equipment to be reimbursed under government contracts are recorded in property, plant, and equipment, while the reimbursements for those expenditures are recorded in unearned income, a liability on the balance sheet. When the assets subject to reimbursement are placed in service, the total cost is depreciated over the useful lives, and the unearned income liability is reduced and credited to cost of sales on the Consolidated Statements of Income ratably with the annual depreciation expense.

Also included in Unearned Income as of December 31, 2022 and 2021, are \$85.9 million and \$72.6 million, respectively, of customer prepayments. See Note K for additional discussion.

Advertising Costs: The Company expenses all advertising costs as incurred. Advertising costs were \$0.3 million in 2022, 2021, and 2020.

Stock-based Compensation: The Company recognizes stock-based compensation expense based on the grant date fair value of the award over the period during which an employee is required to provide service in exchange for the award. Stock-based awards include performance-based restricted stock units (PRSUs), restricted stock units (RSUs), and stock appreciation rights (SARs). The fair value of PRSUs and RSUs is primarily based on the closing market price of a share of the Company's common stock on the date of grant, modified as appropriate to take into account the features of such grants. SARs are granted with an exercise price equal to the closing price of the Company's common shares on the date of grant. The fair value of SARs is determined using a Black-Scholes option-pricing model, which incorporates assumptions regarding the expected volatility, the expected option life, the risk-free interest rate, and the expected dividend yield. The portion of the PRSU awards that are valued based on the Company's total shareholder return as compared to peers is valued using Monte Carlo simulations, which incorporates assumptions regarding the expected volatility, the expected correlation, and the risk-free interest rate. See Note Q for additional information about stock-based compensation.

Capitalized Interest: Interest expense associated with active capital asset construction and mine development projects is capitalized and amortized over the future useful lives of the related assets.

Income Taxes: The Company uses the liability method in measuring the provision for income taxes and recognizing deferred tax assets and liabilities on the balance sheet. The Company will record a valuation allowance to reduce the deferred tax assets to the amount that is more likely than not to be realized, as warranted by current facts and circumstances. The Company applies a more-likely-than-not recognition threshold for all tax uncertainties and will record a liability for those tax benefits that have a less than 50% likelihood of being sustained upon examination by the taxing authorities.

Net Income Per Share: Basic earnings per share (EPS) is computed by dividing income available to common stockholders by the weighted-average number of common shares outstanding for the period. Diluted EPS reflects the assumed conversion of all dilutive common stock equivalents as appropriate using the treasury stock method.

New Pronouncements Adopted:

In October 2021, the FASB issued ASU 2021-08, *Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*. This guidance requires companies to apply ASC 606 on the acquisition date to recognize and measure contract assets and contract liabilities from contracts with customers acquired in a business combination. This is an exception to the recognition and measurement principle in ASC 805 which generally requires an acquirer to recognize and measure the assets it acquires and the liabilities it assumes at fair value on the acquisition date. For

public entities, the guidance is effective for fiscal years beginning after December 15, 2022, and early adoption is permitted. The Company has early adopted this guidance and has applied it to the accounting for contract assets and contract liabilities acquired as part of the HCS-Electronic Materials (as defined in Note B) acquisition.

In March 2020, the FASB issued ASU 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting*. This guidance is intended to provide temporary optional expedients and exceptions to the U.S. GAAP guidance on contract modifications and hedge accounting to ease the financial reporting burden related to the expected market transition from the London Interbank Offered Rate (LIBOR) and other interbank offered rates to alternative reference rates. The guidance is available immediately and the Company has applied this guidance in accounting for the interest rate swap as discussed in Note R. Any additional reference rate reform impacts will be accounted for in accordance with ASU 2020-04.

No other recently issued or effective ASUs had, or are expected to have, a material effect on the Company's results of operations, financial condition, or liquidity.

Reclassifications

Certain items previously reported in specific financial statement captions have been reclassified to conform to the current presentation. These reclassifications had no impact on the Company's financial position, results of operations, or cash flows.

Note B — Acquisition

On November 1, 2021, the Company acquired the industry-leading electronic materials business of H.C. Starck Group GmbH (HCS-Electronic Materials) for a cash purchase price of approximately \$398.9 million, on a cash-free, debt-free basis, subject to a customary purchase price adjustment mechanism. In 2022, acquisition-related inventory step-up expense was \$7.5 million and classified in Cost of Sales and transaction and integration costs were \$4.2 million and classified in Selling, General and Administrative expenses in the accompanying consolidated statements of income. The Company financed the purchase price for the HCS-Electronic Materials acquisition with a new \$300 million five-year term loan pursuant to a delayed draw term loan facility entered during October 2021 and \$103 million of borrowings under its amended revolving credit facility, which was also extended to expire five years in October 2026. This acquired business operates within the Performance Materials and Electronic Materials segments, and the results of operations are included as of the date of acquisition. The combination of Materion and HCS-Electronic Materials enhances the Company's position as the leading supplier to the high growth semiconductor industry.

During the period subsequent to the HCS-Electronic Materials acquisition, we made certain measurement period adjustments to the acquired assets and liabilities assumed due to clarification of information utilized to determine fair value during the measurement period. Additionally, we paid a working capital true-up of approximately \$3.0 million during the second quarter of 2022, which increased the total purchase price. As of November 1 2022, the purchase price allocation was final. The following table sets forth cumulative measurement period changes since the acquisition date, as well as the initial allocation of the estimated fair value of the identifiable tangible and intangible assets acquired and liabilities assumed of HCS-Electronic Materials, with the excess recorded to goodwill:

(Thousands)	Initial Allocation of Consideration	Measurement Period Adjustments	Final Allocation
Assets:			
Cash and cash equivalents	\$ 3,685	\$ —	\$ 3,685
Accounts receivable	28,352	35	28,387
Inventories	70,681	—	70,681
Prepaid and other current assets	660	(450)	210
Property, plant, and equipment	44,681	355	45,036
Operating lease, right-of-use assets	6,120	—	6,120
Intangible assets	107,800	—	107,800
Other long-term assets	4,528	—	4,528
Goodwill	178,181	3,144	181,325
Total assets acquired	\$ 444,688	\$ 3,084	\$ 447,772
Liabilities:			
Accounts payable	\$ 12,139	\$ (240)	\$ 11,899
Salaries and wages	2,516	625	3,141
Other liabilities and accrued items	28	—	28
Income taxes	2,183	(457)	1,726
Other long-term liabilities	5,543	215	5,758
Operating lease liabilities	6,042	—	6,042
Deferred income taxes	20,300	(30)	20,270
Total liabilities assumed	\$ 48,751	\$ 113	\$ 48,864
Net assets acquired	\$ 395,937	\$ 2,971	\$ 398,908

Assets acquired and liabilities assumed are recognized at their respective fair values as of the acquisition date. The Company engaged specialists to assist in the valuation of inventories, property, plant, and equipment, and intangible assets.

In determining the fair value of the amounts above, inventory is fair valued based on the comparative sales method for work in process and finished goods at the selling price less cost to dispose and remaining manufacturing effort. The remaining working capital accounts' carrying values approximate fair value. For property, plant and equipment and intangible asset values, the Company utilized various forms of the income, cost and market approaches depending on the asset being valued. The Company used a relief from royalty method under the income approach to value its trade names and developed technology and the multi-period excess earnings method under the income approach to value customer relationships. The significant assumptions used to estimate the fair value of these intangible assets included the discount rate and certain assumptions that form the basis of future cash flows (including revenue growth rates, royalty rates for trade names and developed technology, and attrition rates for customer relationships). Inputs were generally determined by taking into account independent appraisals and historical data, supplemented by current and anticipated market conditions and are considered Level 3 assets as the assumptions are unobservable inputs developed by the Company.

As part of the acquisition, the Company recorded approximately \$181.3 million of goodwill allocated between its Electronic Materials and Performance Materials segments based on the relative fair values. Goodwill was calculated as the excess of the purchase price over the estimated fair values of the tangible net assets and intangible assets acquired and primarily attributable to the synergies expected to arise after the acquisition dates. The goodwill is not expected to be deductible for U.S. tax purposes.

The following table reports the intangible assets by asset category as of the closing date:

(Thousands)	Value at Acquisition	Useful Life
Customer relationships	\$ 50,200	13 years
Technology	35,300	13 years
Trade name	22,300	15 years
Total	\$ 107,800	

Had the HCS-Electronic Materials acquisition occurred as of the beginning of fiscal 2020, the Company's sales and income (loss) before taxes would have been as follows:

	(Unaudited)	
	Year Ended December 31,	
	2021	2020
Net Sales	\$ 1,659,620	\$ 1,308,300
Profit income (loss) before taxes	\$ 91,551	\$ (17,761)

The unaudited pro forma financial information has been calculated after applying our accounting policies and adjusting the historical results with pro forma adjustments that assume the acquisition occurred on January 1, 2020. These unaudited pro forma results do not represent financial results realized, nor are they intended to be a projection of future results. The transaction accounting adjustments and other adjustments are based on available information and assumptions that the Company's management believes are reasonable. Such adjustments are estimates and actual experience may differ from expectations. The amortization of inventory step-up from the preliminary purchase price allocation of approximately \$15 million of expense is reflected in the 2020 unaudited pro forma income (loss) before taxes above. Additionally, the 2020 pro forma income (loss) before taxes includes approximately \$10 million of additional interest expense related to committed financing to fund the acquisition, annual acquisition-related intangible asset amortization expense of \$8.2 million, and transaction expenses of \$5.5 million as if it occurred on January 1, 2020.

Note C — Segment Reporting and Geographic Information

The Company changed two segment names during the first quarter of 2022: Performance Alloys and Composites became Performance Materials, and Advanced Materials became Electronic Materials. The Company believes these names better represent the markets served and the advanced next-generation product solutions provided to our customers. Other than the name changes, there were no changes in the composition or structure of the Company's reportable segments in 2022.

The Company has the following operating segments: Performance Materials, Electronic Materials, Precision Optics, and Other. The Company's operating segments represent components of the Company for which separate financial information is available that is utilized on a regular basis by the Chief Executive Officer, the Company's Chief Operating Decision Maker, in determining how to allocate the Company's resources and evaluate performance. The segments are determined based on several factors, including the availability of discrete financial information and the Company's organizational and management structure.

Performance Materials provides advanced engineered solutions comprised of beryllium and non-beryllium containing alloy systems and custom engineered parts in strip, bulk, rod, plate, bar, tube, and other customized shapes.

Electronic Materials produces advanced chemicals, microelectronics packaging, precious metal, non-precious metal, and specialty metal products, including vapor deposition targets, frame lid assemblies, clad and precious metal preforms, high temperature braze materials, and ultra-fine wire.

Precision Optics produces thin film coatings, optical filter materials, sputter-coated, and precision-converted thin film materials.

The Other reportable segment includes unallocated corporate costs and assets.

Beginning with the first quarter of 2022, the Company began using earnings before interest, taxes, depreciation, depletion and amortization (EBITDA) as the main operating income metric used by management to measure the financial performance of the Company and each segment. The Company made this change because recent acquisitions have resulted in increased purchase accounting amortization expense, which in turn has affected the comparability of results across periods and when compared to other companies. Management believes EBITDA is useful to investors as it better represents the Company's performance, excluding the effect of the recent acquisition of significant intangible assets that are now being amortized. EBITDA is not a measurement of financial performance under U.S. GAAP. Although the Company uses EBITDA to assess the performance of its business and for various other purposes, the use of this non-GAAP financial measure as an analytical tool has limitations, and it should not be considered in isolation or as a substitute for analysis of the Company's results of operations as reported in accordance with U.S. GAAP.

The below table presents financial information for each segment and a reconciliation of EBITDA to Net Income (the most directly comparable GAAP financial measure) for 2022 and 2021:

(Thousands)	2022	2021
Net sales:		
Performance Materials ⁽¹⁾	\$ 671,525	\$ 511,874
Electronic Materials ⁽¹⁾	\$ 971,902	866,816
Precision Optics	113,682	131,954
Other	—	—
Net sales	<u>1,757,109</u>	<u>1,510,644</u>
Segment EBITDA:		
Performance Materials	\$ 125,227	89,028
Electronic Materials	67,806	\$ 44,852
Precision Optics	13,753	25,854
Other	(28,345)	(33,371)
Total Segment EBITDA	<u>178,441</u>	<u>126,363</u>
Income tax expense	17,110	4,851
Interest expense - net	21,905	4,901
Depreciation, depletion and amortization	53,436	44,137
Net income	<u>\$ 85,990</u>	<u>\$ 72,474</u>

⁽¹⁾ Excludes inter-segment sales of \$0.7 million for Performance Materials and \$14.0 million for Electronic Materials for 2022 and \$0.2 million for Performance Materials and \$13.9 million for Electronic Materials for 2021. Inter-segment sales are eliminated in consolidation.

Other geographic information includes the following:

(Thousands)	2022	2021	2020
Net sales			
United States	\$ 867,053	\$ 794,862	\$ 641,727
Asia	519,395	426,303	329,968
Europe	355,691	270,213	189,281
All other	14,970	19,266	15,298
Total	<u>\$ 1,757,109</u>	<u>\$ 1,510,644</u>	<u>\$ 1,176,274</u>
Property, plant, and equipment, net by country deployed			
United States	\$ 372,779	\$ 327,969	\$ 223,340
All other	75,986	81,006	86,346
Total	<u>\$ 448,765</u>	<u>\$ 408,975</u>	<u>\$ 309,686</u>

International sales include sales from international operations and direct exports from our U.S. operations. No individual country, other than the United States, or customer accounted for 10% or more of the Company's net sales for the years presented.

The following table disaggregates revenue for each segment by end market for 2022 and 2021:

(Thousands)	Performance Materials	Electronic Materials	Precision Optics	Other	Total
2022					
End Market					
Semiconductor	\$ 8,666	\$ 784,517	\$ 5,107	\$ —	\$ 798,290
Industrial	168,012	47,407	31,948	—	247,367
Aerospace and Defense	110,884	5,882	16,988	—	133,754
Consumer Electronics	49,859	1,144	22,666	—	73,669
Automotive	93,581	7,590	9,922	—	111,093
Energy	50,021	98,844	—	—	148,865
Telecom and Data Center	65,230	149	—	—	65,379
Other	125,272	26,369	27,051	—	178,692
Total	\$ 671,525	\$ 971,902	\$ 113,682	\$ —	\$ 1,757,109
2021					
End Market					
Semiconductor	\$ 8,481	\$ 683,085	\$ 2,572	\$ —	\$ 694,138
Industrial	123,337	45,025	32,779	—	201,141
Aerospace and Defense	86,046	5,509	23,622	—	115,177
Consumer Electronics	41,694	1,184	32,485	—	75,363
Automotive	105,466	7,321	8,356	—	121,143
Energy	23,913	99,330	—	—	123,243
Telecom and Data Center	53,510	173	—	—	53,683
Other	69,427	25,189	32,140	—	126,756
Total	\$ 511,874	\$ 866,816	\$ 131,954	\$ —	\$ 1,510,644

Note D — Revenue Recognition

Net sales consist primarily of revenue from the sale of precious and non-precious specialty metals, beryllium and copper-based alloys, beryllium composites, and other products into numerous end markets. The Company requires an agreement with a customer that creates enforceable rights and performance obligations. The Company generally recognizes revenue, in an amount that reflects the consideration to which it expects to be entitled, upon satisfaction of a performance obligation by transferring control over a product to the customer. Control over the product is generally transferred to the customer when the Company has a present right to payment, the customer has legal title, the customer has physical possession, the customer has the significant risks and rewards of ownership, and/or the customer has accepted the product.

Shipping and Handling Costs: The Company accounts for shipping and handling activities related to contracts with customers as costs to fulfill its promise to transfer the associated products. Accordingly, customer payments for shipping and handling costs are recorded as a component of net sales, and related costs are recorded as a component of cost of sales.

Taxes Collected from Customers and Remitted to Governmental Authorities: Revenue is recorded net of taxes collected from customers that are remitted to governmental authorities, with the collected taxes recorded as current liabilities until remitted to the relevant government authority.

Product Warranty: Substantially all of the Company's customer contracts contain a warranty that provides assurance that the purchased product will function as expected and in accordance with certain specifications. The warranty is intended to safeguard the customer against existing defects and does not provide any incremental service to the customer.

Transaction Price Allocated to Future Performance Obligations: ASC 606 requires that the Company disclose the aggregate amount of transaction price that is allocated to performance obligations that have not yet been satisfied at December 31, 2022. Remaining performance obligations include non-cancelable purchase orders and customer contracts. The guidance provides certain practical expedients that limit this requirement. As such, the Company does not disclose the value of unsatisfied performance obligations for contracts with an original expected length of one year or less. After considering the practical expedient, at December 31, 2022, the aggregate amount of the transaction price allocated to remaining performance obligations was approximately \$63.9 million.

Contract Costs: The Company recognizes the incremental costs of obtaining contracts as an expense when incurred if the amortization period of the assets that the Company otherwise would have recognized is one year or less. These costs primarily relate to sales commissions, which are included in selling, general, and administrative expenses.

Contract Balances: The timing of revenue recognition, billings, and cash collections resulted in the following contract assets and contract liabilities:

(Thousands)	December 31, 2022	December 31, 2021	\$ change	% change
Accounts receivable, trade	\$ 215,726	\$ 213,584	\$ 2,142	1 %
Unbilled receivables	10,765	7,961	2,804	35 %
Unearned revenue	15,496	7,770	7,726	99 %

Accounts receivable, trade represents payments due from customers relating to the transfer of the Company's products and services. The Company believes that its receivables are collectible and appropriate allowances for doubtful accounts have been recorded. Impairment losses (bad debt) incurred relating to our receivables were immaterial during 2022.

Unbilled receivables represent expenditures on contracts, plus applicable profit margin, not yet billed. Unbilled receivables are normally billed and collected within one year. Billings made on contracts are recorded as a reduction of unbilled receivables.

Unearned revenue is recorded for consideration received from customers in advance of satisfaction of the related performance obligations. The Company recognized approximately \$7.1 million of the December 31, 2021 unearned amounts as revenue during 2022. The Company recognized approximately \$6.8 million of the December 31, 2020 unearned amounts as revenue during 2021.

As a practical expedient, the Company does not adjust the promised amount of consideration for the effects of a significant financing component because the period between the transfer of a product or service to a customer and when the customer pays for that product or service will be one year or less. The Company does not include extended payment terms in its contracts with customers.

Note E — Other-net

Other-net is summarized for 2022, 2021, and 2020 as follows:

(Thousands)	(Income) Expense		
	2022	2021	2020
Metal consignment fees	\$ 12,212	\$ 9,305	\$ 8,587
Amortization of intangible assets	12,400	5,973	2,377
Foreign currency loss (gain)	(679)	1,573	(2,569)
Net (gain) loss on disposal of fixed assets	14	(282)	466
Other items	290	168	(398)
Total other-net	<u>\$ 24,237</u>	<u>\$ 16,737</u>	<u>\$ 8,463</u>

Note F — Interest Expense-net

The following chart summarizes the interest incurred, capitalized, and paid in 2022, 2021, and 2020:

(Thousands)	2022	2021	2020
Interest incurred, net	\$ 23,014	\$ 5,277	\$ 3,889
Less: Capitalized interest	1,109	376	10
Total net expense	<u>\$ 21,905</u>	<u>\$ 4,901</u>	<u>\$ 3,879</u>
Interest paid	<u>\$ 21,190</u>	<u>\$ 3,652</u>	<u>\$ 3,442</u>

The increase in interest expense in 2022 versus 2021 was driven by increased borrowings under our revolving credit facility and new term loan during 2021 primarily to finance the acquisition of HCS-Electronic Materials. Amortization of deferred financing costs within interest expense was \$1.7 million in 2022, \$1.0 million in 2021, and \$0.8 million in 2020.

Note G — Income Taxes

On August 9, 2022, President Biden signed the CHIPS and Science Act (CHIPS Act) into law. The CHIPS Act provides incentives, beginning in 2023, for manufacturing semiconductors and certain tooling equipment used in the semiconductor manufacturing process. On August 16, 2022, President Biden also signed the Inflation Reduction Act of 2022 (IRA) into law. The IRA, among other provisions, includes a new corporate alternative minimum tax on certain large corporations, an excise tax on stock buybacks, and tax credits for certain critical minerals. The Company does not expect to be an applicable corporation subject to the alternative minimum tax based on our reported GAAP earnings the past three years. The CHIPS Act and the IRA did not have an impact to our consolidated financial statements for the year ended December 31, 2022. We continue to examine the impacts the CHIPS Act and the IRA may have on the Company in 2023 and subsequent years.

Income (loss) before income taxes and income tax expense (benefit) are comprised of the following:

(Thousands)	2022	2021	2020
Income (loss) before income taxes:			
Domestic	\$ 90,403	\$ 54,684	\$ (1,153)
Foreign	12,697	22,641	9,428
Total income (loss) before income taxes	<u>\$ 103,100</u>	<u>\$ 77,325</u>	<u>\$ 8,275</u>
Income tax expense:			
Current income tax expense (benefit):			
Domestic	\$ 12,571	\$ 14,603	\$ 812
Foreign	2,806	3,205	1,851
Total current	<u>\$ 15,377</u>	<u>\$ 17,808</u>	<u>\$ 2,663</u>
Deferred income tax (benefit) expense:			
Domestic	\$ 588	\$ (7,953)	\$ (5,641)
Foreign	1,145	(5,004)	(4,209)
Total deferred	<u>\$ 1,733</u>	<u>\$ (12,957)</u>	<u>\$ (9,850)</u>
Total income tax expense (benefit)	<u>\$ 17,110</u>	<u>\$ 4,851</u>	<u>\$ (7,187)</u>

A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	2022	2021	2020
U.S. federal statutory rate	21.0 %	21.0 %	21.0 %
State and local income taxes, net of federal tax effect	1.7	(0.3)	(10.0)
Effect of excess of percentage depletion over cost depletion	(3.1)	(3.4)	(43.0)
Foreign derived intangible income deduction	(1.7)	(2.3)	(1.8)
Non-deductible goodwill impairment	—	—	7.1
Research and development tax credit	(2.0)	(1.2)	(16.4)
Impact of foreign operations	0.6	0.3	(5.3)
Non-deductible transaction costs	—	1.6	6.9
Interest from tax authorities	—	—	(3.8)
Adjustment to unrecognized tax benefits	(0.5)	(1.9)	1.8
Equity compensation	(0.9)	(0.5)	(5.3)
Non-deductible officers' compensation	1.2	1.4	6.8
Valuation allowance	0.6	(8.5)	(45.5)
Other items	(0.3)	0.1	0.6
Effective tax rate	<u>16.6 %</u>	<u>6.3 %</u>	<u>(86.9)%</u>

Deferred tax assets and (liabilities) are determined based on temporary differences between the financial reporting and tax basis of assets and liabilities. Deferred tax assets and (liabilities) recorded in the Consolidated Balance Sheets consist of the following:

(Thousands)	December 31,	
	2022	2021
Asset (liability)		
Post-employment benefits other than pensions	\$ 1,230	\$ 1,714
Other reserves	1,831	1,901
Deferred compensation	3,850	3,263
Environmental reserves	1,321	1,358
Inventory	6,118	—
Research expenditures	7,069	—
Revenue recognition	7,878	5,027
Lease liabilities	12,651	11,639
Interest expense carryforward	12,470	14,163
Pensions	—	1,393
Accrued compensation expense	5,477	6,410
Net operating loss and credit carryforwards	9,915	11,423
Subtotal	69,810	58,291
Valuation allowance	(4,935)	(4,957)
Total deferred tax assets	64,875	53,334
Depreciation	(42,481)	(24,484)
Lease assets	(12,078)	(11,184)
Inventory	—	(2,329)
Amortization	(32,925)	(35,542)
Mine development	—	(917)
Pensions	(400)	—
Unrealized gains	(1,940)	(663)
Total deferred tax liabilities	(89,824)	(75,119)
Net deferred tax liabilities	\$ (24,949)	\$ (21,785)

The Company had deferred income tax assets offset with a valuation allowance for certain foreign and state net operating losses, a domestic capital loss carryforward, state investment and research and development tax credit carryforwards, and deferred tax assets that are not likely to be realized for certain of the Company's controlled foreign corporations. The Company intends to maintain a valuation allowance on these deferred tax assets until a realization event occurs to support reversal of all or a portion of the allowance.

At December 31, 2022, for income tax purposes, the Company had foreign net operating loss carryforwards of \$21.2 million that do not expire, and \$3.2 million that expire in calendar years 2023 through 2027. The Company had state net operating loss carryforwards of \$16.3 million that expire in calendar years 2023 through 2040 and state tax credits of \$4.1 million that expire in calendar years 2023 through 2037. The Company also had a capital loss carryforward of \$7.4 million that expires in 2026. A valuation allowance of \$4.9 million has been provided against certain foreign and state net operating loss carryforwards, a U.S. capital loss carryforward, and state tax credits due to uncertainty of their realization.

The Company files income tax returns in the U.S. federal jurisdiction, and in various state, local, and foreign jurisdictions. With limited exceptions, the Company is no longer subject to U.S. federal examinations for years before 2019, state and local examinations for years before 2018, and foreign examinations for tax years before 2017.

We operate under a tax holiday in Malaysia, which was extended and is effective through July 31, 2027. The tax holiday is conditional upon our meeting certain employment, sales, and investment thresholds. The impact of this holiday decreased foreign taxes by \$3.0 million in 2022.

A reconciliation of the Company's unrecognized tax benefits for the year-to-date periods ended December 31, 2022 and 2021 is as follows:

(Thousands)	2022	2021
Balance at January 1	\$ 1,142	\$ 2,360
Additions to tax provisions related to the current year	—	431
Additions to tax positions related to prior years	—	—
Reduction to tax positions related to prior years	(8)	(45)
Lapses on statutes of limitations	(482)	(1,604)
Balance at December 31	<u>\$ 652</u>	<u>\$ 1,142</u>

Included in the balance of unrecognized tax benefits, including interest and penalties, as of December 31, 2022 and December 31, 2021 are \$0.7 million and \$1.2 million, respectively, of tax benefits that would affect the Company's effective tax rate if recognized. It is reasonably possible that the amount of unrecognized tax benefits will change in the next twelve months; however, we do not expect the change to have a material impact on the Consolidated Statements of Income or the Consolidated Balance Sheets.

The Company recognizes interest and penalties related to unrecognized tax benefits on the income tax expense line in the accompanying Consolidated Statements of Income. Accrued interest and penalties are included on the related tax liability line in the Consolidated Balance Sheets. The amount of interest and penalties, net of the related tax benefit, recognized in earnings was immaterial during 2022, 2021, and 2020. As of December 31, 2022 and 2021, accrued interest and penalties, net of the related tax benefit, were immaterial.

Income taxes paid during 2022, 2021, and 2020, were approximately \$14.5 million, \$21.8 million, and \$3.9 million, respectively.

No additional income taxes have been provided for any remaining undistributed foreign earnings not subject to the transition tax, or any additional outside basis difference inherent in these entities, as these amounts continue to be indefinitely reinvested in foreign operations as of December 31, 2022. The amount of such unrepatriated earnings totaled \$105.4 million as of December 31, 2022. It is not practicable to estimate the additional income taxes and applicable withholding taxes that would be payable on the remittance of such undistributed earnings.

Note H — Earnings Per Share

The following table sets forth the computation of basic and diluted EPS:

(Thousands except per share amounts)	2022	2021	2020
Numerator for basic and diluted EPS:			
Net income	\$ 85,990	\$ 72,474	\$ 15,462
Denominator:			
Denominator for basic EPS:			
Weighted-average shares outstanding	20,511	20,422	20,338
Effect of dilutive securities:			
Stock appreciation rights	81	78	39
Restricted stock units	102	124	102
Performance-based restricted stock units	66	65	124
Diluted potential common shares	<u>249</u>	<u>267</u>	<u>265</u>
Denominator for diluted EPS:			
Adjusted weighted-average shares outstanding	<u>20,760</u>	<u>20,689</u>	<u>20,603</u>
Basic EPS	<u>\$ 4.19</u>	<u>\$ 3.55</u>	<u>\$ 0.76</u>
Diluted EPS	<u>\$ 4.14</u>	<u>\$ 3.50</u>	<u>\$ 0.75</u>

Equity awards covering shares of common stock totaling 56,636 in 2022, 55,598 in 2021, and 166,255 in 2020 were excluded from the diluted EPS calculation as their effect would have been anti-dilutive.

Note I — Inventories, net

Inventories in the Consolidated Balance Sheets are summarized as follows:

(Thousands)	December 31,	
	2022	2021
Raw materials and supplies	\$ 113,694	\$ 93,518
Work in process	249,105	221,638
Finished goods	60,281	45,959
Inventories, net	<u>423,080</u>	<u>361,115</u>

Inventory balances are presented net of an excess and obsolete reserve totaling \$19.8 million and \$23.9 million at December 31, 2022 and December 31, 2021, respectively.

The Company takes and records the results of a physical inventory count of its precious metals on a quarterly basis. The Company's precious metal operations include a refinery that processes precious metal-containing scrap and other materials from its customers, as well as its own internally generated scrap. The Company also outsources portions of its refining requirements to other vendors, particularly those materials with longer processing times. The precious metal content within these various refine streams may be in solutions, sludges, and other non-homogeneous forms and can vary over time based upon the input materials, yield rates, and other process parameters. The determination of the weight of the precious metal content within the refine streams as part of a physical inventory count requires the use of estimates and calculations based upon assays, assumed recovery percentages developed from actual historical data and other analyses, the total estimated volumes of solutions and other materials within the refinery, data from the Company's refine vendors, and other factors. The resulting calculated weight of the precious metals in the Company's refine operations may differ, in either direction, from what its records indicate that the Company should have on hand, which would then result in an adjustment to its pre-tax income in the period when the physical inventory was taken, and the related estimates were made.

The Company maintains the majority of the precious metals and copper used in production on a consignment basis in order to reduce our exposure to metal price movements and to reduce our working capital investment. The notional value of off-balance sheet precious metals and copper was \$373.1 million as of December 31, 2022 versus \$480.2 million as of December 31, 2021.

Note J — Property, Plant, and Equipment

Property, plant, and equipment on the Consolidated Balance Sheets is summarized as follows:

(Thousands)	December 31,	
	2022	2021
Land	\$ 26,579	\$ 26,627
Buildings	200,223	173,907
Machinery and equipment	770,628	687,502
Software	44,886	45,445
Construction in progress	100,188	130,838
Allowances for depreciation	(720,455)	(690,166)
Subtotal	<u>422,049</u>	<u>374,153</u>
Finance leases	31,662	32,865
Allowances for depreciation	(7,395)	(6,193)
Subtotal	<u>24,267</u>	<u>26,672</u>
Mineral resources	4,980	4,980
Mine development	30,059	30,059
Allowances for amortization and depletion	(32,590)	(26,889)
Subtotal	<u>2,449</u>	<u>8,150</u>
Property, plant, and equipment — net	<u>\$ 448,765</u>	<u>\$ 408,975</u>

The Company received \$63.5 million from the U.S. Department of Defense (DoD), in previous periods, for reimbursement of the DoD's share of the cost of equipment. This amount was recorded in property, plant, and equipment and the reimbursements

are reflected in Unearned income on the Consolidated Balance Sheets. The equipment was placed in service during 2012, and its full cost is being depreciated in accordance with Company policy. The unearned income liability is being reduced ratably with the depreciation expense recorded over the life of the equipment. Unearned income was reduced by \$4.4 million in 2022 and \$4.3 million in both 2021 and 2020 and credited to cost of sales in the Consolidated Statements of Income, offsetting the impact of the depreciation expense on the associated equipment on the Company's cost of sales and gross margin. The unamortized unearned income balance was \$15.3 million and \$19.7 million at December 31, 2022 and December 31, 2021, respectively.

We recorded depreciation and depletion expense of \$35.2 million in 2022, \$31.4 million in 2021, and \$30.9 million in 2020. Depreciation, depletion, and amortization as shown on the Consolidated Statement of Cash Flows is net of the reduction in the unearned income liability in 2022, 2021, and 2020. The net carrying value of capitalized software was \$4.6 million and \$5.4 million at December 31, 2022 and December 31, 2021, respectively. Depreciation expense related to software was \$1.8 million in 2022, 2021, and 2020, respectively.

As of December 31, 2022 and December 31, 2021 capital expenditures in accounts payable was \$12.1 million and \$2.1 million, respectively.

Note K — Customer Prepayments

In 2020, the Company entered into an investment agreement and a master supply agreement with a customer to procure equipment to manufacture product for the customer. The customer provided prepayments to the Company to fund the necessary infrastructure improvements and procure the equipment necessary to supply the customer with the desired product. The Company owns, operates and maintains the equipment that is being used to manufacture product for the customer.

Revenue will be recognized as the Company fulfills purchase orders and ships the commercial product to the customer, as product delivery is considered the satisfaction of the performance obligation.

Additionally, during the second quarter of 2022, the Company entered into an amendment to the investment agreement with the same customer to procure additional equipment to manufacture product for the customer. As of December 31, 2022, the Company has received approximately \$21.9 million in prepayments under the terms of this amended agreement.

As of December 31, 2022 and 2021, \$85.9 million and \$72.6 million, respectively, of prepayments are classified as Unearned income on the Consolidated Balance Sheet. The prepayments will remain in Unearned income until commercial purchase orders are received for product serviced out of the equipment, at which time a portion of the purchase order value related to prepayments will be reclassified to Unearned revenue. As of December 31, 2022 \$4.5 million of the prepayments are classified as Unearned revenue. No amounts of the prepayments were classified as short-term unearned revenue as of December 31, 2021

Note L — Leasing Arrangements

The Company leases warehouse and manufacturing real estate, and manufacturing and computer equipment under operating leases with lease terms ranging up to 25 years. Several operating lease agreements contain options to extend the lease term and/or options for early termination. The lease term consists of the non-cancelable period of the lease, periods covered by options to extend the lease if the Company is reasonably certain to exercise the option, and periods covered by an option to terminate the lease if the Company is reasonably certain not to exercise the option. As of December 31, 2022, we had no material leases that had yet to commence.

The discount rate implicit within the leases is generally not determinable, and, therefore, the Company determines the discount rate based on its incremental borrowing rate. The incremental borrowing rate for leases is determined based on the lease term over which lease payments are made, adjusted for the impact of collateral.

The components of operating and finance lease cost for 2022 and 2021 were as follows:

(Thousands)	2022	2021
Components of lease expense		
Operating lease cost	\$ 13,381	\$ 11,825
Finance lease cost		
Amortization of right-of-use assets	1,202	1,989
Interest on lease liabilities	819	1,009
Total lease cost	<u>\$ 15,402</u>	<u>\$ 14,823</u>

The Company straight-lines its expense of fixed payments for operating leases over the lease term and expenses the variable lease payments in the period incurred. These variable lease payments are not included in the calculation of right-of-use assets or lease liabilities.

Supplemental balance sheet information related to the Company's operating and finance leases as of December 31, 2022 and 2021 is as follows:

(Thousands, except lease term and discount rate)	2022	2021
Supplemental balance sheet information		
Operating Leases		
Operating lease right-of-use assets	\$ 64,249	\$ 63,096
Other liabilities and accrued items	8,401	7,906
Operating lease liabilities	59,055	57,099
Finance Leases		
Property, plant, and equipment	\$ 31,662	\$ 32,865
Allowances for depreciation, depletion, and amortization	(7,395)	(6,193)
Finance lease assets, net	<u>\$ 24,267</u>	<u>\$ 26,672</u>
Other liabilities and accrued items	\$ 1,485	\$ 2,800
Finance lease liabilities	13,876	16,327
Total principal payable on finance leases	<u>\$ 15,361</u>	<u>\$ 19,127</u>
Weighted Average Remaining Lease Term		
Operating leases	11.78	11.47
Finance leases	17.98	16.96
Weighted Average Discount Rate		
Operating leases	6.08%	6.19%
Finance leases	5.11%	4.99%

Future maturities of the Company's lease liabilities as of December 31, 2022 are as follows:

(Thousands)	Finance Leases	Operating Leases
2023	\$ 2,216	\$ 12,338
2024	1,385	9,642
2025	1,230	8,743
2026	1,204	7,355
2027	1,204	5,913
2028 and thereafter	16,579	51,574
Total lease payments	23,818	95,565
Less amount of lease payment representing interest	8,457	28,109
Total present value of lease payments	<u>\$ 15,361</u>	<u>\$ 67,456</u>

Supplemental cash flow information related to leases was as follows:

(Thousands)	2022	2021
Supplemental cash flow information		
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	\$ 19,653	\$ 17,580
Operating cash flows from finance leases	818	1,009
Financing cash flows from finance leases	2,736	2,819
Right-of-use assets obtained in exchange for lease obligations:		
Operating leases	9,967	9,191
Finance leases	—	—

Note M — Intangible Assets and Goodwill

Intangible Assets

The cost and accumulated amortization of intangible assets subject to amortization as of December 31, 2022 and 2021, is as follows:

(Thousands)	2022			2021		
	Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
Customer relationships	\$ 110,347	\$ (28,950)	\$ 81,397	\$ 111,220	\$ (22,777)	\$ 88,443
Technology	44,886	(10,420)	34,466	45,014	(6,917)	38,097
Licenses and other	34,300	(10,562)	23,738	34,468	(7,879)	26,589
Total	<u>\$ 189,533</u>	<u>\$ (49,932)</u>	<u>\$ 139,601</u>	<u>\$ 190,702</u>	<u>\$ (37,573)</u>	<u>\$ 153,129</u>

During 2021, the Company acquired \$50.2 million in customer relationships with a useful life of 13 years and \$35.3 million in technology with a useful life of 13 years, as well as a \$22.3 million trade name with a useful life of 15 years related to the HCS-Electronic Materials acquisition.

During 2020, the Company accelerated amortization on \$26.2 million of intangible assets for its LAC business that was shut down on December 31, 2020. These assets were fully amortized as of December 31, 2020 and fully written off in 2021 with no impact to the Consolidated Statements of Income in 2021.

Amortization expense for 2022, 2021, and 2020 was \$12.4 million, \$6.0 million, and \$2.4 million, respectively.

Estimated amortization expense for each of the five succeeding years is as follows:

(Thousands)	Amortization Expense
2023	12,473
2024	12,473
2025	11,851
2026	10,626
2027	10,471

Intangible assets also includes deferred costs relating to the Company's revolving credit and consignments lines of \$3.6 million and \$3.6 million at December 31, 2022 and 2021, respectively.

Goodwill

In 2021, the Company acquired HCS-Electronic Materials for a total purchase price of \$398.9 million, and recorded goodwill of \$181.3 million. Goodwill of \$157.0 million and \$24.3 million associated with the HCS-Electronic Materials acquisition was allocated to the Electronic Materials and Performance Materials segments, respectively.

The balance of goodwill at December 31, 2022 and 2021 was \$319.5 million and \$318.6 million, respectively.

A summary of changes in goodwill by reportable segment is as follows:

(Thousands)	Performance Materials	Electronic Materials	Precision Optics	Total
Balance at December 31, 2020	\$ 1,899	\$ 50,527	\$ 92,490	\$ 144,916
Acquisition	23,904	154,277	—	178,181
Impairment charge	—	—	—	—
Other	—	(284)	(4,193)	(4,477)
Balance at December 31, 2021	\$ 25,803	\$ 204,520	\$ 88,297	\$ 318,620
Acquisition	—	—	—	—
Impairment charge	—	—	—	—
Other	354	2,150	(1,626)	878
Balance at December 31, 2022	<u>\$ 26,157</u>	<u>\$ 206,670</u>	<u>\$ 86,671</u>	<u>\$ 319,498</u>

Due to recent acquisitions, the Company elected to perform a quantitative annual impairment assessment of its reporting units' goodwill as of October 1, 2022 and determined that the estimated fair values for each of its reporting units exceeded their carrying values, therefore no impairment charges were necessary. The estimated fair value of the Company's Precision Optics reporting unit exceeded the carrying value by less than 10%.

Management believes the future sales growth and EBITDA margins in the long range plan, terminal growth rate and the discount rate used in the valuations requires significant use of judgment. If any of our reporting units do not meet our long range plan estimates or our discount rate increase significantly, we could be required to perform an interim goodwill impairment analysis or recognize charges in future periods. Any impairment charges that the Company may take in the future could be material to its consolidated results of operations and financial condition. The assumptions used for the reporting units with fair values exceeding carrying values of less than 10% are more sensitive to future performance and will be monitored accordingly.

The results of the Company's 2022 and 2021 annual goodwill impairment assessments indicated that no goodwill impairment existed.

The Company's accumulated goodwill impairment losses were \$20.6 million as of December 31, 2022, 2021 and 2020. Accumulated impairment losses were from the closure of the LAC reporting unit which was closed as of December 31, 2020.

Note N — Debt

Long-term debt in the Consolidated Balance Sheets is summarized as follows:

(Thousands)	December 31,	
	2022	2021
Borrowings under Credit Agreement with average interest rate of 6.08% at December 31, 2022 and 2.12% at December 31, 2021	\$ 143,250	\$ 152,296
Borrowings under the Term Loan Facility	285,000	300,000
Foreign debt	7,541	2,252
Total long-term debt outstanding	435,791	454,548
Current portion of long-term debt	(21,105)	(15,359)
Gross long-term debt	\$ 414,686	\$ 439,189
Unamortized deferred financing fees	(3,810)	(4,801)
Long-term debt	<u>\$ 410,876</u>	<u>\$ 434,388</u>

Maturities on long-term debt instruments as of December 31, 2022 are as follows:

(Thousands)	
2023	21,105
2024	30,337
2025	30,337
2026	353,543
2027	204
2028 and thereafter	265
Total	<u>\$ 435,791</u>

In 2021, the Company amended and restated our \$375.0 million revolving credit facility (Credit Agreement) in connection with the HCS-Electronic Materials acquisition. A \$300 million delayed draw term loan facility was added to the Credit Agreement and the maturity date of the Credit Agreement was extended from 2024 to 2026. Moreover, the Credit Agreement also provides for an uncommitted incremental facility whereby, under certain conditions, the Company may be able to borrow additional term loans in an aggregate amount not to exceed \$150.0 million. On November 1, 2021, Materion borrowed the full \$300 million available under the delayed draw term loan facility and used the proceeds to pay a portion of the purchase price of the HCS-Electronic Materials acquisition.

The Credit Agreement provides the Company and its subsidiaries with additional capacity to enter into facilities for the consignment of precious metals and copper, and provides enhanced flexibility to finance acquisitions and other strategic initiatives. Borrowings under the Credit Agreement are secured by substantially all of the assets of the Company and its direct subsidiaries, with the exception of non-mining real property, precious metals, copper and certain other assets.

In January 2023, we amended the Credit Agreement to transition U.S. dollar denominated borrowings from LIBOR to the Secured Overnight Financial Rate (SOFR) for both the revolving credit agreement and the term loan and to increase the cap on precious metals facilities from \$600 million to \$615 million.

The Credit Agreement allows the Company to borrow money at a premium over SOFR, following the January 2023 amendment, or prime rate and at varying maturities. The premium resets quarterly according to the terms and conditions available under the agreement. The Credit Agreement includes restrictive covenants relating to restrictions on additional indebtedness, acquisitions, dividends, and stock repurchases. In addition, the Credit Agreement includes covenants subject to a maximum leverage ratio and a minimum interest coverage ratio. We were in compliance with all of our debt covenants as of December 31, 2022 and December 31, 2021. Cash on hand up to \$25 million can benefit the covenants and may benefit the borrowing capacity under the Credit Agreement. At December 31, 2022 and 2021, there was \$428.3 million and \$452.3 million outstanding under the Credit Agreement, respectively.

At December 31, 2022 and 2021 there was \$46.5 million and \$46.3 million letters of credit outstanding against the credit sub-facility, respectively. The Company pays a variable commitment fee that may reset quarterly (0.28% as of December 31, 2022) on the available and unborrowed amounts under the revolving credit line.

The available borrowings under the individual existing credit lines totaled \$185.3 million as of December 31, 2022.

Note O — Pensions and Other Post-Employment Benefits

The obligation and funded status of the Company's pension and other post-employment benefit plans are shown below. The Pension Benefits column aggregates defined benefit pension plans in the U.S., Germany, Liechtenstein, England, and the U.S. supplemental retirement plans. The Other Benefits column includes the domestic retiree medical and life insurance plan.

(Thousands)	Pension Benefits		Other Benefits	
	2022	2021	2022	2021
Change in benefit obligation				
Benefit obligation at beginning of year	\$ 235,779	\$ 246,107	\$ 7,514	\$ 8,190
Service cost	1,231	1,722	78	80
Interest cost	4,874	4,186	156	116
Net pension curtailments and settlements	(3,104)	—	—	—
Acquisition	—	—	—	—
Plan amendments	—	—	—	—
Actuarial (gain) loss	(61,819)	(8,448)	(1,800)	(112)
Benefit payments	(5,821)	(4,927)	(443)	(742)
Foreign currency exchange rate changes and other	(3,108)	(2,861)	—	(18)
Benefit obligation at end of year	168,032	235,779	5,505	7,514
Change in plan assets				
Fair value of plan assets at beginning of year	227,340	226,176	—	—
Plan settlements	(3,104)	—	—	—
Acquisition	—	—	—	—
Actual return on plan assets	(53,283)	5,769	—	—
Employer contributions	831	955	—	—
Employee contributions	786	878	—	—
Benefit payments from fund	(6,175)	(5,399)	—	—
Foreign currency exchange rate changes and other	(1,799)	(1,039)	—	—
Fair value of plan assets at end of year	164,596	227,340	—	—
Funded status at end of year	\$ (3,436)	\$ (8,439)	\$ (5,505)	\$ (7,514)
Amounts recognized in the Consolidated Balance Sheets consist of:				
Other assets	\$ 11,761	\$ 18,566	\$ —	\$ —
Other liabilities and accrued items	(536)	(1,662)	(754)	(754)
Retirement and post-employment benefits	(14,661)	(25,343)	(4,751)	(6,760)
Net amount recognized	\$ (3,436)	\$ (8,439)	\$ (5,505)	\$ (7,514)

The benefit obligation decreased in 2022 due to actuarial gains that were driven by increases in the discount rate.

The following amounts are included within accumulated other comprehensive loss at December 31, 2022:

(Thousands)	Pension Benefits		Other Benefits	
	2022	2021	2022	2021
Amounts recognized in other comprehensive income (before tax) consist of:				
Net actuarial loss (gain)	\$ 43,039	\$ 42,440	\$ (5,573)	\$ (4,044)
Net prior service cost (credit)	(617)	(695)	(556)	(2,054)
Net transition obligation/(asset)	—	637	—	—
Net amount recognized	\$ 42,422	\$ 42,382	\$ (6,129)	\$ (6,098)

The following table provides information regarding the accumulated benefit obligation:

(Thousands) Additional information	Pension Benefits		Other Benefits	
	2022	2021	2022	2021
Accumulated benefit obligation for all defined benefit pension plans	\$ 167,366	\$ 233,717	\$ —	\$ —
For defined benefit pension plans with benefit obligations in excess of plan assets:				
Aggregate benefit obligation	18,490	58,052	—	—
Aggregate fair value of plan assets	3,279	33,148	—	—
For defined benefit pension plans with accumulated benefit obligations in excess of plan assets:				
Aggregate accumulated benefit obligation	17,833	56,043	—	—
Aggregate fair value of plan assets	3,279	33,148	—	—

The following table summarizes components of net benefit cost:

(Thousands) Net benefit cost	Pension Benefits			Other Benefits		
	2022	2021	2020	2022	2021	2020
Service cost	\$ 1,231	\$ 1,722	\$ 1,403	\$ 78	\$ 80	\$ 59
Interest cost	4,874	4,186	5,234	156	116	213
Expected return on plan assets	(9,570)	(9,881)	(9,333)	—	—	—
Amortization of prior service credit	(78)	(82)	—	(1,497)	(1,497)	(1,497)
Recognized net actuarial loss (gain)	1,701	2,344	1,678	(272)	(275)	(332)
Net periodic benefit (credit) cost	(1,842)	(1,711)	(1,018)	(1,535)	(1,576)	(1,557)
Net pension curtailments and settlements	(551)	—	94	—	—	—
Total net benefit (credit) cost	\$ (2,393)	\$ (1,711)	\$ (924)	\$ (1,535)	\$ (1,576)	\$ (1,557)

Components of net periodic benefit cost, other than service cost, are included in Other non-operating (income) expense in the Consolidated Statements of Income. Additionally, Pension Benefit Guaranty Corporation premiums are reported within expected return on plan assets.

The following table summarizes amounts recognized in other comprehensive income (OCI):

(Thousands) Change in other comprehensive income	Pension Benefits			Other Benefits		
	2022	2021	2020	2022	2021	2020
OCI at beginning of year	\$ 42,382	\$ 48,673	\$ 48,073	\$ (6,098)	\$ (7,525)	\$ (9,578)
Increase (decrease) in OCI:						
Recognized during year — prior service cost (credit)	78	82	—	1,497	1,497	1,497
Recognized during year — net actuarial (losses) gains	(1,701)	(2,344)	(1,678)	272	275	332
Occurring during year — prior service cost	—	—	(799)	—	—	—
Occurring during year — net actuarial losses (gains)	1,112	(4,553)	3,146	(1,800)	(345)	224
Other adjustments	551	—	(94)	—	—	—
Foreign currency exchange rate changes	—	524	25	—	—	—
OCI at end of year	\$ 42,422	\$ 42,382	\$ 48,673	\$ (6,129)	\$ (6,098)	\$ (7,525)

In determining the projected benefit obligation and the net benefit cost, as of a December 31 measurement date, the Company used the following assumptions:

	Pension Benefits			Other Benefits		
	2022	2021	2020	2022	2021	2020
Assumptions used to determine benefit obligations at fiscal year end						
Discount rate	2.16% - 5.54%	0.22% - 3.02%	0.03% - 2.76%	5.52 %	2.90 %	2.45 %
Rate of compensation increase	1.75% - 3.00%	1.50% - 3.00%	1.50% - 3.00%	3.50 %	3.00 %	3.00 %
Assumptions used to determine net cost for the fiscal year						
Discount rate	0.22% - 3.02%	0.03% - 2.76%	0.21% - 3.48%	2.90 %	2.45 %	3.20 %
Expected long-term return on plan assets	1.20% - 5.25%	1.20% - 5.75%	1.80% - 6.00%	N/A	N/A	N/A
Rate of compensation increase	1.50% - 3.00%	1.50% - 3.00%	1.50% - 3.00%	3.00 %	3.00 %	3.00 %

Discount Rate. The discount rate used to determine the present value of the projected and accumulated benefit obligation at the end of each year is established based upon the available market rates for high quality, fixed income investments whose maturities match the plan's projected cash flows.

The Company uses a spot-rate approach to estimate the service and interest cost components of net periodic benefit cost for its defined benefit pension plans. The spot-rate approach applies separate discount rates for each projected benefit payment in the calculation.

Expected Long-Term Return on Plan Assets. Management establishes the domestic expected long-term rate of return assumption by reviewing historical trends and analyzing the current and projected market conditions in relation to the plan's asset allocation and risk management objectives. Consideration is given to both recent plan asset performance as well as plan asset performance over various long-term periods of time, with an emphasis on the assumption being a prospective, long-term rate of return. Management consults with and considers the opinions of its outside investment advisers and actuaries when establishing the rate and reviews assumptions with the Audit Committee of the Board of Directors.

Rate of Compensation Increase. The rate of compensation increase assumption is no longer applicable for the domestic defined benefit due to the Company freezing the plan effective January 1, 2020. The rate of compensation assumption to determine the benefit obligation and net cost for the domestic retiree medical plan was 3.5% in 2022 and 3.0% in both 2022 and 2021.

Assumptions for the defined benefit pension plans in Germany, Liechtenstein, and England are determined separately from the U.S. plan assumptions, based on historical trends and current and projected market conditions in each respective country. One plan in Germany is unfunded.

Assumed health care trend rates at fiscal year end	2022	2021
Health care trend rate assumed for next year	6.00%	6.00%
Rate that the trend rate gradually declines to (ultimate trend rate)	5.00%	5.00%
Year that the rate reaches the ultimate trend rate	2032	2028

Plan Assets

The following tables present the fair values of the Company's defined benefit pension plan assets as of December 31, 2022 and 2021 by asset category. The Company has some investments that are valued using net asset value (NAV) as the practical expedient and have not been classified in the fair value hierarchy. Refer to Note R for definitions of the fair value hierarchy.

(Thousands)	December 31, 2022			
	Total	Level 1	Level 2	Level 3
Cash	\$ 1,058	\$ 1,058	\$ —	\$ —
Equity securities (a)	37,083	37,083	—	—
Fixed-income securities (b)	13,314	13,314	—	—
Other types of investments:				
Real estate fund (c)	3,115	3,115	—	—
Total	54,570	54,570	—	—
Investments measured at NAV: (d)				
Pooled investment fund (e)	103,142			
Multi-strategy hedge funds (f)	6,812			
Private equity funds	72			
Total assets at fair value	\$ 164,596			

(Thousands)	December 31, 2021			
	Total	Level 1	Level 2	Level 3
Cash	\$ 4,777	\$ 4,777	\$ —	\$ —
Equity securities (a)	49,618	49,618	—	—
Fixed-income securities (b)	14,344	14,344	—	—
Other types of investments:				
Real estate fund (c)	3,258	3,258	—	—
Total	71,997	71,997	—	—
Investments measured at NAV: (d)				
Pooled investment fund (e)	147,832			
Multi-strategy hedge funds (f)	7,438			
Private equity funds	73			
Total assets at fair value	\$ 227,340			

- (a) Equity securities are primarily comprised of corporate stock and mutual funds directly held by the plans. Equity securities are valued using the closing price reported on the active market on which the individual securities are traded.
- (b) Fixed income securities are primarily comprised of governmental and corporate bonds directly held by the plans. Governmental and corporate bonds are valued using both market observable inputs for similar assets that are traded on an active market and the closing price on the active market on which the individual securities are traded.
- (c) Includes a mutual fund that typically invests at least 80% of its assets in equity and debt securities of companies in the real estate industry or related industries or in companies which own significant real estate assets at the time of investment.
- (d) Certain assets that are measured at fair value using the NAV practical expedient have not been classified in the fair value hierarchy.
- (e) Pooled investment fund consists of various investment types including equity investments covering a range of geographies and including investment managers that hold long and short positions, property investments, and other multi-strategy funds which combine a range of different credit, equity, and macro-orientated ideas and dynamically allocate funds across asset classes.
- (f) Includes a fund that invests in a broad portfolio of hedge funds.

The Company's domestic defined benefit pension plan investment strategy, as approved by the Governance and Organization Committee of the Board of Directors, is to employ an allocation of investments that will generate returns equal to or better than the projected long-term growth of pension liabilities so that the plan will be self-funding. The return objective is to maximize investment return to achieve and maintain a 100% funded status over time, taking into consideration required cash contributions. The allocation of investments is designed to maximize the advantages of diversification while mitigating the risk and overall portfolio volatility to achieve the return objective. Risk is defined as the annual variability in value and is measured in terms of the standard deviation of investment return. Under the Company's investment policies, allowable investments include domestic equities, international equities, fixed income securities, cash equivalents, and alternative securities (which include real estate, private venture capital investments, hedge funds, and tactical asset allocation). Ranges, in terms of a percentage of the total assets, are established for each allowable class of security. Derivatives may be used to hedge an existing security or as a risk reduction strategy. Current asset allocation guidelines are to invest 0% to 40% in equity securities, 60% to

90% in fixed income securities and cash, and up to 20% in alternative securities. Management reviews the asset allocation on a quarterly or more frequent basis and makes revisions as deemed necessary.

None of the plan assets noted above are invested in the Company's common stock.

Cash Flows

Employer Contributions. The Company does not expect to contribute to its domestic defined benefit pension plan in 2023.

All plan participants with an accrued benefit may elect an immediate payout in lieu of their future monthly annuity if the lump sum amount does not exceed \$100,000.

Estimated Future Benefit Payments. The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

(Thousands)	Pension Benefits	Other Benefits	
		Gross Benefit Payment	Net of Medicare Part D Subsidy
2023	7,565	767	767
2024	8,174	679	679
2025	8,880	608	608
2026	9,773	518	518
2027	10,638	478	478
2028 through 2032	56,634	1,815	1,815

Other Benefit Plans

In addition to the plans shown above, the Company also has certain foreign subsidiaries with accrued unfunded pension and other post-employment arrangements. The liability for these arrangements was \$0.5 million at December 31, 2022 and \$1.1 million at December 31, 2021, and was included in retirement and post-employment benefits on the Consolidated Balance Sheets.

The Company also sponsors defined contribution plans available to substantially all U.S. employees. The Company's annual defined contribution expense, including the expense for the enhanced defined contribution plan, was \$13.1 million in 2022, \$9.9 million in 2021, and \$9.8 million in 2020.

Note P — Accumulated Other Comprehensive (Loss) Income

Changes in the components of accumulated other comprehensive (loss) income, including amounts reclassified out, for 2022, 2021, and 2020, and the balances in accumulated other comprehensive (loss) income as of December 31, 2022, 2021, and 2020 are as follows:

(Thousands)	Gains and Losses On Cash Flow Hedges					Pension and Post- Employment Benefits	Foreign Currency Translation	Total
	Foreign Currency	Interest Rate	Precious Metals	Copper	Total			
Balance at December 31, 2019	\$ 1,324	\$ —	\$ (452)	\$ 25	\$ 897	\$ (41,346)	\$ (5,013)	\$ (45,462)
Other comprehensive income (loss) before reclassifications	(1,268)	—	(1,675)	218	(2,725)	(2,721)	9,030	3,584
Amounts reclassified from accumulated other comprehensive income	222	—	2,041	354	2,617	(57)	—	2,560
Other comprehensive income (loss) before tax	(1,046)	—	366	572	(108)	(2,778)	9,030	6,144
Deferred taxes on current period activity	(241)	—	84	129	(28)	(651)	—	(679)
Other comprehensive income (loss) after tax	(805)	—	282	443	(80)	(2,127)	9,030	6,823
Balance at December 31, 2020	\$ 519	\$ —	\$ (170)	\$ 468	\$ 817	\$ (43,473)	\$ 4,017	\$ (38,639)
Balance at December 31, 2020	\$ 519	\$ —	\$ (170)	\$ 468	\$ 817	\$ (43,473)	\$ 4,017	\$ (38,639)
Other comprehensive income (loss) before reclassifications	2,252	—	508	2,444	5,204	4,428	(6,904)	2,728
Amounts reclassified from accumulated other comprehensive income	123	—	(193)	(3,049)	(3,119)	437	—	(2,682)
Other comprehensive income (loss) before tax	2,375	—	315	(605)	2,085	4,865	(6,904)	46
Deferred taxes on current period activity	546	—	73	(137)	482	1,094	—	1,576
Other comprehensive income (loss) after tax	1,829	—	242	(468)	1,603	3,771	(6,904)	(1,530)
Balance at December 31, 2021	\$ 2,348	\$ —	\$ 72	\$ —	\$ 2,420	\$ (39,702)	\$ (2,887)	\$ (40,169)
Balance at December 31, 2021	\$ 2,348	\$ —	\$ 72	\$ —	\$ 2,420	\$ (39,702)	\$ (2,887)	\$ (40,169)
Other comprehensive income (loss) before reclassifications	(1,260)	8,113	(259)	—	6,594	(394)	(5,869)	331
Amounts reclassified from accumulated other comprehensive income	(176)	(250)	(126)	—	(552)	386	—	(166)
Other comprehensive income (loss) before tax	(1,436)	7,863	(385)	—	6,042	(8)	(5,869)	165
Deferred taxes on current period activity	(331)	1,808	(90)	—	1,387	518	—	1,905
Other comprehensive income (loss) after tax	(1,105)	6,055	(295)	—	4,655	(526)	(5,869)	(1,740)
Balance at December 31, 2022	\$ 1,243	\$ 6,055	\$ (223)	\$ —	\$ 7,075	\$ (40,228)	\$ (8,756)	\$ (41,909)

Reclassifications of gains and losses on foreign currency cash flow hedges from accumulated other comprehensive income are recorded in Net sales in the Consolidated Statements of Income while gains and losses on precious metal cash flow hedges are recorded in Cost of sales in the Consolidated Statements of Income. Refer to Note R for additional details on cash flow hedges.

Reclassifications from accumulated other comprehensive income for pension and post-employment benefits are included in the computation of the net periodic pension and post-employment benefit expense. Refer to Note O for additional details on pension and other post-employment expenses.

Note Q — Stock-based Compensation

The Company maintains two stock incentive plans (the 2006 Stock Incentive Plan and the 2006 Non-employee Director Equity Plan) that have been approved by its shareholders. These plans authorize the granting of option rights, stock appreciation rights (SARs), performance-restricted shares, performance shares, performance units, restricted shares, and restricted stock units (RSUs).

Stock-based compensation expense, which includes awards settled in shares and in cash and is recognized as a component of selling, general, and administrative (SG&A) expenses, was \$9.0 million, \$7.3 million, and \$5.7 million in 2022, 2021, and 2020, respectively. The Company derives a tax deduction measured by the excess of the market value over the grant price at the date stock-based awards vest or are exercised. The Company recognized \$1.0 million, \$0.9 million, and \$0.5 million of tax benefits in 2022, 2021, and 2020, respectively, relating to the issuance of common stock for the exercise/vesting of equity awards.

The following sections provide information on awards settled in shares.

SARs. The Company grants SARs to certain employees. Upon exercise of vested SARs, the participant will receive a number of shares of common stock equal to the spread (the difference between the market price of the Company's common shares at the time of exercise and the strike price established on the grant date) divided by the common share price. The strike price of the SARs is equal to the market value of the Company's common shares on the day of the grant. The number of SARs available to be issued is established by plans approved by the shareholders. The vesting period and the life of the SARs are established at the time of grant. The exercise of the SARs is generally satisfied by the issuance of treasury shares. SARs vest in equal installments annually over three years. SARs expire in seven years.

The following table summarizes the Company's SARs activity during 2022:

(Shares in thousands)	Number of SARs	Weighted-average Exercise Price Per Share	Aggregate Intrinsic Value (thousands)	Weighted-average Remaining Term (Years)
Outstanding at December 31, 2021	260	\$ 51.55		
Granted	45	80.85		
Exercised	(49)	42.83		
Cancelled	—	—		
Outstanding at December 31, 2022	256	58.38	\$ 7,448	3.8
Vested and expected to vest as of December 31, 2022	256	58.38	7,448	3.8
Exercisable at December 31, 2022	160	50.56	5,928	2.8

A summary of the status and changes of shares subject to SARs and the related average price per share follows:

(Shares in thousands)	Number of SARs	Weighted-average Grant Date Fair Value
Nonvested as of December 31, 2021	100	\$ 17.98
Granted	45	25.87
Vested	(50)	17.47
Cancelled	—	—
Nonvested as of December 31, 2022	95	\$ 21.97

As of December 31, 2022, \$1.3 million of expense with respect to non-vested SARs has yet to be recognized as expense over a weighted-average period of approximately 22 months. The total fair value of shares vested during 2022, 2021, and 2020 was \$0.9 million, \$0.8 million, and \$1.5 million, respectively.

The weighted-average grant date fair value for 2022, 2021, and 2020 was \$25.87, \$20.66, and \$13.67, respectively. The fair value will be amortized to compensation cost on a straight-line basis over the vesting period of three years, or earlier if the employee is retirement eligible and continued vesting is approved by the Board of Directors as defined in the Plan. Stock-based compensation expense relating to SARs was \$0.9 million in each of the last three years.

The total intrinsic value of stock options exercised during 2022, 2021 and 2020 was \$2.1 million, \$1.6 million and \$0.5 million, respectively.

The fair value of the SARs was estimated on the grant date using the Black-Scholes pricing model with the following assumptions:

	2022	2021	2020
Risk-free interest rate	1.56 %	0.57 %	1.41 %
Dividend yield	0.6 %	0.7 %	0.9 %
Volatility	38.5 %	37.6 %	31.8 %
Expected lives (in years)	4.4	4.6	4.8

The risk-free rate of return was based on U.S. Treasury yields with a maturity equal to the expected life of the award. The dividend yield was based on the Company's historical dividend rate and stock price. The expected volatility of stock was derived by referring to changes in the Company's historical common stock prices over a time-frame similar to the expected life of the award. In addition to considering the vesting period and contractual term of the award for the expected life assumption, the Company analyzes actual historical exercise experience for previously granted awards.

Restricted Stock Units (RSUs) - Employees. The Company may grant RSUs to employees of the Company. These units constitute an agreement to deliver shares of common stock to the participant at the end of the vesting period, which is defined at the date of the grant, and are forfeited should the holder's employment terminate during the restriction period. The fair market value of the RSUs is determined on the date of the grant and is amortized over the vesting period. With the exception of the 2022 annual employee grant, the vesting period is typically three years unless the recipient is retirement eligible and continued vesting is approved by the Board of Directors. The 2022 annual employee grant vests in three equal annual installments on the anniversary of the grant date.

The fair value of RSUs settled in stock is based on the closing stock price on the date of grant. The weighted-average grant date fair value for 2022, 2021, and 2020 was \$80.96, \$68.62, and \$51.55, respectively. Cash-settled RSUs are accounted for as liability-based compensation awards and adjusted based on the closing price of Materion's common stock over the vesting period of three years.

Stock-based compensation expense relating to stock-settled RSUs was \$3.5 million in 2022, \$3.5 million in 2021, and \$2.7 million in 2020. The unamortized compensation cost on the outstanding RSUs was \$5.5 million as of December 31, 2022 and is expected to be recognized over a weighted-average period of 23 months. The total fair value of shares that vested during 2022 was \$2.8 million, compared to \$2.0 million in 2021 and \$1.2 million in 2020.

The following table summarizes the stock-settled RSU activity during 2022:

(Shares in thousands)	Number of Shares	Weighted-average Grant Date Fair Value
Outstanding at December 31, 2021	162	\$ 59.23
Granted	61	80.96
Vested	(49)	58.29
Forfeited	(9)	64.91
Outstanding at December 31, 2022	165	\$ 67.31

RSUs - Non-Employee Directors. In 2022, 2021, and 2020, 11,120, 9,904, and 15,976 RSUs, with a one year vesting period, were granted to certain non-employee members of the Board of Directors. The weighted-average grant date fair value of these RSUs was \$81.59, \$75.77, and \$48.42 in 2022, 2021, and 2020, respectively. The Company recognized \$0.9 million of expense related to these awards in 2022, compared to \$0.8 million of expense in 2021 and \$0.7 million of expense in 2020. At December 31, 2022, \$0.3 million of expense with respect to non-vested RSU awards granted to the Board of Directors has yet to be recognized and will be amortized into expense over a weighted-average period of approximately four months.

Long-term Incentive Plans. Under the long-term incentive compensation plans, executive officers and selected other employees receive restricted stock unit awards based upon the Company's performance over the defined period, typically three years. Total units earned for grants made in 2022, 2021, and 2020, may vary between 0% and 200% of the units granted based on the attainment of performance targets during the related three-year period. All grants will be settled in Materion common shares and are equity classified. Vesting of performance-based awards is contingent upon the attainment of threshold performance objectives.

The following table summarizes the activity related to performance-based RSUs during 2022:

(Shares in thousands)	Number of Shares	Weighted- average Grant Date Fair Value
Outstanding at December 31, 2021	119	\$ 70.77
Granted	38	95.44
Vested	(43)	69.84
Forfeited	(3)	79.01
Outstanding at December 31, 2022	111	\$ 79.31

Compensation expense is based upon the performance projections for the plan period of three years, the percentage of requisite service rendered, and the fair market value of the Company's common shares on the date of grant. The offset to the compensation expense for the portion of the award to be settled in shares is recorded within shareholders' equity and was \$3.6 million for 2022, \$2.2 million for 2021, and \$2.0 million for 2020.

Directors' Deferred Compensation. Non-employee directors may defer all or part of their compensation into the Company's common stock. The fair value of the deferred shares is determined at the share acquisition date and is recorded within shareholders' equity. At December 31, 2022, shareholders' equity included 0.1 million shares related to this plan.

Note R — Fair Value Information and Derivative Financial Instruments

The Company measures and records financial instruments at fair value. A hierarchy is used for those instruments measured at fair value that distinguishes between assumptions based upon market data (observable inputs) and the Company's assumptions (unobservable inputs). The hierarchy consists of three levels:

- Level 1 — Quoted market prices in active markets for identical assets and liabilities;
- Level 2 — Inputs other than Level 1 inputs that are either directly or indirectly observable; and
- Level 3 — Unobservable inputs developed using estimates and assumptions developed by the Company, which reflect those that a market participant would use.

The following table summarizes the financial instruments measured at fair value on the Consolidated Balance Sheets at December 31, 2022 and 2021:

(Thousands)	Fair Value Measurements			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Other Significant Unobservable Inputs (Level 3)
December 31, 2022				
Financial Assets				
Deferred compensation investments	\$ 3,001	\$ 3,001	\$ —	\$ —
Foreign currency forward contracts	1,291	—	1,291	—
Interest rate swap	7,863	—	7,863	—
Precious metal swaps	118	—	118	—
Total	\$ 12,273	\$ 3,001	\$ 9,272	\$ —
Financial Liabilities				
Deferred compensation liability	\$ 3,001	\$ 3,001	\$ —	\$ —
Foreign currency forward contracts	1,757	—	1,757	—
Interest rate swap	—	—	—	—
Precious metal swaps	411	—	411	—
Total	\$ 5,169	\$ 3,001	\$ 2,168	\$ —
December 31, 2021				
Financial Assets				
Deferred compensation investments	\$ 4,246	\$ 4,246	\$ —	\$ —
Foreign currency forward contracts	3,368	—	3,368	—
Precious metal swaps	116	—	116	—
Total	\$ 7,730	\$ 4,246	\$ 3,484	\$ —
Financial Liabilities				
Deferred compensation liability	\$ 4,246	\$ 4,246	\$ —	\$ —
Foreign currency forward contracts	136	—	136	—
Precious metal swaps	24	—	24	—
Total	\$ 4,406	\$ 4,246	\$ 160	\$ —

The Company uses a market approach to value the assets and liabilities for financial instruments in the table above. Outstanding contracts are valued through models that utilize market observable inputs, including both spot and forward prices, for the same underlying currencies and metals. The Company's deferred compensation investments and liabilities are based on the fair value of the investments corresponding to the employees' investment selections, primarily in mutual funds, based on quoted prices in active markets for identical assets. Deferred compensation investments are primarily presented in Other assets. Deferred compensation liabilities are primarily presented in Other long-term liabilities.

Due to the nature of fair value calculations for variable-rate debt, the carrying value of the Company's long-term variable-rate debt is a reasonable estimate of its fair value. As noted in Note R, the Company entered into a \$100.0 million interest rate swap to hedge the interest rate risk on the fixed rate portion of the Credit Agreement. The fair value of the interest rate swap asset was \$7.9 million as of December 31, 2022, and was determined using level 2 inputs. The total of the outstanding amount on the fixed rate debt and the fair value of the interest rate swap approximates the total fair value of the fixed rate debt as of December 31, 2022.

The carrying values of the other working capital items in the Consolidated Balance Sheets approximate fair values at December 31, 2022 and 2021.

The Company uses derivative contracts to hedge portions of its foreign currency exposures and may also use derivatives to hedge a portion of its precious metal and interest expense fluctuations. The objectives and strategies for using derivatives in these areas are as follows:

Interest Rate. On March 4, 2022, the Company entered into a \$100.0 million interest rate swap to hedge the interest rate risk on the Credit Agreement described in Note P. The swap hedges the change in 1-month LIBOR from March 4, 2022 to November 2, 2026. In February 2023 we amended the terms of the interest rate swap to hedge the change in 1-month

USD-SOFR. The purpose of this hedge is to manage the risk of changes in the monthly interest payments attributable to changes in the benchmark interest rate.

Foreign Currency. The Company sells a portion of its products to overseas customers in their local currencies, primarily in euro and yen. The Company secures foreign currency derivatives, mainly forward contracts and options, to hedge these anticipated sales transactions. The purpose of the hedge program is to protect against the reduction in the dollar value of foreign currency sales from adverse exchange rate movements. Should the dollar strengthen significantly, the decrease in the translated value of the foreign currency sales should be partially offset by gains on the hedge contracts. Depending upon the methods used, the hedge contracts may limit the benefits from a weakening U.S. dollar.

The use of forward contracts locks in a firm rate and eliminates any downside risk from an adverse rate movement as well as any benefit from a favorable rate movement. The Company may from time to time choose to hedge with options or a tandem of options known as a collar. These hedging techniques can limit or eliminate the downside risk but can allow for some or all of the benefit from a favorable rate movement to be realized. Unlike a forward contract, a premium is paid for an option; collars, which are a combination of a put and call option, may have a net premium but can be structured to be cash neutral. The Company will primarily hedge with forward contracts due to the relationship between the cash outlay and the level of risk.

Precious Metals. The Company maintains the majority of its precious metal production requirements on consignment in order to reduce its working capital investment and the exposure to metal price movements. When a product containing precious metal is fabricated and delivered to the customer, the metal content is purchased out of consignment based on the current market price. The price paid by the Company for the precious metal forms the basis for the price charged to the customer for the metal content in the product. This methodology allows for changes in either direction in the market prices of the precious metals used by the Company to be passed through to the customer and reduces the impact that changes in prices could have on the Company's margins and operating profit. The consigned metal is owned by precious metal consignors that charge the Company consignment fees based upon the value of the metal as it fluctuates while on consignment. Each precious metal consignor retains title to its consigned precious metal until it is purchased by the Company, and it is the Company's typical practice to purchase metal out of consignment only after a product containing that metal has been purchased by one of our customers.

In certain instances, a customer may want to fix the price for the precious metal at the time the sales order is placed rather than at the time of shipment. Setting the sales price at a different date than when the material would be purchased out of consignment potentially creates an exposure to movements in the market price of the metal. Therefore, in these limited situations, the Company may elect to enter into a forward contract to purchase precious metal. The forward contract allows the Company to purchase metal at a fixed price on a specific future date. The price in the forward contract serves as the basis for the price to be charged to the customer. By doing so, the selling price and purchase price are matched, and the Company's price exposure is reduced.

The Company refines precious metal-containing materials for its customers and typically will purchase the refined metal from the customer at current market prices. In limited circumstances, the customer may want to fix the price to be paid at the time of the order as opposed to when the material is refined. The customer may also want to fix the price for a set period of time. The Company may then elect to enter into a hedge contract, either a forward contract or a swap, to fix the price for the estimated quantity of metal to be refined and purchased, thereby reducing the exposure to adverse movements in the price of the metal. The Company may also enter into hedges to mitigate the risk relating to the prices of the metals that we process or refine.

In certain circumstances, the Company also refines metal from the customer and may retain a portion of the refined metal as payment. The Company may elect to enter into a forward contract to sell precious metal to reduce the Company's price exposure in these instances.

The Company may from time to time elect to purchase precious metal and hold in inventory rather than on consignment due to potential consignment line limitations or other factors. These purchases are infrequent and, when made are typically held for a short duration. A forward contract will be secured at the time of the purchase to fix the price to be paid when the metal is transferred back to the consignment line, thereby limiting any price exposure during the time when the metal was owned by the Company.

Copper. The Company also uses copper in its production processes. When possible, fluctuations in the purchase price of copper are passed on to customers in the form of price adders or reductions. While over time the Company's price exposure to copper is generally in balance, there can be a lag between the change in the Company's cost and the pass-through to its customers, resulting in higher or lower margins in a given period. To mitigate this impact, the Company hedges a portion of this pricing risk.

A team consisting of senior financial managers reviews the estimated exposure levels, as defined by budgets, forecasts, and other internal data, and determines the timing, amounts, and instruments to use to hedge exposures. Management analyzes the effective hedged rates and the actual and projected gains and losses on the hedging transactions against the program objectives, targeted rates, and levels of risk assumed. Foreign currency contracts are typically layered in at different times for a specified exposure period in order to minimize the impact of market rate movements.

The use of derivatives is governed by policies adopted by the Audit and Risk Committee of the Board of Directors. The Company will only enter into a derivative contract if there is an underlying identified exposure. Contracts are typically held to maturity. The Company does not engage in derivative trading activities and does not use derivatives for speculative purposes. The Company only uses hedge contracts that are denominated in the same currency or metal as the underlying exposure.

All derivatives are recorded on the balance sheet at fair value. If the derivative is designated and effective as a cash flow hedge, changes in the fair value of the derivative are recognized in OCI until the hedged item is recognized in earnings. The ineffective portion of a derivative's fair value, if any, is recognized in earnings immediately. If a derivative is not a hedge, changes in the fair value are adjusted through income. The fair values of the outstanding derivatives are recorded on the balance sheet as assets (if the derivatives are in a gain position) or liabilities (if the derivatives are in a loss position). The fair values will also be classified as short-term or long-term depending upon their maturity dates.

The following table summarizes the notional amount and the fair value of the Company's outstanding derivatives not designated as hedging instruments (on a gross basis) and balance sheet classification as of December 31, 2022 and 2021:

(Thousands)	December 31, 2022		December 31, 2021	
	Notional Amount	Fair Value	Notional Amount	Fair Value
Foreign currency forward contracts				
Prepaid expenses	\$ 12,242	\$ 791	\$ 55,063	\$ 2,132
Other liabilities and accrued items	17,061	1,048	9,425	128

These outstanding foreign currency derivatives were related to balance sheet hedges and intercompany loans. Other-net included foreign currency gains related to these derivatives of \$0.2 million in 2022, compared to \$1.2 million of foreign currency gains in 2021.

The following table summarizes the notional amount and the fair value of the Company's outstanding derivatives designated as cash flow hedges (on a gross basis) and balance sheet classification at December 31, 2022 and 2021:

(Thousands)	December 31, 2022				
	Notional Amount	Fair Value			
		Prepaid and other current assets	Other assets	Other liabilities and accrued items	Other long-term liabilities
Foreign currency forward contracts - yen	\$ 2,985	\$ 145	\$ —	\$ 74	\$ 26
Foreign currency forward contracts - euro	25,712	355	—	472	137
Precious metal swaps	8,758	118	—	411	—
Interest rate swap	100,000	3,114	4,749	—	—
Total	\$ 137,455	\$ 3,732	\$ 4,749	\$ 957	\$ 163

(Thousands)	December 31, 2021				
	Notional Amount	Fair Value			
		Prepaid and other current assets	Other assets	Other liabilities and accrued items	Other long-term liabilities
Foreign currency forward contracts - yen	\$ 3,907	\$ 131	\$ 2	\$ —	\$ —
Foreign currency forward contracts - euro	28,412	1,102	—	—	8
Precious metal swaps	6,256	116	—	24	—
Total	\$ 38,575	\$ 1,349	\$ 2	\$ 24	\$ 8

All of these contracts were designated and effective as cash flow hedges. No ineffectiveness expense was recorded in 2022, 2021, or 2020.

The fair value of derivative contracts recorded in accumulated other comprehensive income (loss) totaled \$7.4 million and \$1.3 million as of December 31, 2022 and December 31, 2021, respectively. Deferred gains of \$3.9 million at December 31, 2022 are expected to be reclassified to earnings within the next 18-month period.

The following table summarizes the pre-tax amounts reclassified from accumulated other comprehensive income relating to the hedging relationship of the Company's outstanding derivatives designated as cash flow hedges and income statement classification for years ended December 31, 2022 and 2021:

(Thousands)	Line item	2022	2021
Hedging relationship			
Foreign currency forward contracts	Net sales	\$ (176)	\$ 123
Precious metal swaps	Cost of sales	(126)	(193)
Interest rate swap	Interest expense - net	(250)	—
Copper swaps	Cost of sales	—	(3,049)
Total		<u>\$ (552)</u>	<u>\$ (3,119)</u>

The derivative activity in the table above is reflected in cash flows from operating activities.

Note S — Contingencies and Commitments

Beryllium Cases

The Company is a defendant from time to time in proceedings in various state and federal courts brought by plaintiffs alleging that they have contracted, or have been placed at risk of contracting, beryllium sensitization or Chronic Beryllium Disease (CBD) or related ailments as a result of exposure to beryllium. Plaintiffs in beryllium cases seek recovery under theories of negligence and various other legal theories and seek compensatory and punitive damages, in many cases of an unspecified sum. Spouses, if any, often claim loss of consortium.

Employee cases, in which plaintiffs have a high burden of proof, have historically involved relatively small losses to the Company. Third-party plaintiffs (typically employees of customers) face a lower burden of proof than do the Company's employees, but these cases have generally been covered by varying levels of insurance. Management has vigorously contested the beryllium cases brought against the Company.

Non-employee beryllium cases are covered by insurance, subject to certain limitations. The insurance covers defense costs and indemnity payments (resulting from settlements or court verdicts) and is subject to various levels of deductibles. Defense and indemnity costs were less than or equal to the deductible in both 2022 and 2021.

As of December 31, 2022, the Company was a defendant in one beryllium litigation cases, which was also outstanding as of December 31, 2021. The Company does not expect the resolution of this case to have a material impact on its consolidated financial statements. During 2022, one beryllium litigation case was resolved.

Although it is not possible to predict the outcome of any pending litigation, the Company provides for costs related to litigation matters when a loss is probable, and the amount is reasonably estimable. Litigation is subject to many uncertainties, and it is possible that some of the actions could be decided unfavorably in amounts exceeding the Company's reserves. An unfavorable outcome or settlement of a beryllium case or adverse media coverage could encourage the commencement of additional similar litigation. The Company is unable to estimate its potential exposure to unasserted claims.

Based upon currently known facts and assuming collectability of insurance, the Company does not believe that resolution of the current or any potential future beryllium proceedings will have a material adverse effect on the financial condition or cash flow of the Company. However, the Company's results of operations could be materially affected by unfavorable results in one or more cases.

Environmental Proceedings

The Company has an active program for environmental compliance that includes the identification of environmental projects and estimating the impact on the Company's financial performance and available resources. Environmental expenditures that

relate to current operations, such as wastewater treatment and control of airborne emissions, are either expensed or capitalized as appropriate. The Company records reserves for the probable costs for identified environmental remediation projects. The Company's environmental engineers perform routine ongoing analyses of the remediation sites and will use outside consultants to assist in their analyses from time to time. Reserve accruals are based upon their analyses and are established based on the reasonably estimable loss or range of loss. The accruals are revised for the results of ongoing studies, changes in strategies, inflation, and for differences between actual and projected costs. The accruals may also be affected by rulings and negotiations with regulatory agencies. The timing of payments often lags the accrual, as environmental projects typically require a number of years to complete.

The environmental reserves recorded represent the Company's best estimate of what is reasonably possible and cover existing or currently foreseen projects based upon current facts and circumstances. For sites where the investigative work and work plan development are substantially complete, the Company does not believe that it is reasonably possible that the cost to resolve environmental matters will be materially different than what has been accrued. For sites that are in the preliminary stages of investigation, the ultimate loss contingencies cannot be reasonably determined at the present time. As facts and circumstances change, the ultimate cost may be revised, and the recording of additional costs may be material in the period in which the additional costs are accrued. The Company does not believe that the ultimate liability for environmental matters will have a material impact on its financial condition or liquidity due to the nature of known environmental matters and the extended period of time over which environmental remediation normally takes place.

The undiscounted reserve balance at the beginning of the year, the amounts expensed and paid, and the balance at December 31, 2022 and 2021 are as follows:

(Thousands)	2022		2021	
Reserve balance at beginning of year	\$	4,770	\$	5,476
Expensed		180		185
Paid		(480)		(891)
Reserve balance at end of year	\$	4,470	\$	4,770
Ending balance recorded in:				
Other liabilities and accrued items	\$	440	\$	539
Other long-term liabilities		4,030		4,231

The majority of expenses in both 2022 and 2021 was for various remediation projects at the Elmore, Ohio plant site.

Asset Retirement Obligations

The Company has asset retirement obligations related to its mine in Utah, as well as for certain leased facilities where the Company is contractually obligated to restore the facility back to its original condition at the end of the lease. The following represents a roll forward of the Company's asset retirement obligation liabilities for the years ended December 31, 2022 and 2021:

(Thousands)	2022		2021	
Asset retirement obligation at beginning of period	\$	2,231	\$	1,765
Accretion expense		198		134
Change in liability		—		332
Asset retirement obligation at end of period	\$	2,429	\$	2,231

These obligations are reflected in Other long-term liabilities on the Consolidated Balance Sheet.

Other

The Company is subject to various legal or other proceedings that relate to the ordinary course of its business. The Company believes that the resolution of these proceedings, individually or in the aggregate, will not have a material adverse impact upon the Company's consolidated financial statements.

On October 14, 2020, Garett Lucyk, et al. v. Materion Brush Inc., et al., case number 20CV0234, a wage and hour purported collective and class action, was filed in the Northern District of Ohio against the Company and its subsidiary, Materion Brush Inc. (collectively, the Company). Plaintiff, a former hourly production employee at the Company's Elmore, Ohio facility, alleges that he and other similarly situated employees are not paid for all time they spend donning and doffing personal protective equipment in violation of the Fair Labor Standards Act and Ohio law. Plaintiff filed a motion for conditional certification, which the Company opposed. On August 2, 2022, the Court conditionally certified a class of employees at the Company's Elmore facility only and rejected certification of a class across the Company's other facilities. In November 2022, the parties reached a settlement for an immaterial amount. The settlement is pending court approval.

At December 31, 2022, the Company had outstanding letters of credit totaling \$46.5 million related to workers' compensation, consigned precious metal guarantees, environmental remediation issues, and other matters. The majority of the Company's outstanding letters of credit expire in 2023 and are expected to be renewed.

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

None.

Item 9A. CONTROLS AND PROCEDURES

a) Evaluation of Disclosure Controls and Procedures

The Company carried out an evaluation under the supervision and with participation of the Company's management, including the chief executive officer and chief financial officer, of the effectiveness of the design and operation of disclosure controls and procedures as of December 31, 2022 pursuant to Rules 13a-15(b) and 15d-15(b) under the Securities Exchange Act of 1934, as amended (Exchange Act). Based on that evaluation, management, including the chief executive officer and chief financial officer, concluded that disclosure controls and procedures are effective as of December 31, 2022.

b) Management's Report on Internal Control over Financial Reporting

The Report of Management on Internal Control over Financial Reporting and the Report of Independent Registered Public Accounting Firm thereon are set forth in Item 8 of this Form 10-K and are incorporated herein by reference.

c) Changes in Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting identified in connection with the evaluation required by Rules 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the three months ended December 31, 2022 that have materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. OTHER INFORMATION

None.

Item 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

Not applicable.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information under “Election of Directors” in Materion Corporation's Proxy Statement for the 2023 Annual Meeting of Shareholders (Proxy Statement), to be filed with the Securities and Exchange Commission pursuant to Regulation 14A, is incorporated herein by reference.

A listing of executive officers, their ages, positions, and offices held over the past five years, is as follows:

<u>Name</u>	<u>Age</u>	<u>Positions and Offices Held</u>
Jugal K. Vijayvargiya	54	President and Chief Executive Officer (March 2017-Present); President Delphi Electronics and Safety, a global technology solutions provider to the automotive and transportation sectors (prior to March 2017)
Shelly M. Chadwick	51	Vice President, Finance and Chief Financial Officer (November 2020-Present); Vice President Finance and Chief Accounting Officer at The Timken Company, a world leader in engineered bearings and power transmission products (November 2016-November 2020)
Gregory R. Chemnitz	65	Vice President, General Counsel and Secretary

The information required by Item 10 with respect to directors, the Audit and Risk Committee of the Board of Directors, and Audit and Risk Committee financial experts is incorporated herein by reference from the section entitled “Corporate Governance; Committees of the Board of Directors — Audit and Risk Committee” and “Audit and Risk Committee Expert, Financial Literacy and Independence” in the Proxy Statement.

We have adopted a Policy Statement on Significant Corporate Governance Issues and a Code of Conduct Policy that applies to our chief executive officer and senior financial officers, including the principal financial and accounting officer, controller, and other persons performing similar functions, in compliance with applicable New York Stock Exchange and Securities and Exchange Commission requirements. The aforementioned materials and any amendments thereto, along with the charters of the Audit and Risk, Nominating, Governance, and Corporate Social Responsibility, and Compensation and Human Capital Committees of our Board of Directors, which also comply with applicable requirements, are available on our website at <http://materion.com>, and copies are also available upon request by any shareholder to Secretary, Materion Corporation, 6070 Parkland Boulevard, Mayfield Heights, Ohio 44124.

Item 11. EXECUTIVE COMPENSATION

Incorporated by reference from the sections of the Proxy Statement entitled “Executive Compensation” and “2022 Compensation of Non-Employee Directors.”

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

Incorporated by reference from the sections of the Proxy Statement entitled “Related Party Transactions” and “Corporate Governance; Committees of the Board of Directors — Director Independence.”

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

The information required under Item 12 regarding security ownership is incorporated by reference from the section of the Proxy Statement entitled "Security Ownership of Certain Beneficial Owners and Management." The information required by Item 12 regarding securities authorized for issuance under equity compensation plans is incorporated by reference from the section of the Proxy Statement entitled "Equity Compensation Plan Information."

Item 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

Incorporated by reference from the section of the Proxy Statement entitled "Ratification of Independent Registered Public Accounting Firm."

PART IV

Item 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) 1. Financial Statements and Supplemental Information

See Index to Consolidated Financial Statements in Item 8 of this Form 10-K.

(a) 2. Financial Statement Schedules

The following consolidated financial information for the years ended December 31, 2022, 2021, and 2020 is submitted herewith:

Schedule II — Valuation and qualifying accounts.

All other schedules for which provision is made in the applicable accounting regulations of the Securities and Exchange Commission are not required under the related instructions or are inapplicable, and therefore have been omitted.

(a) 3. Exhibits

All documents referenced below were filed pursuant to the Exchange Act by Materion Corporation, file number 001-15885, unless otherwise noted.

- 2.1 [Share Purchase Agreement, dated as of September 19, 2021, by and among Materion Corporation, HCST Hungary Holding Vagyonkezelő Korlátolt Felelősségű Társaság, H.C. Starck Group GmbH and Opus HoldCo S.à.r.l.](#) (filed as Exhibit 2.1 to Materion's Form 8-K filed on November 1, 2021), incorporated herein by reference
- 3.1 [Amended and Restated Articles of Incorporation of Materion Corporation](#) (filed as Exhibit 3.2 to the Company's Quarterly Report on Form 10-Q for the period ended on June 27, 2014), incorporated herein by reference.
- 3.2 [Amended and Restated Code of Regulations](#) (filed as Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q for the period ended June 27, 2014), incorporated herein by reference.
- 4.1 [Description of Materion Corporation Common Stock](#) (filed as Exhibit 4.1 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019), incorporated herein by reference.
- 4.2 [Amendment No. 1, dated September 30, 2021, to Third Amended and Restated Credit Agreement, dated September 24, 2019, by and among Materion, Materion's subsidiary, Materion Netherlands B.V., Materion's other foreign subsidiaries party thereto from time to time, the financial institutions party thereto from time to time as lenders, JPMorgan Chase Bank, N.A., as administrative agent, Wells Fargo Bank National Association and Bank of America, N.A., as co-syndication agents, and KeyBank National Association, as documentation agent](#) (filed as Exhibit 4.2 to the Company's Annual Report on Form 10-K for the year ended December 31, 2021), incorporated herein by reference.
- 4.3 [Fourth Amended and Restated Credit Agreement, by and among Materion Corporation, Materion Netherlands B.V., the other foreign borrowers party thereto from time to time, the financial institutions party thereto from time to time as lenders, JPMorgan Chase Bank, N.A., as administrative agent, Wells Fargo Bank, National Association and Bank of America, N.A., as co-syndication agents, KeyBank National Association, as documentation agent, and JPMorgan Chase Bank, N.A., Wells Fargo Securities, LLC and BofA Securities, Inc., as joint bookrunners and joint lead arrangers](#) (filed as Exhibit 10.1 to the Company's 8-K filed on November 1, 2021), incorporated herein by reference.
- 4.4# [Amendment No. 1 dated as of January 13, 2023 to Fourth Amended and Restated Credit Agreement dated as of October 27, 2021, by and among Materion Corporation \(the "Company"\), Materion Netherlands B.V. \(the "Dutch Borrower" and, together with the Company, the "Borrowers"\), the financial institutions listed on the signature pages hereof and JPMorgan Chase Bank, N.A., as Administrative Agent \(the "Administrative Agent"\), under that certain Fourth Amended and Restated Credit Agreement dated as of October 27, 2021 by and among the Company, the Dutch Borrower, the other Foreign Subsidiary Borrowers from time to time party thereto.](#)
- 10.1 [Metals Consignment Agreement, dated as of August 12, 2022](#), among Materion Corporation, certain of its subsidiaries and Bank of Montreal (filed as Exhibit 10.1 to the Company's Form 8-K Filed on August 15, 2022), incorporated herein by reference.
- 10.2 [The Bank of Nova Scotia Consignment Agreement with Materion Advanced Materials Germany GMBH](#) dated as of February 28, 2017 (filed as Exhibit 99.1 to the Company's Form 8-K filed on March 1, 2017), incorporated herein by reference.
- 10.3 [Form of Indemnification Agreement entered into by the Company and its executive officers](#) (filed as Exhibit 10a to the Company's Annual Report on Form 10-K for the year ended December 31, 2008), incorporated herein by reference.

- 10.4 [Form of Indemnification Agreement entered into by the Company and its directors](#) (filed as Exhibit 10b to the Company's Annual Report on Form 10-K for the year ended December 31, 2008), incorporated herein by reference.
- 10.5* [Amended and Restated Form of Severance Agreement for Executive Officers](#) (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended June 27, 2008), incorporated herein by reference.
- 10.6* [Amendment No. 1 to Amended and Restated Severance Agreement, dated May 4, 2011](#) (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended July 1, 2011), incorporated herein by reference.
- 10.7* [Amended and Restated Form of Severance Agreement for Key Employees](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended June 27, 2008), incorporated herein by reference.
- 10.8* [Form of Severance Agreement for Key Employees](#) (filed as Exhibit 10f to the Company's Annual Report on Form 10-K for the year ended December 31, 2015), incorporated herein by reference.
- 10.9* [Severance Agreement for Jugal Vijayvargiya](#) dated as of March 3, 2017 (filed as Exhibit 10.2 to the Company's Form 8-K filed on March 3, 2017), incorporated herein by reference.
- 10.10* [CEO Offer Letter for Jugal Vijayvargiya](#) dated as of March 1, 2017 (filed as Exhibit 10.1 to the Company's Form 8-K filed on March 3, 2017), incorporated herein by reference.
- 10.11* [Severance Agreement for Shelly M. Chadwick](#) dated as of December 15, 2020 (filed as Exhibit 10.11 to the Company's Form 10-K for the year ended December 31, 2020), incorporated herein by reference.
- 10.12* [CFO Offer Letter for Shelly M. Chadwick](#) dated as of October 24, 2020 (filed as Exhibit 10.12 to the Company's Form 10-K for the year ended December 31, 2020), incorporated herein by reference.
- 10.13* Form of Trust Agreement between the Company and Key Trust Company of Ohio, N.A. (formerly Ameritrust Company National Association) on behalf of the Company's executive officers (filed as Exhibit 10e to the Company's Annual Report on Form 10-K for the year ended December 31, 1994), incorporated herein by reference.
- 10.14* [2022 Management Incentive Plan](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended April 1, 2022), incorporated herein by reference.
- 10.15* [Materion and Subsidiaries Management Incentive Plan for the 2020 Plan Year](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended March 27, 2020), incorporated herein by reference.
- 10.16* [Materion and Subsidiaries Management Incentive Plan for the 2021 Plan Year](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended April 2, 2021), incorporated herein by reference.
- 10.17* [Materion Corporation 2006 Stock Incentive Plan](#) (as Amended and Restated as of May 3, 2017) (filed as Exhibit 4.3 to the Registration Statement on Form S-8 (Registration No. 333-217633), incorporated herein by reference.
- 10.18* [Form of 2022 Restricted Stock Unit Agreement \(Stock-Settled\)](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2022 (filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the period ended April 1, 2022), incorporated herein by reference.
- 10.19* [Form of 2020 Restricted Stock Unit Agreement \(Stock-Settled\)](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2020 (filed as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the period ended March 27, 2020), incorporated herein by reference.
- 10.20* [Form of 2021 Restricted Stock Unit Agreement \(Stock-Settled\)](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2021 (filed as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the period ended April 2, 2021), incorporated herein by reference.
- 10.21* [Form of 2022 Performance-Based Restricted Stock Unit Agreement](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2022 (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended April 1, 2022), incorporated herein by reference.
- 10.22* [Form of 2020 Performance-Based Restricted Stock Units Agreement](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2020 (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended March 27, 2020), incorporated herein by reference.

- 10.23* [Form of 2021 Performance-Based Restricted Stock Units Agreement](#) under the Materion Corporation 2006 Stock Incentive Plan (As Amended and Restated as of May 3, 2017), covering grants made in 2021 (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended April 2, 2021), incorporated herein by reference.
- 10.24* [Form of 2010 Stock Appreciation Rights Agreement](#) (filed as Exhibit 10.34 to the Company's Annual Report on Form 10-K for the year ended December 31, 2009), incorporated herein by reference.
- 10.25* [Form of 2016 Stock Appreciation Rights Agreement](#) (filed as Exhibit 10ad to the Company's Annual Report on Form 10-K for the year ended December 31, 2015), incorporated herein by reference.
- 10.26* [Form of 2020 Appreciation Rights Agreement under the Materion Corporation 2006 Stock Incentive Plan](#) (As Amended and Restated as of May 3, 2017), covering grants made in 2020 (filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the period ended March 27, 2020), incorporated herein by reference.
- 10.27* [Form of 2021 Appreciation Rights Agreement under the Materion Corporation 2006 Stock Incentive Plan](#) (As Amended and Restated as of May 3, 2017), covering grants made in 2021 (filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the period ended April 2, 2021), incorporated herein by reference.
- 10.28* [Materion Corporation Supplemental Retirement Benefit Plan](#) (filed as Exhibit 10.1 to the Company's Form 8-K filed on September 19, 2011), incorporated herein by reference.
- 10.29* [Amendment No. 1 to the Supplemental Retirement Benefit Plan](#) (filed as Exhibit 10al to the Company's Annual Report on Form 10-K for the year ended December 31, 2012), incorporated herein by reference.
- 10.30* [Amendment No. 2 to the Supplemental Retirement Benefit Plan](#) (filed as Exhibit 10ah to the Company's Annual Report on Form 10-K for the year ended December 31, 2013), incorporated herein by reference.
- 10.31* [Materion Corporation 2006 Non-employee Director Equity Plan](#) (as Amended and Restated as of May 3, 2017) (filed as Exhibit 4.3 to the Registration Statement on Form S-8 (Registration No. 333-217618), incorporated herein by reference.
- 10.32* [Form of 2020 Non-Employee Directors Restricted Stock Unit Agreement](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended June 26, 2020), incorporated herein by reference.
- 10.33* [Amended and Restated Executive Deferred Compensation Plan II](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended March 28, 2008), incorporated herein by reference.
- 10.34* [Amendment No. 1 to the Amended and Restated Executive Deferred Compensation Plan II](#) (filed as Exhibit 10bf to the Company's Annual Report on Form 10-K for the year ended December 31, 2008), incorporated herein by reference.
- 10.35* [Amendment No. 2 to the Amended and Restated Executive Deferred Compensation Plan II](#) (filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the period ended July 3, 2009), incorporated herein by reference.
- 10.36* [Amendment No. 3 to the Amended and Restated Executive Deferred Compensation Plan II](#), dated July 6, 2011 (filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the period ended July 1, 2011), incorporated herein by reference.
- 10.37* [Materion Corporation Restoration & Deferred Compensation Plan, dated March 4, 2015](#) (filed as Exhibit 10.1 to the Company's Form 8-K filed on March 10, 2015), incorporated herein by reference.
- 10.38* [Trust Agreement between the Company and Fidelity Investments dated September 26, 2006 for certain deferred compensation plans for Non-employee Directors of the Company](#) (filed as Exhibit 99.4 to the Current Report on Form 8-K filed by the Company on September 29, 2006), incorporated herein by reference.
- 10.39* [Trust Agreement between the Company and Fidelity Management Trust Company, dated June 25, 2009 relating to the Executive Deferred Compensation Plan II](#) (filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the period ended July 3, 2009), incorporated herein by reference.
- (21)# [Subsidiaries of the Registrant](#)
- (23.1)# [Consent of Ernst & Young LLP](#)
- (24)# [Powers of Attorney](#)
- (31.1)# [Certification of Chief Executive Officer required by Rule 13a-14\(a\) or 15d-14\(a\)](#)
- (31.2)# [Certification of Chief Financial Officer required by Rule 13a-14\(a\) or 15d-14\(a\)](#)
- (32)# [Certifications of Chief Executive Officer and Chief Financial Officer required by 18 U.S.C. Section 1350](#)
- (95)# [Mine Safety Disclosure Pursuant to Section 1503\(a\) of the Dodd-Frank Wall Street Reform and Consumer Protection Act for the Fiscal Year Ended December 31, 2022](#)

(101.INS)# Inline XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
(101.SCH)# Inline XBRL Taxonomy Extension Schema Document.
(101.CAL)# Inline XBRL Taxonomy Extension Calculation Linkbase Document.
(101.DEF)# Inline XBRL Taxonomy Extension Definition Linkbase Document.
(101.LAB)# Inline XBRL Taxonomy Extension Label Linkbase Document.
(101.PRE)# Inline XBRL Taxonomy Extension Presentation Linkbase Document.
(104)# Cover Page Interactive Data File (formatted in Inline XBRL and contained in the Exhibit 101 attachments)
* Denotes a compensatory plan or arrangement.
Filed or furnished herewith.

Item 16. FORM 10-K SUMMARY

None.

Materion Corporation and Subsidiaries
Schedule II—Valuation and Qualifying Accounts

(Thousands)

Valuation allowance on deferred tax assets:	2022	2021	2020
Balance at Beginning of Period	\$ 4,957	\$ 14,134	\$ 17,676
Additions:			
Charged to Costs and Expenses (1)	373	497	884
Charged to Other Accounts(3)	—	1,019	—
Deductions (2)	\$ (395)	\$ (10,693)	\$ (4,426)
Balance at End of Period	\$ 4,935	\$ 4,957	\$ 14,134

(1) Increase in valuation allowance is recorded as a component of the provision for income taxes.

(2) 2021 includes a \$6.9 million valuation allowance reversal in the fourth quarter of 2021 and a \$3.8 million balance sheet impact to deferred taxes.

(3) Change in foreign currency exchange rates and acquired reserves. See acquisition footnote B for acquisition details.

EXECUTION COPY

AMENDMENT NO. 1

Dated as of January 13, 2023

to

FOURTH AMENDED AND RESTATED CREDIT AGREEMENT

Dated as of October 27, 2021

THIS AMENDMENT NO. 1 (this "Amendment") is made as of January 13, 2023 by and among Materion Corporation (the "Company"), Materion Netherlands B.V. (the "Dutch Borrower" and, together with the Company, the "Borrowers"), the financial institutions listed on the signature pages hereof and JPMorgan Chase Bank, N.A., as Administrative Agent (the "Administrative Agent"), under that certain Fourth Amended and Restated Credit Agreement dated as of October 27, 2021 by and among the Company, the Dutch Borrower, the other Foreign Subsidiary Borrowers from time to time party thereto, the financial institutions from time to time party thereto as Lenders and the Administrative Agent (as amended, restated, supplemented or otherwise modified from time to time prior to the date hereof, the "Credit Agreement"). Capitalized terms used herein and not otherwise defined herein shall have the respective meanings given to them in the Credit Agreement.

WHEREAS, the Borrowers have informed the Administrative Agent and the Lenders that they desire to amend the Intercreditor Agreement to, *inter alia*, increase the "Maximum Dollar Amount" (as defined in the Intercreditor Agreement) in respect of the "Consignor Obligations" (as defined in the Intercreditor Agreement) permitted to have priority over the Secured Obligations with respect to the Metals Collateral (as defined in the Intercreditor Agreement) from \$550,000,000 to \$615,000,000, as set forth in that certain Amendment No. 2 to Second Amended and Restated Intercreditor Agreement (the "Intercreditor Agreement Amendment") in substantially the form provided to the Lenders in connection with this Amendment;

WHEREAS, the Borrowers have requested (i) that the requisite Lenders approve, and direct the Administrative Agent to enter into, the Intercreditor Agreement Amendment and (ii) that the requisite Lenders and the Administrative Agent agree to make certain amendments to the Credit Agreement;

WHEREAS, the Borrowers, the Lenders party hereto and the Administrative Agent have so agreed on the terms and conditions set forth herein;

NOW, THEREFORE, in consideration of the premises set forth above, the terms and conditions contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Borrowers, the Lenders party hereto and the Administrative Agent hereby agree to enter into this Amendment.

1. Consent. In reliance on the representations and warranties of the Borrowers set forth in Section 4 below, the Required Lenders hereby consent to, and authorize and direct the Administrative Agent to enter into, the Intercreditor Agreement Amendment and approve the terms set forth therein.

2. Amendments to the Credit Agreement. Effective as of the date of satisfaction of the conditions precedent set forth in Section 3 below (such date, the "Amendment No. 1 Effective Date"),

the parties hereto agree that the Credit Agreement (including the Exhibits thereto) shall be amended to delete the stricken text (indicated textually in the same manner as the following example: ~~stricken text~~) and to add the double-underlined text (indicated textually in the same manner as the following example: double-underlined text) as set forth in Annex A hereto (the Credit Agreement as so amended, the "Amended Credit Agreement").

3. Conditions of Effectiveness. The effectiveness of this Amendment is subject to the satisfaction of the following conditions precedent:

(a) The Administrative Agent shall have received counterparts of (i) this Amendment duly executed by the Borrowers, each of the Lenders, the Issuing Bank, the Swingline Lender and the Administrative Agent and (ii) the Consent and Reaffirmation attached hereto duly executed by the Subsidiary Guarantors.

(b) The Administrative Agent shall have received, to the extent invoiced at least two (2) Business Days prior to the Amendment No. 1 Effective Date (except as otherwise reasonably agreed by the Company), payment and/or reimbursement of the Administrative Agent's and its Affiliates' reasonable out-of-pocket fees and expenses (including, to the extent invoiced, reasonable fees, charges and disbursements of counsel for the Administrative Agent) in connection with this Amendment and the other Loan Documents, subject to the provisions of Section 9.03 of the Credit Agreement.

The Administrative Agent shall notify the Company and the Lenders of the Amendment No. 1 Effective Date, and such notice shall be conclusive and binding.

4. Representations and Warranties of the Borrowers. Each Borrower hereby represents and warrants as follows:

(a) This Amendment and the Amended Credit Agreement constitute legal, valid and binding obligations of such Borrower, enforceable against such Borrower in accordance with their terms, subject to applicable bankruptcy, insolvency, reorganization, moratorium or other laws affecting creditors' rights generally and subject to general principles of equity, regardless of whether considered in a proceeding in equity or at law.

(b) As of the date hereof and immediately after giving effect to the terms of this Amendment, (i) no Default has occurred and is continuing and (ii) the representations and warranties of such Borrower set forth in the Amended Credit Agreement are true and correct in all material respects (or, in the case of any representation or warranty qualified by materiality or Material Adverse Effect, in all respects) on and as of the Amendment No. 1 Effective Date (it being understood and agreed that any representation or warranty which by its terms is made as of a specified date shall be required to be true and correct in all material respects (or, in the case of any representation or warranty qualified by materiality or Material Adverse Effect, in all respects) only as of such specified date).

5. Reference to and Effect on the Credit Agreement.

(a) Upon the effectiveness hereof, each reference to the Credit Agreement in the Amended Credit Agreement or any other Loan Document shall mean and be a reference to the Amended Credit Agreement.

(b) Each Loan Document and all other documents, instruments and agreements executed and/or delivered in connection therewith shall remain in full force and effect and are hereby ratified and confirmed.

(c) The execution, delivery and effectiveness of this Amendment shall not operate as a waiver of any right, power or remedy of the Administrative Agent or the Lenders, nor constitute a waiver of any provision of the Credit Agreement, the Loan Documents or any other documents, instruments and agreements executed and/or delivered in connection therewith.

(d) This Amendment is a “Loan Document” under (and as defined in) the Credit Agreement.

6. Governing Law. This Amendment shall be construed in accordance with and governed by the law of the State of New York, without regard to its conflicts of laws principles.


7. Headings. Section headings in this Amendment are included herein for convenience of reference only and shall not constitute a part of this Amendment for any other purpose.

8. Counterparts. This Amendment may be executed by one or more of the parties hereto on any number of separate counterparts, and all of said counterparts taken together shall be deemed to constitute one and the same instrument. Delivery by facsimile or electronic transmission of an executed counterpart of a signature page to this Amendment shall be effective as delivery of an original executed counterpart of this Amendment. The words “execution,” “signed,” “signature,” “delivery,” and words of like import in or relating to this Amendment and the transactions contemplated hereby shall be deemed to include Electronic Signatures (as defined below), deliveries or the keeping of records in electronic form, each of which shall be of the same legal effect, validity or enforceability as a manually executed signature, physical delivery thereof or the use of a paper-based recordkeeping system, as the case may be. As used herein, “Electronic Signatures” means any electronic symbol or process attached to, or associated with, any contract or other record and adopted by a person with the intent to sign, authenticate or accept such contract or record.


[Signature Pages Follow]

IN WITNESS WHEREOF, this Amendment has been duly executed as of the day and year first above written.

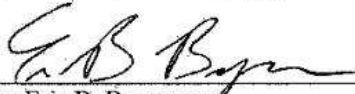
MATERION CORPORATION,
as the Company

By: 
Name: Christopher E. Eberhardt
Title: Vice President, Tax and Treasury

MATERION NETHERLANDS B.V.,
as the Dutch Borrower

By: 
Name: Christopher E. Eberhardt
Title: Authorized Signatory


JPMORGAN CHASE BANK, N.A.,
individually as a Lender, as Swingline Lender, as Issuing
Bank and as Administrative Agent

By: 
Name: Eric B. Bergeson
Title: Authorized Officer

WELLS FARGO BANK, NATIONAL ASSOCIATION,
as a Lender

By: Michelle Kuhn
Name: Michelle Kuhn
Title: Director

BANK OF AMERICA, N.A.,
as a Lender

By: 
Name: Gregg Bush
Title: Senior Vice President

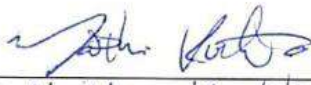
KEYBANK NATIONAL ASSOCIATION,
as a Lender

By: 
Name: John R. Macks
Title: Vice President

FIFTH THIRD BANK, NATIONAL ASSOCIATION,
as a Lender

By: Tony Pisciotta
Name: Tony Pisciotta
Title: Assistant Vice President

CITIZENS BANK, N.A.,
as a Lender

By: 
Name: Matthew Kuchta
Title: SVP

PNC BANK, NATIONAL ASSOCIATION,
as a Lender

By: 

Name: Spencer Dieken

Title: Senior Vice President

TRUIST BANK,
as a Lender

By: 
Name: William P. Rutkowski
Title: Director

MUFG BANK, LTD.,
as a Lender

By: Christine Howatt
Name: Christine Howatt
Title: Authorized Signatory

HSBC BANK USA, NATIONAL ASSOCIATION,
as a Lender

By: 
Name: Shaun R. Kleinman
Title: Senior Vice President

Annex A

Amended Credit Agreement

J.P.Morgan

FOURTH AMENDED AND RESTATED CREDIT AGREEMENT

dated as of

October 27, 2021

among

MATERION CORPORATION

MATERION NETHERLANDS B.V.

The Other Foreign Subsidiary Borrowers Party Hereto

The Lenders Party Hereto

JPMORGAN CHASE BANK, N.A.
as Administrative Agent

WELLS FARGO BANK, NATIONAL ASSOCIATION
and
BANK OF AMERICA, N.A.
as Co-Syndication Agents

KEYBANK NATIONAL ASSOCIATION
as Documentation Agent

JPMORGAN CHASE BANK, N.A.,
WELLS FARGO SECURITIES, LLC and BofA SECURITIES, INC.
as Joint Bookrunners and Joint Lead Arrangers

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FOURTH AMENDED AND RESTATED CREDIT AGREEMENT (this "Agreement") dated as of October 27, 2021 among MATERION CORPORATION, MATERION NETHERLANDS B.V., the other FOREIGN SUBSIDIARY BORROWERS from time to time party hereto, the LENDERS from time to time party hereto, JPMORGAN CHASE BANK, N.A., as Administrative Agent, WELLS FARGO BANK, NATIONAL ASSOCIATION and BANK OF AMERICA, N.A., as Co-Syndication Agents and KEYBANK NATIONAL ASSOCIATION, as Documentation Agent.

WHEREAS, the Company, the Foreign Subsidiary Borrowers party thereto, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent thereunder, are currently party to the Third Amended and Restated Credit Agreement, dated as of September 24, 2019 (as amended, supplemented or otherwise modified prior to the date hereof, the "Existing Credit Agreement").

WHEREAS, the Company, the Foreign Subsidiary Borrowers, the Lenders and the Administrative Agent have agreed to enter into this Agreement in order to (i) amend and restate the Existing Credit Agreement in its entirety, (ii) re-evidence the "Obligations" under, and as defined in, the Existing Credit Agreement, which shall constitute "Obligations" hereunder and be repayable in accordance with the terms of this Agreement, and (iii) set forth the terms and conditions under which the Lenders will, from time to time, make loans and extend other financial accommodations to or for the benefit of the Borrowers.

WHEREAS, it is the intent of the parties hereto that this Agreement not constitute a novation of the obligations and liabilities of the parties under the Existing Credit Agreement or be deemed to evidence or constitute full repayment of such obligations and liabilities, but that this Agreement amend and restate in its entirety the Existing Credit Agreement and re-evidence the obligations and liabilities of the Company and the other Loan Parties outstanding thereunder, which shall be payable in accordance with the terms hereof.

WHEREAS, it is also the intent of the Company and the other Loan Parties to confirm that all obligations under the applicable "Loan Documents" (as referred to and defined in the Existing Credit Agreement) shall continue in full force and effect as modified or restated by the Loan Documents (as referred to and defined herein) and that, from and after the Effective Date, all references to the "Credit Agreement" contained in any such existing "Loan Documents" shall be deemed to refer to this Agreement.

NOW, THEREFORE, in consideration of the premises and the mutual covenants contained herein, the parties hereto agree that the Existing Credit Agreement is hereby amended and restated as follows:

ARTICLE I

Definitions

SECTION 1.01. Defined Terms. As used in this Agreement, the following terms have the meanings specified below:

"ABR", when used in reference to any Loan or Borrowing, refers to such Loan, or the Loans comprising such Borrowing, bearing interest at a rate determined by reference to the Alternate Base Rate. All ABR Loans shall be denominated in Dollars.

"Acquisition" means any transaction, or any series of related transactions, consummated on or after the Effective Date, by which the Company or any Subsidiary (a) acquires any going business

or all or substantially all of the assets of any Person, whether through purchase of assets, merger or otherwise or (b) directly or indirectly acquires (in one transaction or as the most recent transaction in a series of transactions) at least a majority (in number of votes) of the Equity Interests of a Person which has ordinary voting power for the election of directors or other similar management personnel of a Person (other than Equity Interests having such power only by reason of the happening of a contingency) or a majority of the outstanding Equity Interests of a Person.

“Additional Commitment Lender” is defined in Section 2.25(d).

“Adjusted Daily Simple RFR” means, (i) with respect to any RFR Borrowing denominated in Pounds Sterling, an interest rate per annum equal to the Daily Simple RFR for Pounds Sterling, (ii) with respect to any RFR Borrowing denominated in Swiss Francs, an interest rate per annum equal to the Daily Simple RFR for Swiss Francs, and (iii) with respect to any RFR Borrowing denominated in Dollars, an interest rate per annum equal to (a) the Daily Simple RFR for Dollars, plus (b) 0.10%; provided that if the Adjusted Daily Simple RFR as so determined would be less than the Floor, such rate shall be deemed to be equal to the Floor for the purposes of this Agreement.

“Adjusted EURIBO Rate” means, with respect to any EurocurrencyTerm Benchmark Borrowing denominated in euro for any Interest Period, an interest rate per annum equal to (a) the EURIBO Rate for such Interest Period multiplied by (b) the Statutory Reserve Rate; provided that if the Adjusted EURIBO Rate as so determined would be less than the Floor, such rate shall be deemed to be equal to the Floor for the purposes of this Agreement.

“Adjusted LIBOTerm SOFR Rate” means, with respect to any EurocurrencyTerm Benchmark Borrowing denominated in Dollars for any Interest Period, an interest rate per annum (rounded upwards, if necessary, to the next 1/100 of 1%) equal to (a) the LIBOTerm SOFR Rate for such Interest Period multiplied by (b) the Statutory Reserve Rate, plus (b) 0.10%; provided that if the Adjusted Term SOFR Rate as so determined would be less than the Floor, such rate shall be deemed to be equal to the Floor for the purposes of this Agreement.

“Adjusted TIBO Rate” means, with respect to any EurocurrencyTerm Benchmark Borrowing denominated in Japanese Yen for any Interest Period, an interest rate per annum equal to (a) the TIBO Rate for such Interest Period multiplied by (b) the Statutory Reserve Rate; provided that if the Adjusted TIBO Rate as so determined would be less than the Floor, such rate shall be deemed to be equal to the Floor for the purposes of this Agreement.

“Administrative Agent” means JPMorgan Chase Bank, N.A. (including its branches and affiliates), in its capacity as administrative agent for the Lenders hereunder.

“Administrative Questionnaire” means an Administrative Questionnaire in a form supplied by the Administrative Agent.

“Affected Financial Institution” means (a) any EEA Financial Institution or (b) any UK Financial Institution.

“Affected Foreign Subsidiary” means (a) any Foreign Subsidiary organized under the laws of a jurisdiction other than the Netherlands and (b) any Foreign Subsidiary Holding Company.

“Affiliate” means, with respect to a specified Person, another Person that directly, or indirectly through one or more intermediaries, Controls or is Controlled by or is under common Control with the Person specified.

“Agreed Currencies” means (i) Dollars, (ii) euro, (iii) Pounds Sterling, (iv) Japanese Yen, (v) Swiss Francs and (vi) any other currency (x) that is a lawful currency (other than Dollars) that is readily available and freely transferable and convertible into Dollars and (y) that is agreed to by the Administrative Agent and each of the Revolving Lenders.

“Agreement” has the meaning assigned to such term in the introductory paragraph.

“Alternate Base Rate” means, for any day, a rate per annum equal to the greatest of (a) the Prime Rate in effect on such day, (b) the NYFRB Rate in effect on such day plus ½ of 1% and (c) the Adjusted ~~LIBO~~Term SOFR Rate for a one month Interest Period ~~in Dollars on as published two U.S. Government Securities Business Days prior to~~ such day (or if such day is not a U.S. Government Securities Business Day, the immediately preceding U.S. Government Securities Business Day) plus 1%; ~~provided that for the purpose of this definition, the Adjusted LIBO Term SOFR Rate for any day shall be based on the LIBO Screen Rate (or if the LIBO Screen Rate is not available for such one month Interest Period, the LIBO Interpolated Rate)~~Term SOFR Reference Rate at approximately ~~11:005:00 a.m. London time on such day, Chicago time, on such day (or any amended publication time for the Term SOFR Reference Rate, as specified by the CME Term SOFR Administrator in the Term SOFR Reference Rate methodology).~~ Any change in the Alternate Base Rate due to a change in the Prime Rate, the NYFRB Rate or the Adjusted ~~LIBO~~Term SOFR Rate shall be effective from and including the effective date of such change in the Prime Rate, the NYFRB Rate or the Adjusted ~~LIBO~~Term SOFR Rate, respectively. If the Alternate Base Rate is being used as an alternate rate of interest pursuant to Section 2.14 (for the avoidance of doubt, only until the Benchmark Replacement has been determined pursuant to Section 2.14(b)), then the Alternate Base Rate shall be the greater of clauses (a) and (b) above and shall be determined without reference to clause (c) above. For the avoidance of doubt, if the Alternate Base Rate as determined pursuant to the foregoing would be less than 1.00%, such rate shall be deemed to be 1.00% for purposes of this Agreement.

“Amendment No. 1” means that certain Amendment No. 1, dated as of January 13, 2023, to this Agreement, by and among the Borrowers, the Administrative Agent and the Lenders party thereto.

“Amendment No. 1 Effective Date” has the meaning assigned to such term in Amendment No. 1.

“Ancillary Document” has the meaning assigned to such term in Section 9.06.

“Anti-Corruption Laws” means all laws, rules, and regulations of any jurisdiction applicable to the Company or its Subsidiaries from time to time concerning or relating to bribery or corruption.

“Applicable Party” has the meaning assigned to such term in Section 8.03(c).

“Applicable Percentage” means, with respect to any Lender, (a) with respect to Revolving Loans, LC Exposure or Swingline Loans, the percentage equal to a fraction the numerator of which is such Lender’s Revolving Commitment and the denominator of which is the aggregate Revolving Commitments of all Revolving Lenders (if the Revolving Commitments have terminated or expired, the Applicable Percentages shall be determined based upon the Revolving Commitments most recently in

effect, giving effect to any assignments) and (b) with respect to the Term Loans, (i) at any time prior to advancing the Term Loans, a percentage equal to a fraction the numerator of which is such Lender's Term Loan Commitment and the denominator of which is the aggregate Term Loan Commitments of all Term Lenders and (ii) at any time after advancing the Term Loans, a percentage equal to a fraction the numerator of which is such Lender's outstanding principal amount of the Term Loans and the denominator of which is the aggregate outstanding principal amount of the Term Loans of all Term Lenders; provided that , in the case of each of the foregoing clauses (a) and (b), in the case of Section 2.24 when a Defaulting Lender shall exist, any such Defaulting Lender's Revolving Commitment and/or Term Loan Commitment, as applicable, shall be disregarded in the calculation.

"Applicable Pledge Percentage" means 100%, but 65% in the case of a pledge by the Company or any Domestic Subsidiary of its Equity Interests in a Foreign Subsidiary or Foreign Subsidiary Holding Company.

"Applicable Rate" means, for any day, with respect to commitment fees payable hereunder, any ~~Eurocurrency~~ Eurocurrency Term Benchmark Loan, any ABR Loan, any RFR Loan or any CBR Loan, as the case may be, the applicable rate per annum set forth below under the caption "Commitment Fee Rate", "~~Eurocurrency~~ Eurocurrency Term Benchmark Spread", "~~RFR Spread / CBR Spread~~" or "ABR Spread", as the case may be, based upon the Leverage Ratio applicable on such date:

	<u>Leverage Ratio:</u>	<u>Commitment Fee Rate</u>	Eurocurrency <u>Eurocurrency Term Benchmark Spread</u>	RFR Spread / CBR Spread	<u>ABR Spread</u>
<u>Category 1:</u>	≤ 2.00 to 1.00	0.15%	1.25%	1.25%	0.25%
<u>Category 2:</u>	> 2.00 to 1.00 but ≤ 2.50 to 1.00	0.20%	1.50%	1.50%	0.50%
<u>Category 3:</u>	> 2.50 to 1.00 but ≤ 3.00 to 1.00	0.275%	1.75%	1.75%	0.75%
<u>Category 4:</u>	> 3.00 to 1.00 but ≤ 3.50 to 1.00	0.35%	2.00%	2.00%	1.00%
<u>Category 5:</u>	> 3.50 to 1.00	0.40%	2.25%	2.25%	1.25%

For purposes of the foregoing,

(i) if at any time the Company fails to deliver the Financials on or before the date the Financials are due pursuant to Section 5.01, Category 5 shall be deemed applicable for the period commencing three (3) Business Days after the required date of delivery and ending on the date which is three (3) Business Days after the Financials are actually delivered, after which the Category shall be determined in accordance with the table above as applicable;

(ii) adjustments, if any, to the Category then in effect shall be effective three (3) Business Days after the Administrative Agent has received the applicable Financials (it being understood and agreed that each change in Category shall apply during the period commencing on the effective date of such change and ending on the date immediately preceding the effective date of the next such change); and

(iii) notwithstanding the foregoing, Category 4 shall be deemed to be applicable until the Administrative Agent's receipt of the applicable Financials for the Company's first full Fiscal Quarter ending after the Effective Date (unless such Financials demonstrate that Category 5 should have been applicable during such period, in which case such other Category shall be deemed to be applicable during such period) and adjustments to the Category then in effect shall thereafter be effected in accordance with the preceding paragraphs.

"Applicable Time" means, with respect to any Borrowings and payments in any Foreign Currency, the local time in the place of settlement for such Foreign Currency as may be reasonably determined by the Administrative Agent or the Issuing Bank, as the case may be, to be necessary for timely settlement on the relevant date in accordance with normal banking procedures in the place of payment.

"Approved Electronic Platform" has the meaning assigned to such term in Section 8.03(a).

"Approved Fund" has the meaning assigned to such term in Section 9.04(b).

"Arranger" means each of JPMorgan Chase Bank, N.A., Wells Fargo Securities, LLC and BofA Securities, Inc. in its capacity as a joint bookrunner and joint lead arranger hereunder.

"Assignment and Assumption" means an assignment and assumption agreement entered into by a Lender and an assignee (with the consent of any party whose consent is required by Section 9.04), and accepted by the Administrative Agent, substantially in the form of Exhibit A or any other form (including electronic records generated by the use of an electronic platform) approved by the Administrative Agent.

"Augmenting Lender" has the meaning assigned to such term in Section 2.20.

"Available Tenor" means, as of any date of determination and with respect to the then-current Benchmark for any Agreed Currency, as applicable, any tenor for such Benchmark (or component thereof) or payment period for interest calculated with reference to such Benchmark (or component thereof), as applicable, that is or may be used for determining the length of an Interest Period for any term rate or otherwise, for determining any frequency of making payments of interest calculated pursuant to this Agreement as of such date and not including, for the avoidance of doubt, any tenor for such Benchmark that is then-removed from the definition of "Interest Period" pursuant to clause (f) of Section 2.14.

"Bail-In Action" means the exercise of any Write-Down and Conversion Powers by the applicable Resolution Authority in respect of any liability of an Affected Financial Institution.

"Bail-In Legislation" means, (a) with respect to any EEA Member Country implementing Article 55 of Directive 2014/59/EU of the European Parliament and of the Council of the European Union, the implementing law, regulation, rule or requirement for such EEA Member Country from time to time which is described in the EU Bail-In Legislation Schedule and (b) with respect to the United

Kingdom, Part I of the United Kingdom Banking Act 2009 (as amended from time to time) and any other law, regulation or rule applicable in the United Kingdom relating to the resolution of unsound or failing banks, investment firms or other financial institutions or their affiliates (other than through liquidation, administration or other insolvency proceedings).

“Banking Services” means each and any of the following bank services provided to the Company or any Subsidiary by any Lender or any of its Affiliates: (a) credit cards for commercial customers (including, without limitation, commercial credit cards and purchasing cards), (b) stored value cards, (c) merchant processing services and (d) treasury management services (including, without limitation, controlled disbursement, automated clearinghouse transactions, return items, any direct debit scheme or arrangement, overdrafts and interstate depository network services).

“Banking Services Agreement” means any agreement entered into by the Company or any Subsidiary in connection with Banking Services.

“Banking Services Obligations” means any and all obligations of the Company or any Subsidiary, whether absolute or contingent and howsoever and whensoever created, arising, evidenced or acquired (including all renewals, extensions and modifications thereof and substitutions therefor) in connection with Banking Services.

“Beryllium Contracts” means any and all agreements or other arrangements (however styled) for the purchase, procurement or other acquisition of Beryllium, in whatever form (including, without limitation, Beryl ore, Copper Beryllium Master Alloy, Vacuum Cast Beryllium Ingot, and Vacuum Hot Pressed Beryllium Billet), entered into from time to time by the Company or any Subsidiary, but only to the extent that the Dollar Amount of any Indebtedness related thereto does not exceed \$20,000,000 during any consecutive 12-month period.

“Bankruptcy Code” means Title 11 of the United States Code entitled “Bankruptcy”, as now and hereafter in effect, or any successor statute.

“Bankruptcy Event” means, with respect to any Person, such Person becomes the subject of a voluntary or involuntary bankruptcy or insolvency proceeding, or has had a receiver, conservator, trustee, administrator, custodian, assignee for the benefit of creditors, restructuring officer (herstrukturierungsdeskundige) or similar Person charged with the reorganization or liquidation of its business appointed for it, or, in the good faith determination of the Administrative Agent, has taken any action in furtherance of, or indicating its consent to, approval of, or acquiescence in, any such proceeding or appointment or has had any order for relief in such proceeding entered in respect thereof; provided that a Bankruptcy Event shall not result solely by virtue of any ownership interest, or the acquisition of any ownership interest, in such Person by a Governmental Authority or instrumentality thereof, unless such ownership interest results in or provides such Person with immunity from the jurisdiction of courts within the United States or from the enforcement of judgments or writs of attachment on its assets or permits such Person (or such Governmental Authority or instrumentality) to reject, repudiate, disavow or disaffirm any contracts or agreements made by such Person.

“Benchmark” means, initially, with respect to any (i) RFR Loan in any Agreed Currency, the applicable Relevant Rate for such Agreed Currency or (ii) Eurocurrency Term Benchmark Loan, the Relevant Rate for such Agreed Currency; provided that if a Benchmark Transition Event, ~~a Term SOFR Transition Event, an Early Opt-in Election or an Other Benchmark Rate Election, as applicable, and its~~ and the related Benchmark Replacement Date have occurred with respect to the applicable Relevant Rate or the then-current Benchmark for such Agreed Currency, then “Benchmark”

means the applicable Benchmark Replacement to the extent that such Benchmark Replacement has replaced such prior benchmark rate pursuant to clause (b) or clause (c) of Section 2.14.

“Benchmark Replacement” means, for any Available Tenor, the first alternative set forth in the order below that can be determined by the Administrative Agent for the applicable Benchmark Replacement Date; provided that, in the case of any Loan denominated in a Foreign Currency ~~or in the case of an Other Benchmark Rate Election~~, “Benchmark Replacement” ~~means~~ shall mean the alternative set forth in (32) below:

~~(1) in the case of any Loan denominated in Dollars, the sum of: (a) Term SOFR and (b) the related Benchmark Replacement Adjustment;~~

~~(2) in the case of any Loan denominated in Dollars, the sum of: (a) Adjusted Daily Simple SOFR and (b) the related Benchmark Replacement Adjustment~~ RFR for RFR Borrowings denominated in Dollars;

(32) the sum of: (a) the alternate benchmark rate that has been selected by the Administrative Agent and the Company as the replacement for the then-current Benchmark for the applicable Corresponding Tenor giving due consideration to (i) any selection or recommendation of a replacement benchmark rate or the mechanism for determining such a rate by the Relevant Governmental Body or (ii) any evolving or then-prevailing market convention for determining a benchmark rate as a replacement for the then-current Benchmark for syndicated credit facilities denominated in the applicable Agreed Currency at such time in the United States and (b) the related Benchmark Replacement Adjustment;

~~provided that, in the case of clause (1), such Unadjusted Benchmark Replacement is displayed on a screen or other information service that publishes such rate from time to time as selected by the Administrative Agent in its reasonable discretion; provided further that, in the case of clause (3), when such clause is used to determine the Benchmark Replacement in connection with the occurrence of an Other Benchmark Rate Election, the alternate benchmark rate selected by the Administrative Agent and the Company shall be the term benchmark rate that is used in lieu of a LIBOR-based rate in the relevant other Dollar-denominated syndicated credit facilities; provided further that, notwithstanding anything to the contrary in this Agreement or in any other Loan Document, upon the occurrence of a Term SOFR Transition Event, and the delivery of a Term SOFR Notice, on the applicable Benchmark Replacement Date the “Benchmark Replacement” shall revert to and shall be deemed to be the sum of (a) Term SOFR and (b) the related Benchmark Replacement Adjustment, as set forth in clause (1) of this definition (subject to the first proviso above);~~

~~If~~ provided that if the Benchmark Replacement as determined pursuant to clause (1); or clause (2) or (3) above would be less than the Floor, the Benchmark Replacement will be deemed to be the Floor for the purposes of this Agreement and the other Loan Documents.

“Benchmark Replacement Adjustment” means, with respect to any replacement of the then-current Benchmark with an Unadjusted Benchmark Replacement for any applicable Interest Period and Available Tenor for any setting of such Unadjusted Benchmark Replacement:

the spread adjustment, or method for calculating or determining such spread adjustment (which may be a positive or negative value or zero) ~~(1)~~ for purposes of clauses

~~(1) and (2) of the definition of "Benchmark Replacement," the first alternative set forth in the order below that can be determined by the Administrative Agent:~~

~~(a) the spread adjustment, or method for calculating or determining such spread adjustment, (which may be a positive or negative value or zero) as of the Reference Time such Benchmark Replacement is first set for such Interest Period that has been selected or recommended by the Relevant Governmental Body for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for the applicable Corresponding Tenor;~~

~~(b) the spread adjustment (which may be a positive or negative value or zero) as of the Reference Time such Benchmark Replacement is first set for such Interest Period that would apply to the fallback rate for a derivative transaction referencing the ISDA Definitions to be effective upon an index cessation event with respect to such Benchmark for the applicable Corresponding Tenor; and~~

~~(2) for purposes of clause (3) of the definition of "Benchmark Replacement," the spread adjustment, or method for calculating or determining such spread adjustment, (which may be a positive or negative value or zero), that has been selected by the Administrative Agent and the Company for the applicable Corresponding Tenor giving due consideration to (i) any selection or recommendation of a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement by the Relevant Governmental Body on the applicable Benchmark Replacement Date and/or (ii) any evolving or then-prevailing market convention for determining a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for syndicated credit facilities denominated in the applicable Agreed Currency at such time in the United States;~~

~~provided that, in the case of clause (1) above, such adjustment is displayed on a screen or other information service that publishes such Benchmark Replacement Adjustment from time to time as selected by the Administrative Agent in its reasonable discretion.~~

"Benchmark Replacement Conforming Changes" means, with respect to any Benchmark Replacement and/or any Term Benchmark Loan denominated in Dollars, any technical, administrative or operational changes (including changes to the definition of "Alternate Base Rate," the definition of "Business Day," the definition of "U.S. Government Securities Business Day," the definition of "RFR Business Day," the definition of "Interest Period," timing and frequency of determining rates and making payments of interest, timing of borrowing requests or prepayment, conversion or continuation notices, length of lookback periods, the applicability of breakage provisions, and other technical, administrative or operational matters) that the Administrative Agent, in consultation with the Company, decides in its reasonable discretion may be appropriate to reflect the adoption and implementation of such Benchmark Replacement and to permit the administration thereof by the Administrative Agent in a manner substantially consistent with market practice (or, if the Administrative Agent decides in its reasonable discretion that adoption of any portion of such market practice is not administratively feasible or if the Administrative Agent determines in its reasonable discretion that no market practice for the administration of such Benchmark Replacement exists, in such other manner of administration as the Administrative Agent, in consultation with the Company, decides is reasonably necessary in connection with the administration of this Agreement and the other Loan Documents).

“Benchmark Replacement Date” means, with respect to any Benchmark, the earliest to occur of the following events with respect to such then-current Benchmark:

(1) in the case of clause (1) or (2) of the definition of “Benchmark Transition Event,” the later of (a) the date of the public statement or publication of information referenced therein and (b) the date on which the administrator of such Benchmark (or the published component used in the calculation thereof) permanently or indefinitely ceases to provide all Available Tenors of such Benchmark (or such component thereof); or

(2) in the case of clause (3) of the definition of “Benchmark Transition Event,” the first date on which such Benchmark (or the published component used in the calculation thereof) has been determined and announced by the regulatory supervisor for the administrator of such Benchmark (or such component thereof) to be no longer representative; provided, that such non-representativeness will be determined by reference to the most recent statement or publication referenced in such clause (3) and even if any Available Tenor of such Benchmark (or such component thereof) continues to be provided on such date; ;

~~(3) in the case of a Term SOFR Transition Event, the date that is thirty (30) days after the date a Term SOFR Notice is provided to the Lenders and the Company pursuant to Section 2.14(e); or~~

~~(4) in the case of an Early Opt-in Election or an Other Benchmark Rate Election, the sixth (6th) Business Day after the date notice of such Early Opt-in Election or Other Benchmark Rate Election, as applicable, is provided to the Lenders, so long as the Administrative Agent has not received, by 5:00 p.m. (New York City time) on the fifth (5th) Business Day after the date notice of such Early Opt-in Election or Other Benchmark Rate Election, as applicable, is provided to the Lenders, written notice of objection to such Early Opt-in Election or Other Benchmark Rate Election, as applicable, from Lenders comprising the Required Lenders;~~

For the avoidance of doubt, (i) if the event giving rise to the Benchmark Replacement Date occurs on the same day as, but earlier than, the Reference Time in respect of any determination, the Benchmark Replacement Date will be deemed to have occurred prior to the Reference Time for such determination and (ii) the “Benchmark Replacement Date” will be deemed to have occurred in the case of clause (1) or (2) with respect to any Benchmark upon the occurrence of the applicable event or events set forth therein with respect to all then-current Available Tenors of such Benchmark (or the published component used in the calculation thereof).

“Benchmark Transition Event” means, with respect to any Benchmark, the occurrence of one or more of the following events with respect to such then-current Benchmark:

(1) a public statement or publication of information by or on behalf of the administrator of such Benchmark (or the published component used in the calculation thereof) announcing that such administrator has ceased or will cease to provide all Available Tenors of such Benchmark (or such component thereof), permanently or indefinitely; ; ~~provided that,~~ at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such Benchmark (or such component thereof);

(2) a public statement or publication of information by the regulatory supervisor for the administrator of such Benchmark (or the published component used in the calculation thereof), the Board, the NYFRB, the CME Term SOFR Administrator, the central bank for the

Agreed Currency applicable to such Benchmark, an insolvency official with jurisdiction over the administrator for such Benchmark (or such component), a resolution authority with jurisdiction over the administrator for such Benchmark (or such component) or a court or an entity with similar insolvency or resolution authority over the administrator for such Benchmark (or such component), in each case which states that the administrator of such Benchmark (or such component) has ceased or will cease to provide all Available Tenors of such Benchmark (or such component thereof) permanently or indefinitely; provided that, at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such Benchmark (or such component thereof); or

(3) a public statement or publication of information by the regulatory supervisor for the administrator of such Benchmark (or the published component used in the calculation thereof) announcing that all Available Tenors of such Benchmark (or such component thereof) are no longer, or as of a specified future date will no longer be, representative.

For the avoidance of doubt, a "Benchmark Transition Event" will be deemed to have occurred with respect to any Benchmark if a public statement or publication of information set forth above has occurred with respect to each then-current Available Tenor of such Benchmark (or the published component used in the calculation thereof).

"Benchmark Unavailability Period" means, with respect to any Benchmark, the period (if any) (x) beginning at the time that a Benchmark Replacement Date pursuant to clauses (1) or (2) of that definition has occurred if, at such time, no Benchmark Replacement has replaced such then-current Benchmark for all purposes hereunder and under any Loan Document in accordance with Section 2.14 and (y) ending at the time that a Benchmark Replacement has replaced such then-current Benchmark for all purposes hereunder and under any Loan Document in accordance with Section 2.14.

"Beneficial Ownership Certification" means a certification regarding beneficial ownership or control as required by the Beneficial Ownership Regulation.

"Beneficial Ownership Regulation" means 31 C.F.R. § 1010.230.

"Benefit Plan" means any of (a) an "employee benefit plan" (as defined in Section 3(3) of ERISA) that is subject to Title I of ERISA, (b) a "plan" as defined in Section 4975 of the Code to which Section 4975 of the Code applies, and (c) any Person whose assets include (for purposes of the Plan Asset Regulations or otherwise for purposes of Title I of ERISA or Section 4975 of the Code) the assets of any such "employee benefit plan" or "plan".

"BHC Act Affiliate" of a party means an "affiliate" (as such term is defined under, and interpreted in accordance with, 12 U.S.C. 1841(k)) of such party.

"Blocking Regulation" means Council Regulation (EC) 2271/96.

"Board" means the Board of Governors of the Federal Reserve System of the United States of America.

"Borrower" means the Company or any Foreign Subsidiary Borrower.

"Borrowing" means (a) Revolving Loans of the same Type, made, converted or continued on the same date and, in the case of Eurocurrency Term Benchmark Loans, as to which a single Interest Period is in effect, (b) a Term Loan of the same Type, made, converted or continued on the

same date and, in the case of ~~Eurocurrency~~Term Benchmark Loans, as to which a single Interest Period is in effect or (c) a Swingline Loan.

“Borrowing Request” means a request by any Borrower for a Borrowing in accordance with Section 2.03, which shall be substantially in the form attached hereto as Exhibit G-1 or any other form approved by the Administrative Agent.

“Borrowing Subsidiary Agreement” means a Borrowing Subsidiary Agreement substantially in the form of Exhibit F-1 or any other form approved by the Administrative Agent.

“Borrowing Subsidiary Termination” means a Borrowing Subsidiary Termination substantially in the form of Exhibit F-2 or any other form approved by the Administrative Agent.

“Business Day” means, any day (other than a Saturday or a Sunday) on which banks are open for business in New York City ~~or Chicago~~; provided that, in addition to the foregoing, a Business Day shall be (i) in relation to Loans denominated ~~in Pounds Sterling and the calculation or computation of LIBOR, any day (other than a Saturday or a Sunday) on which banks are open for business in London,~~ (ii) ~~in relation to Loans denominated~~ in euro and in relation to the calculation or computation of ~~EURIBOR~~the EURIBO Rate, any day which is a TARGET Day, (iii) in relation to Loans denominated in Japanese Yen and in relation to the calculation or computation of ~~TIBOR~~the TIBO Rate or the Japanese Prime Rate, any day (other than a Saturday or a Sunday) on which banks are open for business in Japan ~~and,~~ (iv) in relation to RFR Loans and any interest rate settings, fundings, disbursements, settlements or payments of any such RFR Loan, or any other dealings in the applicable Agreed Currency of such RFR Loan, any such day that is only an RFR Business Day; and (v) in relation to Loans referencing the Adjusted Term SOFR Rate and any interest rate settings, fundings, disbursements, settlements or payments of any such Loans referencing the Adjusted Term SOFR Rate, any such day that is a U.S. Government Securities Business Day.

“Capitalized Lease” of a Person means any lease of Property by such Person as lessee which would be capitalized on a balance sheet of such Person prepared in accordance with GAAP; provided, that notwithstanding the foregoing, for purposes of this Agreement, any lease (or similar arrangement) that would constitute an “operating lease” under GAAP as in effect on December 31, 2015 (or would have constituted an “operating lease” had such lease or similar arrangement been in effect on such date) shall constitute an “operating lease” hereunder.

“Capitalized Lease Obligations” of a Person means the aggregate amount of the obligations of such Person under Capitalized Leases which would be shown as a liability on a balance sheet of such Person prepared in accordance with GAAP; provided, that notwithstanding the foregoing, for purposes of this Agreement, any lease (or similar arrangement) that would constitute an “operating lease” under GAAP as in effect on December 31, 2015 (or would have constituted an “operating lease” had such lease or similar arrangement been in effect on such date) shall constitute an “operating lease” hereunder and the obligations thereunder shall not constitute Capitalized Lease Obligations.

“Cash Equivalent Investments” means (a) direct obligations of, or fully guaranteed by, the U.S. maturing within one year from the date of acquisition thereof, (b) commercial paper rated A-1 or better by S&P or P-1 or better by Moody's, (c) demand deposit accounts maintained in the ordinary course of business, (d) certificates of deposit issued by, bankers' acceptances of, and time deposits with, any Lender or any commercial bank (whether domestic or foreign) having capital and surplus in excess of \$100,000,000, and money market deposit accounts issued or offered by any such Person and (e) in the case of any Foreign Subsidiary, any other investments that are similar to the foregoing, are of comparable

credit quality and are customarily used by companies in the jurisdiction of such Foreign Subsidiary for cash management purposes or approved by the Administrative Agent.

“CBR Loan” means a Loan that bears interest at a rate determined by reference to the Central Bank Rate or the Japanese Prime Rate.

“CBR Spread” means the Applicable Rate applicable to such Loan that is replaced by a CBR Loan.

“Central Bank Rate” means ~~(A)~~ the greater of (i) (A) for any Loan denominated in (a) Pounds Sterling, the Bank of England (or any successor thereto)'s “Bank Rate” as published by the Bank of England (or any successor thereto) from time to time, (b) euro, one of the following three rates as may be selected by the Administrative Agent in its reasonable discretion: (1) the fixed rate for the main refinancing operations of the European Central Bank (or any successor thereto), or, if that rate is not published, the minimum bid rate for the main refinancing operations of the European Central Bank (or any successor thereto), each as published by the European Central Bank (or any successor thereto) from time to time, (2) the rate for the marginal lending facility of the European Central Bank (or any successor thereto), as published by the European Central Bank (or any successor thereto) from time to time, or (3) the rate for the deposit facility of the central banking system of the Participating Member States, as published by the European Central Bank (or any successor thereto) from time to time, (c) ~~Japanese Yen, the “short-term prime rate” as publicly announced by the Bank of Japan (or any successor thereto) from time to time,~~ (d) Swiss Francs, the policy rate of the Swiss National Bank (or any successor thereto) as published by the Swiss National Bank (or any successor thereto) from time to time and (ed) any other Foreign Currency determined after the Amendment No. 1 Effective Date, a central bank rate as reasonably determined by the Administrative Agent in its reasonable discretion ~~and (ii) 0%~~; plus (B) the applicable Central Bank Rate Adjustment and (ii) the Floor.

“Central Bank Rate Adjustment” means, for any day, for any Loan denominated in:

(a) Pounds Sterling, a rate equal to the difference (which may be a positive or negative value or zero) of (i) the average of ~~SONIA for the last~~ Adjusted Daily Simple RFR for Pounds Sterling Borrowings for the five (5) most recent RFR Business Days preceding such day for which ~~SONIA~~ Adjusted Daily Simple RFR for Pounds Sterling Borrowings was available (excluding, from such averaging, the highest and the lowest ~~SONIA~~ such Adjusted Daily Simple RFR applicable during such period of five (5) RFR Business Days) minus (ii) the Central Bank Rate in respect of Pounds Sterling in effect on the last RFR Business Day in such period,

(b) euro, a rate equal to the difference (which may be a positive or negative value or zero) of (i) the average of the Adjusted EURIBO Rate for the ~~last~~ five (5) most recent Business Days preceding such day for which the EURIBO Screen Rate was available (excluding, from such averaging, the highest and the lowest Adjusted EURIBO Rate applicable during such period of five (5) Business Days) minus (ii) the Central Bank Rate in respect of euro in effect on the last Business Day in such period,

(c) ~~Japanese Yen, a rate equal to the difference (which may be a positive or negative value or zero) of (i) the average of the~~ TIBO Rate for the last five (5) Business Days for which the TIBO Screen Rate was available (excluding, from such averaging, the highest and the lowest TIBO Rate applicable during such period of five (5) Business Days) minus (ii) the Central Bank Rate in respect of Japanese Yen on the last Business Day in such period, (d) Swiss Francs, a rate equal to the difference (which may be a positive or negative value or zero) of (i) the average of ~~SARON for the~~ last Adjusted Daily Simple RFR for Swiss Franc Borrowings for the five (5) most recent RFR

Business Days preceding such day for which SARON was available (excluding, from such averaging, the highest and the lowest SARON such Adjusted Daily Simple RFR applicable during such period of five (5) RFR Business Days) minus (ii) the Central Bank Rate in respect of Swiss Francs in effect on the last RFR Business Day in such period, and

(ed) any other Foreign Currency determined after the Amendment No. 1 Effective Date, an adjustment as reasonably determined by the Administrative Agent in its reasonable discretion.

For purposes of this definition, (x) the term Central Bank Rate shall be determined disregarding clause (i)(B) of the definition of such term and (y) ~~each of the EURIBO Rate and the TIBO Rate on any day shall be based on the EURIBO Screen Rate or the TIBO Screen Rate, as applicable, on such day at approximately the time referred to in the definition of such term for deposits in the applicable Agreed Currency euro for a maturity of one month (or, in the event the EURIBO Screen Rate or the TIBO Screen Rate, as applicable, for deposits in the applicable Agreed Currency is not available for such maturity of one month, shall be based on the EURIBO Interpolated Rate or the TIBO Interpolated Rate, as applicable, as of such time); provided that if such rate shall be less than zero, such rate shall be deemed to be zero.~~

“Change in Control” means (a) the acquisition of ownership, directly or indirectly, beneficially or of record, by any Person or group (within the meaning of the Securities Exchange Act of 1934 and the rules of the SEC thereunder as in effect on the date hereof), of Equity Interests representing more than 20% of the aggregate ordinary voting power represented by the issued and outstanding Equity Interests of the Company; (b) occupation of a majority of the seats (other than vacant seats) on the board of directors of the Company by Persons who were neither (i) nominated by the board of directors of the Company nor (ii) appointed by directors so nominated; or (c) the occurrence of a change in control, or other similar provision, as defined in any agreement or instrument evidencing any Material Indebtedness (triggering a default or mandatory prepayment, which default or mandatory prepayment has not been waived in writing).

“Change in Law” means the occurrence, after the date of this Agreement (or with respect to any Lender, if later, the date on which such Lender becomes a Lender), of any of the following: (a) the adoption or taking effect of any law, rule, regulation or treaty, (b) any change in any law, rule, regulation or treaty or in the administration, interpretation, implementation or application thereof by any Governmental Authority, or (c) compliance by any Lender or Issuing Bank (or, for purposes of Section 2.15(b), by any lending office of such Lender or by such Lender’s or Issuing Bank’s holding company, if any), with any request, rules, guideline, requirement or directive (whether or not having the force of law) by any Governmental Authority; provided however, that notwithstanding anything herein to the contrary, (i) the Dodd-Frank Wall Street Reform and Consumer Protection Act and all requests, rules, guidelines, requirements and directives thereunder, issued in connection therewith or in implementation thereof, and (ii) all requests, rules, guidelines, requirements and directives promulgated by the Bank for International Settlements, the Basel Committee on Banking Supervision (or any successor or similar authority) or the United States or foreign regulatory authorities, in each case pursuant to Basel III, shall in each case be deemed to be a “Change in Law” regardless of the date enacted, adopted, issued or implemented.

“Charges” has the meaning assigned to such term in Section 9.15.

“Class” (a) when used in reference to any Loan or Borrowing, refers to whether such Loan, or the Loans comprising such Borrowing, are Revolving Loans, Swingline Loans, Term Loans or Incremental Term Loans, (b) when used in reference to Lenders, refers to whether such Lenders have a Loan or Commitment with respect to a particular Class of Loans or Commitments and (c) when used in reference to Commitments, refers to whether such Commitments are Revolving Commitments, Term

Loan Commitments, commitments in respect of Incremental Term Loans or Incremental Revolving Commitments.

“CME Term SOFR Administrator” means CME Group Benchmark Administration Limited as administrator of the forward-looking term Secured Overnight Financing Rate (SOFR) (or a successor administrator).

“Code” means the Internal Revenue Code of 1986, as amended from time to time.

“Collateral” means any and all property owned, leased or operated by a Person covered by the Collateral Documents and any and all other property of any Loan Party, now existing or hereafter acquired, that may at any time be or become subject to a security interest or Lien in favor of the Administrative Agent, on behalf of itself and the Holders of Secured Obligations as required under Section 5.09, to secure the Secured Obligations; provided that Collateral shall not include any Excluded Assets.

“Collateral Documents” means, collectively, the Domestic Collateral Documents, the Dutch Collateral Documents and any other agreements, instruments and documents executed in connection with this Agreement that are intended to create, perfect or evidence Liens to secure the Secured Obligations.

“Commitment” means, (a) the Revolving Commitments, the Term Loan Commitments and any commitments in respect of Incremental Facilities, as applicable, and (b) with respect to each Lender, the sum of such Lender’s Revolving Commitment, Term Loan Commitment and commitments in respect of Incremental Facilities. The initial amount of each Lender’s Commitment is set forth on Schedule 2.01, or in the Assignment and Assumption or other documentation contemplated hereby pursuant to which such Lender shall have assumed its Commitment, as applicable.

“Commodity Exchange Act” means the Commodity Exchange Act (7 U.S.C. § 1 et seq.), as amended from time to time, and any successor statute.

“Communications” means, collectively, any notice, demand, communication, information, document or other material provided by or on behalf of any Loan Party pursuant to any Loan Document or the transactions contemplated therein which is distributed by the Administrative Agent, any Lender or the Issuing Bank by means of electronic communications pursuant to Section 8.03, including through an Approved Electronic Platform.

“Company” means Materion Corporation, an Ohio corporation.

“Computation Date” is defined in Section 2.04.

“Consolidated EBITDA” means, with reference to any period, Consolidated Net Income for such period plus, to the extent deducted from revenues in determining Consolidated Net Income for such period, (a) Consolidated Interest Expense, (b) Consolidated Tax Expense, (c) depreciation, (d) amortization, (e) depletion expense and (f) nonrecurring losses incurred other than in the ordinary course of business, minus, to the extent included in Consolidated Net Income for such period, nonrecurring gains realized other than in the ordinary course of business, all calculated for the Company and its Subsidiaries on a consolidated basis.

“Consolidated First Lien Debt” means, as of any date of determination, without duplication, the aggregate principal amount of Consolidated Funded Debt outstanding on such date that is

secured by a Lien on any asset or property of the Company or any Subsidiary that is senior or pari passu to the Liens securing the Obligations.

“Consolidated Funded Debt” means all Indebtedness for borrowed money and Capitalized Leases, including, without limitation, current, long-term and Subordinated Indebtedness, for the Company and its Subsidiaries on a consolidated basis; provided that, for purposes of this definition, obligations under the following will not be considered in calculating Consolidated Funded Debt: (a) obligations under Swap Agreements, (b) Permitted Precious Metals Agreements (up to a maximum outstanding amount of ~~\$600,000,000~~615,000,000), (c) the Beryllium Contracts, and (d) Indebtedness under any Sale and Leaseback Transaction.

“Consolidated Interest Expense” means, with reference to any period, the interest expense of the Company and its Subsidiaries calculated on a consolidated basis for such period (but not including any up-front fees ~~paid in connection with this Agreement~~); provided, that notwithstanding the foregoing, for purposes of this Agreement, any lease (or similar arrangement) that would constitute an “operating lease” under GAAP as in effect on December 31, 2015 (or would have constituted an “operating lease” had such lease or similar arrangement been in effect on such date) shall constitute an “operating lease” hereunder and any payments owed thereunder shall not constitute or be included in interest expense.

“Consolidated Net Income” means, with reference to any period, the net income (or loss) of the Company and its Subsidiaries calculated on a consolidated basis for such period.

“Consolidated Net Worth” means, on any date, all amounts that would be included under stockholders’ equity on a consolidated balance sheet of the Company and its consolidated Subsidiaries, as determined on a consolidated basis in accordance with GAAP.

“Consolidated Tax Expense” means, with reference to any period, the tax expense of the Company and its Subsidiaries calculated on a consolidated basis for such period.

“Consolidated Total Assets” means, as of the date of any determination thereof, total assets of the Company and its Subsidiaries calculated in accordance with GAAP on a consolidated basis as of such date.

“Contingent Obligation” of a Person means any agreement, undertaking or arrangement by which such Person assumes, guarantees, endorses, contingently agrees to purchase or provide funds for the payment of, or otherwise becomes or is contingently liable upon, the obligation or liability of any other Person, or agrees to maintain the net worth or working capital or other financial condition of any other Person, or otherwise assures any creditor of such other Person against loss, including, without limitation, any comfort letter, operating agreement, take or pay contract or the obligations of any such Person as general partner of a partnership with respect to the liabilities of the partnership.

“Control” means the possession, directly or indirectly, of the power to direct or cause the direction of the management or policies of a Person, whether through the ability to exercise voting power, by contract or otherwise. “Controlling” and “Controlled” have meanings correlative thereto.

“Corresponding Tenor” with respect to any Available Tenor means, as applicable, either a tenor (including overnight) or an interest payment period having approximately the same length (disregarding business day adjustment) as such Available Tenor.

"CRR" means the Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

"Daily Simple RFR" means, for any day (an "RFR Interest Day"), an interest rate per annum equal to ~~the greater of (a)~~, for any RFR Loan denominated in (i) Pounds Sterling, SONIA for the day that is five (5) RFR Business Days prior to (A) if such RFR Interest Day is aan RFR Business Day, such RFR Interest Day or (B) if such RFR Interest Day is not aan RFR Business Day, the RFR Business Day immediately preceding such RFR Interest Day ~~and~~, (ii) Swiss Francs, SARON for the day that is five (5) RFR Business Days prior to (A) if such RFR Interest Day is aan RFR Business Day, such RFR Interest Day or (B) if such RFR Interest Day is not aan RFR Business Day, the RFR Business Day immediately preceding such RFR Interest Day and ~~(b) 0%~~iii) Dollars, Daily Simple SOFR. Any change in Daily Simple RFR due to a change in the applicable RFR shall be effective from and including the effective date of such change in the RFR without notice to the Company.

~~"Daily Simple SOFR" means, for any day, (a "SOFR, with the conventions for this rate (which may include a lookback) being established by the Administrative Agent in accordance with the conventions for this rate selected or recommended by the Relevant Governmental Body for determining "Daily Simple SOFR" for business loans; provided that, if the Administrative Agent decides that any such convention is not administratively feasible for the Administrative Agent, then the Administrative Agent may establish another convention in its reasonable discretion; Rate Day"), a rate per annum equal to SOFR for the day that is five (5) RFR Business Days prior to (i) if such SOFR Rate Day is an RFR Business Day, such SOFR Rate Day or (ii) if such SOFR Rate Day is not an RFR Business Day, the RFR Business Day immediately preceding such SOFR Rate Day, in each case, as such SOFR is published by the SOFR Administrator on the SOFR Administrator's Website. Any change in Daily Simple SOFR due to a change in SOFR shall be effective from and including the effective date of such change in SOFR without notice to the Company.~~

"Default" means any event or condition which constitutes an Event of Default or which upon notice, lapse of time or both would, unless cured or waived, become an Event of Default.

"Default Right" has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable.

"Defaulting Lender" means any Lender that (a) has failed, within two (2) Business Days of the date required to be funded or paid, to (i) fund any portion of its Loans, (ii) fund any portion of its participations in Letters of Credit or Swingline Loans or (iii) pay over to any Credit Party any other amount required to be paid by it hereunder, unless, in the case of clause (i) above, such Lender notifies the Administrative Agent in writing that such failure is the result of such Lender's good faith determination that a condition precedent to funding (specifically identified and including the particular default, if any) has not been satisfied, (b) has notified the Company or any Credit Party in writing, or has made a public statement to the effect, that it does not intend or expect to comply with any of its funding obligations under this Agreement (unless such writing or public statement indicates that such position is based on such Lender's good faith determination that a condition precedent (specifically identified and including the particular default, if any) to funding a Loan under this Agreement cannot be satisfied) or generally under other agreements in which it commits to extend credit, (c) has failed, within three (3) Business Days after request by a Credit Party, acting in good faith, to provide a certification in writing from an authorized officer of such Lender that it will comply with its obligations (and is financially able to meet such obligations as of the date of certification) to fund prospective Loans and participations in then outstanding Letters of Credit and Swingline Loans under this Agreement, provided

“Dutch Share Pledge – Junior Priority” means the Dutch law governed deed of pledge on shares in the capital of the Dutch Borrower, dated 29 November 2007 and made among Materion Advanced Materials Technologies and Services Inc. (formerly known as William Advanced Materials Inc.) as pledgor, the Administrative Agent as pledgee and the Dutch Borrower as company.

“Dutch Share Pledge – Senior Priority” means the Dutch law governed deed of pledge on shares in the capital of the Dutch Borrower, dated as of the Effective Date and made among Materion Advanced Materials Technologies and Services Inc. as pledgor, the Administrative Agent as pledgee and the Dutch Borrower as company.

“Dutch Subsidiary” means any Subsidiary established under the laws of the Netherlands.

“Dutch Subsidiary Guarantor” means each Wholly-Owned Material Dutch Subsidiary that is party to the Subsidiary Guaranty and certain Dutch Collateral Documents (in each case including pursuant to a joinder or supplement thereto).

~~“Early Opt-in Election” means, if the then current Benchmark with respect to Dollars is the LIBO Rate, the occurrence of:~~

~~(1) a notification by the Administrative Agent to (or the request by the Company to the Administrative Agent to notify) each of the other parties hereto that at least five (5) currently outstanding Dollar-denominated syndicated credit facilities at such time contain (as a result of amendment or as originally executed) a SOFR-based rate (including SOFR, Term SOFR or any other rate based upon SOFR) as a benchmark rate (and such syndicated credit facilities are identified in such notice and are publicly available for review), and~~

~~(2) the joint election by the Administrative Agent and the Company to trigger a fallback from the LIBO Rate and the provision, as applicable, by the Administrative Agent of written notice of such election to the Company and the Lenders.~~

“ECP” means an “eligible contract participant” as defined in Section 1(a)(18) of the Commodity Exchange Act or any regulations promulgated thereunder and the applicable rules issued by the Commodity Futures Trading Commission and/or the SEC.

“EEA Financial Institution” means (a) any credit institution or investment firm established in any EEA Member Country which is subject to the supervision of an EEA Resolution Authority, (b) any entity established in an EEA Member Country which is a parent of an institution described in clause (a) of this definition, or (c) any financial institution established in an EEA Member Country which is a subsidiary of an institution described in clauses (a) or (b) of this definition and is subject to consolidated supervision with its parent.

“EEA Member Country” means any of the member states of the European Union, Iceland, Liechtenstein, and Norway.

“EEA Resolution Authority” means any public administrative authority or any Person entrusted with public administrative authority of any EEA Member Country (including any delegee) having responsibility for the resolution of any EEA Financial Institution.

“Effective Date” means the date on which the conditions specified in Section 4.01 are satisfied (or waived in accordance with Section 9.02).

determination that a Multiemployer Plan is, or is expected to be, insolvent or in reorganization, within the meaning of Title IV of ERISA.

“EU” means the European Union.

“EU Bail-In Legislation Schedule” means the EU Bail-In Legislation Schedule published by the Loan Market Association (or any successor Person), as in effect from time to time.

~~“EURIBO Interpolated Rate” means, at any time, with respect to any Eurocurrency Borrowing denominated in euro and for any Interest Period, the rate per annum determined by the Administrative Agent (which determination shall be conclusive and binding absent manifest error) to be equal to the rate that results from interpolating on a linear basis between: (a) the EURIBO Screen Rate for the longest Interest Period (for which the EURIBO Screen Rate is available for euro) that is shorter than the Impacted EURIBO Rate Interest Period; and (b) the EURIBO Screen Rate for the shortest Interest Period (for which the EURIBO Screen Rate is available for euro) that exceeds the Impacted EURIBO Rate Interest Period, in each case, at such time; provided that, if any EURIBO Interpolated Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~

~~“EURIBO Rate” means, with respect to any Eurocurrency Term Benchmark Borrowing denominated in euro and for any Interest Period, the EURIBO Screen Rate at approximately 11:00 a.m., Brussels time, two (2) TARGET Days prior to the commencement of such Interest Period; provided that, if the EURIBO Screen Rate shall not be available at such time for such Interest Period (an “Impacted EURIBO Rate Interest Period”) with respect to euro then the EURIBO Rate shall be the EURIBO Interpolated Rate.~~

~~“EURIBO Screen Rate” means, for any day and time, with respect to any Eurocurrency Borrowing denominated in euro and for any Interest Period, the euro interbank offered rate administered by the European Money Markets Institute (or any other person which takes over the administration of such rate) for euro for the relevant period displayed (before any correction, recalculation or republication by the administrator) on page EURIBOR01 of the Reuters screen (or any replacement Reuters page which displays that rate) or on the appropriate page of such other information service which publishes that rate from time to time in place of Reuters as published at approximately 11:00 a.m. Brussels time two (2) TARGET Days prior to the commencement of such Interest Period. If such page or service ceases to be available, the Administrative Agent may specify another page or service displaying the relevant rate after consultation with the Company. If the EURIBO Screen Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~

~~“EURIBOR” has the meaning assigned to such term in Section 1.06.~~

“euro” and/or “€” means the single currency of the Participating Member States.

~~“Eurocurrency” when used in reference to a currency means an Agreed Currency and, when used in reference to any Loan or Borrowing, means that such Loan, or the Loans comprising such Borrowing, bears interest at a rate determined by reference to the Adjusted LIBO Rate, the Adjusted EURIBO Rate or the Adjusted TIBO Rate.~~

~~“Eurocurrency Payment Office” of the Administrative Agent means, for each Foreign Currency, the office, branch, affiliate or correspondent bank of the Administrative Agent for~~

~~such currency as specified from time to time by the Administrative Agent to the Company and each Lender.~~

“Event of Default” has the meaning assigned to such term in Section 7.01.

“Excluded Assets” means: (i) any fee-owned real property that is not real mining Property and all leasehold interests in real property, (ii) any “intent-to-use” application for registration of a trademark filed pursuant to Section 1(b) of the Lanham Act, 15 U.S.C. § 1051, prior to the filing of a “Statement of Use” pursuant to Section 1(d) of the Lanham Act or an “Amendment to Allege Use” pursuant to Section 1(c) of the Lanham Act with respect thereto, solely to the extent, if any, that and solely during the period, if any, in which, the grant of a security interest therein would impair the validity or enforceability of any registration that issues from such intent-to-use application under applicable federal law, (iii) assets in respect of which pledges and security interests are prohibited by applicable U.S. law, rule or regulation or agreements with any U.S. governmental authority (other than to the extent that such prohibition would be rendered ineffective pursuant to Sections 9-406, 9-407, 9-408, 9-409 or other applicable provisions of the UCC of any relevant jurisdiction or any other applicable law); provided that, immediately upon the ineffectiveness, lapse or termination of any such prohibitions, such assets shall automatically cease to constitute Excluded Assets, (iv) equity interests in any entity (other than Wholly-Owned Subsidiaries) to the extent pledges thereof are not permitted by customary terms in such entity’s organizational or joint venture documents (unless any such restriction would be rendered ineffective pursuant to Sections 9-406, 9-407, 9-408, 9-409 or other applicable provisions of the UCC of any relevant jurisdiction or any other applicable law), (v) assets subject to certificates of title (other than motor vehicles subject to certificates of title, provided that perfection of security interests in such motor vehicles shall be limited to the filing of UCC financing statements), letter of credit rights (other than to the extent the security interest in such letter of credit right may be perfected by the filing of UCC financing statements) with a value of less than \$1,000,000 and commercial tort claims with a value of less than \$1,000,000, (vi) any lease, license or other agreement or any property subject to a purchase money security interest or similar arrangement to the extent that a grant of a security interest therein would violate or invalidate such lease, license or agreement or purchase money arrangement or create a right of termination in favor of any other party thereto (other than the Company or a Subsidiary Guarantor) (other than (1) proceeds and receivables thereof, the assignment of which is expressly deemed effective under the UCC notwithstanding such prohibition, (2) to the extent that any such term has been waived or (3) to the extent that any such term would be rendered ineffective pursuant to Sections 9-406, 9-407, 9-408, 9-409 or other applicable provisions of the UCC of any relevant jurisdiction or any other applicable law); provided that, immediately upon the ineffectiveness, lapse or termination of any such term, such assets shall automatically cease to constitute Excluded Assets, (vii) trust accounts, payroll accounts, custodial accounts, escrow accounts and other similar deposit or securities accounts, and deposit or securities accounts having a balance of less than \$250,000 individually, and less than \$1,000,000 in the aggregate for all such accounts, (viii) Precious Metals and (ix) those assets as to which the Administrative Agent and the Company reasonably agree that the cost of obtaining such a security interest or perfection thereof are excessive in relation to the benefit to the Lenders of the security to be afforded thereby. Notwithstanding the foregoing, Excluded Assets shall not include any proceeds, products, substitutions or replacements of Excluded Assets (unless such proceeds, products, substitutions or replacements would otherwise constitute Excluded Assets).

“Excluded Swap Obligation” means, with respect to any Loan Party, any Specified Swap Obligation if, and to the extent that, all or a portion of the Guarantee of such Loan Party of, or the grant by such Loan Party of a security interest to secure, such Specified Swap Obligation (or any Guarantee thereof) is or becomes illegal under the Commodity Exchange Act or any rule, regulation or order of the Commodity Futures Trading Commission (or the application or official interpretation of any thereof) by virtue of such Loan Party’s failure for any reason to constitute an ECP at the time the Guarantee of such

Loan Party or the grant of such security interest becomes or would become effective with respect to such Specified Swap Obligation. If a Specified Swap Obligation arises under a master agreement governing more than one swap, such exclusion shall apply only to the portion of such Specified Swap Obligation that is attributable to swaps for which such Guarantee or security interest is or becomes illegal.

“Excluded Taxes” means any of the following Taxes imposed on or with respect to a Recipient or required to be withheld or deducted from a payment to a Recipient, (a) income or franchise Taxes imposed on (or measured by) its net income (however denominated) (i) by the United States of America or any other Governmental Authority, including the jurisdiction under the laws of which such Recipient is organized (or any political subdivision thereof) or in which its principal office is located or, in the case of any Lender, in which its applicable lending office is located or (ii) that are Other Connection Taxes, (b) any branch profits taxes imposed by the United States of America or any other jurisdiction described in clause (a) above, (c) in the case of a Lender (other than an assignee pursuant to a request by the Company under Section 2.19(b)), any withholding Tax that is imposed on amounts payable to such Lender resulting from any law in effect on the date such Lender becomes a party to this Agreement (or designates a new lending office), except to the extent that such Lender (or its assignor, if any) was entitled, at the time of designation of a new lending office (or assignment), to receive additional amounts from the Company with respect to such withholding Tax pursuant to Section 2.17(a), (d) Taxes attributable to such Recipient’s failure to comply with Section 2.17(e) or (h), and (e) any Taxes imposed under FATCA.

“Existing Credit Agreement” is defined in the recitals hereof.

“Existing Letters of Credit” is defined in Section 2.06(a).

“Existing Loans” is defined in Section 2.01.

“Existing Maturity Date” is defined in Section 2.25(a).

“Extending Lender” is defined in Section 2.25(b).

“Extension Date” is defined in Section 2.25(a).

“FATCA” means Sections 1471 through 1474 of the Code, as of the date of this Agreement (or any amended or successor version that is substantively comparable and not materially more onerous to comply with), any current or future regulations or official interpretations thereof, any agreement entered into pursuant to Section 1471(b)(1) of the Code and any fiscal or regulatory legislation, rules or practices adopted pursuant to any intergovernmental agreement, treaty or convention among Governmental Authorities and implementing such Sections of the Code.

~~“FCA” has the meaning assigned to such term in Section 1.06.~~

“Federal Funds Effective Rate” means, for any day, the rate calculated by the NYFRB based on such day’s federal funds transactions by depository institutions, as determined in such manner as shall be set forth on the NYFRB’s Website from time to time, and published on the next succeeding Business Day by the NYFRB as the effective federal funds rate; provided that if the Federal Funds Effective Rate as so determined would be less than ~~zero~~0%, such rate shall be deemed to be ~~zero~~0% for the purposes of this Agreement.

“Financial Officer” means the chief financial officer, principal accounting officer, treasurer or controller of the Company.

“Financials” means the annual or quarterly financial statements, and accompanying certificates and other documents, of the Company and its Subsidiaries required to be delivered pursuant to Section 5.01(a) or 5.01(b).

“First Lien Leverage Ratio” means, the ratio, determined as of the end of each Fiscal Quarter of the Company of (a)(x) Consolidated First Lien Debt minus (y) Qualified Cash to (b) Consolidated EBITDA for the then most-recently ended four Fiscal Quarters.

“First Tier Foreign Subsidiary” means each Foreign Subsidiary with respect to which any one or more of the Company and its Domestic Subsidiaries directly owns or Controls more than 50% of such Foreign Subsidiary’s issued and outstanding Equity Interests.

“Fiscal Quarter” means any of the quarterly accounting periods of the Company.

“Fiscal Year” means any of the annual accounting periods of the Company ending on December 31 of each year.

“Floor” means the benchmark rate floor, if any, provided in this Agreement initially (as of the execution of this Agreement, the modification, amendment or renewal of this Agreement or otherwise) with respect to the LIBOR Adjusted Term SOFR Rate, the Adjusted EURIBO Rate, the Adjusted TIBO Rate ~~or~~, each Adjusted Daily Simple RFR, the Japanese Prime Rate or the Central Bank Rate, as applicable. For the avoidance of doubt, the initial Floor for each of the Adjusted Term SOFR Rate, the Adjusted EURIBO Rate, the Adjusted TIBO Rate, each Adjusted Daily Simple RFR, the Japanese Prime Rate or the Central Bank Rate shall be 0%.

“Foreign Currencies” means Agreed Currencies other than Dollars.

“Foreign Currency LC Exposure” means, at any time, the sum of (a) the Dollar Amount of the aggregate undrawn and unexpired amount of all outstanding Foreign Currency Letters of Credit at such time plus (b) the aggregate principal Dollar Amount of all LC Disbursements in respect of Foreign Currency Letters of Credit that have not yet been reimbursed at such time.

“Foreign Currency Letter of Credit” means a Letter of Credit denominated in a Foreign Currency.

“Foreign Currency Payment Office” of the Administrative Agent shall mean, for each Foreign Currency, the office, branch, affiliate or correspondent bank of the Administrative Agent for such currency as specified from time to time by the Administrative Agent to the Company and each Lender.

“Foreign Currency Sublimit” means \$30,000,000.

“Foreign Lender” means (a) if the applicable Borrower is a U.S. Person, a Lender that is not a U.S. Person, and (b) if the applicable Borrower is not a U.S. Person, a Lender that is resident or organized under the laws of a jurisdiction other than that in which such Borrower is resident for tax purposes.

“Foreign Secured Obligations” means all Obligations of the Foreign Subsidiary Borrowers under this Agreement.

“Foreign Subsidiary” means any Subsidiary which is not a Domestic Subsidiary.

of such Person or by similar action if such Person is not a corporation and (b) any such Acquisition as to which such approval has been withdrawn.

~~“Impacted EURIBO Rate Interest Period” has the meaning assigned to such term in the definition of “EURIBO Rate”.~~

~~“Impacted LIBO Rate Interest Period” has the meaning assigned to such term in the definition of “LIBO Rate”.~~

~~“Impacted TIBO Rate Interest Period” has the meaning assigned to such term in the definition of “TIBO Rate”.~~

“Increasing Lender” has the meaning assigned to such term in Section 2.20.

“Incremental Facilities” has the meaning assigned to such term in Section 2.20.

“Incremental Revolving Commitment” has the meaning assigned to such term in Section 2.20.

“Incremental Term Loan” has the meaning assigned to such term in Section 2.20.

“Incremental Term Loan Amendment” has the meaning assigned to such term in Section 2.20.

“Indebtedness” of a Person means, without duplication, such Person’s (a) obligations for borrowed money, (b) obligations representing the deferred purchase price of Property or services (other than accounts payable arising in the ordinary course of such Person’s business payable on terms customary in the trade), (c) obligations, whether or not assumed, secured by Liens or payable out of the proceeds or production from Property now or hereafter owned or acquired by such Person, (d) obligations which are evidenced by notes, acceptances, or other similar instruments, (e) obligations of such Person to purchase securities or other Property arising out of or in connection with the sale of the same or substantially similar securities or Property or any other Off-Balance Sheet Liabilities, (f) Capitalized Lease Obligations, (g) Contingent Obligations for which the underlying transaction constitutes Indebtedness under this definition, (h) the stated face amount of all letters of credit or bankers’ acceptances issued for the account of such Person and, without duplication, all reimbursement obligations with respect to such issued letters of credit, (i) any and all obligations, contingent or otherwise, whether now existing or hereafter arising, under or in connection with Swap Agreements, including, without limitation, Net Mark-to-Market Exposure, and (j) obligations of such Person under any Sale and Leaseback Transaction.

“Indemnified Taxes” means Taxes that are imposed on or with respect to any payment made by a Loan Party hereunder or any other Loan Document other than Excluded Taxes or Other Taxes.

“Indemnitee” has the meaning assigned to such term in Section 9.03(c).

“Ineligible Institution” has the meaning assigned to such term in Section 9.04(b).

“Information” has the meaning assigned to such term in Section 9.12.

“Information Memorandum” means the Confidential Information Memorandum dated September 2021 relating to the Company and the Transactions.

“Insolvency Regulation” shall mean the Regulation EU 2015/848 of the European Parliament and of the Council of 20 May 2015 on insolvency proceedings (recast).

“Intercreditor Agreements” means (a) that certain Second Amended and Restated Intercreditor Agreement dated as of August 27, 2019 by and between the Administrative Agent, on behalf of itself and the Lenders, and Bank of Montreal, on behalf of itself and as collateral agent on behalf of other consignors of Precious Metal and (b) every other intercreditor agreement related to the Loans entered into by the Administrative Agent, on behalf of itself and the other Lenders, on or after the Effective Date, in each case, as amended, restated, supplemented or otherwise modified from time to time.

“Interest Coverage Ratio” means, the ratio, determined as of the end of each Fiscal Quarter of the Company for the then most-recently ended four Fiscal Quarters of (a) Consolidated EBITDA to (b) Consolidated Interest Expense.

“Interest Election Request” means a request by the applicable Borrower to convert or continue a Borrowing in accordance with Section 2.08, which shall be substantially in the form attached hereto as Exhibit G-2 or any other form approved by the Administrative Agent.

“Interest Payment Date” means (a) with respect to any ABR Loan (other than a Swingline Loan) and any Loan that bears interest at the Japanese Prime Rate, the last day of each March, June, September and December and the applicable Maturity Date, (b) with respect to any RFR Loan, each date that is on the numerically corresponding day in each calendar month that is one month after the Borrowing of such RFR Loan (or, if there is no such numerically corresponding day in such month, then the last day of such month) and the applicable Maturity Date, (c) with respect to any Eurocurrency Term Benchmark Loan, the last day of each Interest Period applicable to the Borrowing of which such Loan is a part and, in the case of a Eurocurrency Term Benchmark Borrowing with an Interest Period of more than three months' duration, each day prior to the last day of such Interest Period that occurs at intervals of three months' duration after the first day of such Interest Period and the applicable Maturity Date and (d) with respect to any Swingline Loan, the day that such Loan is required to be repaid and the Revolving Credit Maturity Date.

“Interest Period” means with respect to any Eurocurrency Term Benchmark Borrowing, the period commencing on the date of such Borrowing and ending on the numerically corresponding day in the calendar month that is one, three or six months thereafter (in each case, subject to the availability for the Benchmark applicable to the relevant Loan or Commitment for any Agreed Currency), as the applicable Borrower (or the Company on behalf of the applicable Borrower) may elect; provided, that (i) if any Interest Period would end on a day other than a Business Day, such Interest Period shall be extended to the next succeeding Business Day unless such next succeeding Business Day would fall in the next calendar month, in which case such Interest Period shall end on the next preceding Business Day, (ii) any Interest Period pertaining to a Eurocurrency Borrowing that commences on the last Business Day of a calendar month (or on a day for which there is no numerically corresponding day in the last calendar month of such Interest Period) shall end on the last Business Day of the last calendar month of such Interest Period and (iii) no tenor that has been removed from this definition (and not reinstated) pursuant to Section 2.14(fe) shall be available for specification in such Borrowing Request or Interest Election Request. For purposes hereof, the date of a Borrowing initially shall be the date on which such Borrowing is made and thereafter shall be the effective date of the most recent conversion or continuation of such Borrowing.

“Investment” means, as to any Person, any direct or indirect acquisition or investment by such Person, whether by means of (a) the purchase or other acquisition of Equity Interests of another

Person, or (b) a loan, advance or capital contribution to, Guarantee or assumption of Indebtedness of, or purchase or other acquisition of any other Indebtedness or equity participation or interest in, another Person, including any partnership or joint venture interest in such other Person and any arrangement pursuant to which such investing Person Guarantees Indebtedness of such other Person, but excluding any Acquisition.

“IRS” means the United States Internal Revenue Service.

~~“ISDA Definitions” means the 2006 ISDA Definitions published by the International Swaps and Derivatives Association, Inc. or any successor thereto, as amended or supplemented from time to time, or any successor definitional booklet for interest rate derivatives published from time to time by the International Swaps and Derivatives Association, Inc. or such successor thereto.~~

“Issuing Bank” means JPMorgan Chase Bank, N.A., in its capacity as the issuer of Letters of Credit hereunder, and its successors in such capacity as provided in Section 2.06(i). The Issuing Bank may, in its discretion, arrange for one or more Letters of Credit to be issued by Affiliates of the Issuing Bank, in which case the term “Issuing Bank” shall include any such Affiliate with respect to Letters of Credit issued by such Affiliate.

“Japanese Prime Rate” means for any Loan denominated in Japanese Yen the greater of (a) (i) the Japanese local bank prime rate plus (ii) the Japanese Prime Rate Adjustment and (b) the Floor.

“Japanese Prime Rate Adjustment” means, for any day, for any Loan denominated in Japanese Yen, a rate equal to the difference (which may be a positive or negative value or zero) of (i) the average of the Adjusted TIBO Rate for the five most recent Business Days preceding such day for which the TIBO Screen Rate was available (excluding, from such averaging, the highest and the lowest Adjusted TIBO Rate applicable during such period of five Business Days) minus (ii) the Japanese Prime Rate in effect on the last Business Day in such period. For purposes of this definition, the TIBO Rate on any day shall be based on the TIBO Screen Rate on such day at approximately the time referred to in the definition of such term for deposits in Japanese Yen for a maturity of one month.

“Japanese Yen” and/or “JPY” means the lawful currency of Japan.

“LC Collateral Account” has the meaning assigned to such term in Section 2.06(j).

“LC Disbursement” means a payment made by the Issuing Bank pursuant to a Letter of Credit.

“LC Exposure” means, at any time, the sum of (a) the aggregate undrawn Dollar Amount of all outstanding Letters of Credit at such time plus (b) the aggregate Dollar Amount of all LC Disbursements that have not yet been reimbursed by or on behalf of the Company at such time. The LC Exposure of any Revolving Lender at any time shall be its Applicable Percentage of the total LC Exposure at such time. For all purposes of this Agreement, if on any date of determination a Letter of Credit has expired by its terms but any amount may still be drawn thereunder by reason of the operation of Article 29(a) of the Uniform Customs and Practice for Documentary Credits, International Chamber of Commerce Publication No. 600 (or such later version thereof as may be in effect at the applicable time) or Rule 3.13 or Rule 3.14 of the International Standby Practices, International Chamber of Commerce Publication No. 590 (or such later version thereof as may be in effect at the applicable time) or similar

terms of the Letter of Credit itself, or if compliant documents have been presented but not yet honored, such Letter of Credit shall be deemed to be "outstanding" and "undrawn" in the amount so remaining available to be paid, and the obligations of the Borrowers and each Revolving Lender shall remain in full force and effect until the Issuing Bank and the Revolving Lenders shall have no further obligations to make any payments or disbursements under any circumstances with respect to any Letter of Credit.

"Lender Notice Date" is defined in Section 2.25(b).

"Lender Parent" means, with respect to any Lender, any Person as to which such Lender is, directly or indirectly, a subsidiary.

"Lender-Related Person" has the meaning assigned to such term in Section 9.03(b).

"Lenders" means the Persons listed on Schedule 2.01 and any other Person that shall have become a Lender hereunder pursuant to Section 2.20 or pursuant to an Assignment and Assumption or otherwise, other than any such Person that ceases to be a party hereto pursuant to an Assignment and Assumption or otherwise. Unless the context otherwise requires, the term "Lenders" includes the Swingline Lender and the Issuing Bank.

"Letter of Credit" means any letter of credit issued pursuant to this Agreement and shall include each Existing Letter of Credit.

"Letter of Credit Agreement" has the meaning assigned to such term in Section 2.06(b).

"Leverage Ratio" means, the ratio, determined as of the end of each Fiscal Quarter of the Company of (a)(x) Consolidated Funded Debt minus (y) Qualified Cash to (b) Consolidated EBITDA for the then most-recently ended four Fiscal Quarters.

"Liabilities" means any losses, claims (including intraparty claims), demands, damages or liabilities of any kind.

~~"LIBO Interpolated Rate" means, at any time, with respect to any Eurocurrency Borrowing denominated in Dollars and for any Interest Period, the rate per annum determined by the Administrative Agent (which determination shall be conclusive and binding absent manifest error) to be equal to the rate that results from interpolating on a linear basis between: (a) the LIBO Screen Rate for the longest Interest Period (for which the LIBO Screen Rate is available for Dollars) that is shorter than the Impacted LIBO Rate Interest Period; and (b) the LIBO Screen Rate for the shortest Interest Period (for which the LIBO Screen Rate is available for Dollars) that exceeds the Impacted LIBO Rate Interest Period, in each case, at such time; provided that if any LIBO Interpolated Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~

~~"LIBO Rate" means, with respect to any Eurocurrency Borrowing denominated in Dollars and for any Interest Period, the LIBO Screen Rate at approximately 11:00 a.m., London time, two (2) Business Days prior to the commencement of such Interest Period; provided that if the LIBO Screen Rate shall not be available at such time for such Interest Period (an "Impacted LIBO Rate Interest Period") with respect to Dollars then the LIBO Rate shall be the LIBO Interpolated Rate.~~

~~"LIBO Screen Rate" means, for any day and time, with respect to any Eurocurrency Borrowing denominated in Dollars and for any Interest Period, the London~~

~~interbank offered rate as administered by ICE Benchmark Administration (or any other Person that takes over the administration of such rate) for Dollars for a period equal in length to such Interest Period as displayed on such day and time on pages LIBOR01 or LIBOR02 of the Reuters screen that displays such rate (or, in the event such rate does not appear on a Reuters page or screen, on any successor or substitute page on such screen that displays such rate, or on the appropriate page of such other information service that publishes such rate from time to time as selected by the Administrative Agent in its reasonable discretion); provided that if the LIBO Screen Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~

“LIBOR” has the meaning assigned to such term in Section 1.06.

“Lien” means, with respect to any asset, (a) any mortgage, deed of trust, lien, pledge, hypothecation, encumbrance, charge or security interest in, on or of such asset, (b) the interest of a vendor or a lessor under any conditional sale agreement, capital lease or title retention agreement (or any financing lease having substantially the same economic effect as any of the foregoing) relating to such asset and (c) in the case of securities, any purchase option, call or similar right of a third party with respect to such securities.

“Limited Conditionality Acquisition” means any Acquisition permitted under Section 6.04(g) for which the Company has determined, in good faith, that limited conditionality is reasonably necessary or desirable.

“Limited Conditionality Acquisition Agreement” means, with respect to any Limited Conditionality Acquisition, the definitive acquisition documentation in respect thereof.

“Loan Documents” means this Agreement, each Borrowing Subsidiary Agreement, each Borrowing Subsidiary Termination, any promissory notes issued pursuant to Section 2.10(f) of this Agreement, any Letter of Credit applications, any Letter of Credit Agreement, the Collateral Documents, the Subsidiary Guaranty, and all other agreements, instruments, documents and certificates identified in Section 4.01 executed and delivered to, or in favor of, the Administrative Agent or any Lenders and including all other pledges, powers of attorney, consents, assignments, contracts, notices, letter of credit agreements, intercreditor agreements and all other written matter whether heretofore, now or hereafter executed by or on behalf of any Loan Party and delivered to the Administrative Agent or any Lender in connection with this Agreement or the transactions contemplated hereby, excluding any Banking Services Agreement or Swap Agreement. Any reference in this Agreement or any other Loan Document to a Loan Document shall include all appendices, exhibits or schedules thereto, and all amendments, restatements, supplements or other modifications thereto, and shall refer to this Agreement or such Loan Document as the same may be in effect at any and all times such reference becomes operative.

“Loan Parties” means, collectively, the Borrowers and the Subsidiary Guarantors.

“Loans” means the loans made by the Lenders to the Borrowers pursuant to this Agreement.

“Local Time” means (i) Chicago time in the case of a Loan, Borrowing or LC Disbursement denominated in Dollars and (ii) local time in the case of a Loan, Borrowing or LC Disbursement denominated in a Foreign Currency (it being understood that such local time shall mean (a) London, England time with respect to any Foreign Currency (other than euro, Japanese Yen and Swiss Francs), (b) Brussels, Belgium time with respect to euro, (c) Tokyo, Japan time with respect to

"NYFRB" means the Federal Reserve Bank of New York.

"NYFRB Rate" means, for any day, the greater of (a) the Federal Funds Effective Rate in effect on such day and (b) the Overnight Bank Funding Rate in effect on such day (or for any day that is not a Business Day, for the immediately preceding Business Day); provided that if none of such rates are published for any day that is a Business Day, the term "NYFRB Rate" means the rate for a federal funds transaction quoted at 11:00 a.m., New York City time, on such day received by the Administrative Agent from a federal funds broker of recognized standing selected by it; provided, further, that if any of the aforesaid rates as so determined would be less than ~~zero~~0%, such rate shall be deemed to be ~~zero~~0% for purposes of this Agreement.

"NYFRB's Website" means the website of the NYFRB at <http://www.newyorkfed.org>, or any successor source.

"Obligations" means all unpaid principal of and accrued and unpaid interest on the Loans, all LC Exposure, all accrued and unpaid fees and all expenses, reimbursements, indemnities and other obligations and indebtedness (including interest and fees accruing during the pendency of any bankruptcy, insolvency, receivership or other similar proceeding, regardless of whether allowed or allowable in such proceeding), obligations and liabilities of the Loan Parties to any of the Lenders, the Administrative Agent, the Issuing Bank or any indemnified party, individually or collectively, existing on the Effective Date or arising thereafter, direct or indirect, joint or several, absolute or contingent, matured or unmatured, liquidated or unliquidated, secured or unsecured, in each case, arising by contract, operation of law or otherwise, arising or incurred under this Agreement or any of the other Loan Documents or in respect of any of the Loans made or reimbursement or other obligations incurred or any of the Letters of Credit or other instruments at any time evidencing any thereof.

"OFAC" means the Office of Foreign Assets Control of the U.S. Department of the Treasury.

"Off-Balance Sheet Liability" of a Person means (a) any repurchase obligation or liability of such Person with respect to accounts or notes receivable sold by such Person, (b) any indebtedness, liability or obligation under any Sale and Leaseback Transaction to which such Person is a party which is not a Capitalized Lease, (c) any indebtedness, liability or obligation under any so-called "synthetic lease" transaction entered into by such Person, or (d) any indebtedness, liability or obligation arising with respect to any other transaction to which such Person is a party which is the functional equivalent of or takes the place of borrowing but which does not constitute a liability on the balance sheets of such Person, but excluding obligations with respect to Operating Leases.

"Omega" means H.C. Starck Inc., a Delaware corporation.

"Omega Acquisition" means the acquisition, directly or indirectly, of all of the outstanding Equity Interests of Omega by the Company pursuant to the Omega Purchase Agreement.

"Omega Closing Date" means the date on which the conditions specified in Section 4.02 are satisfied (or waived in accordance with Section 9.02).

"Omega Closing Date Commitments" means the Term Loan Commitments and the Omega Closing Date Revolving Commitments.

"Omega Closing Date Limited Conditionality Provision" means that, to the extent any Collateral (including the grant or perfection of any security interest therein) is not or cannot be provided

Affiliates') obligations under the Omega Purchase Agreement or decline to consummate the Omega Acquisition as a result of a breach of such representations in the Omega Purchase Agreement.

"Operating Lease" of a Person means any lease of Property other than a Capitalized Lease.

~~"Other Benchmark Rate Election" means, with respect to any Loan denominated in Dollars, if the then-current Benchmark is the LIBO Rate, the occurrence of:~~

~~(a) a request by the Company to the Administrative Agent to notify each of the other parties hereto that, at the determination of the Company, Dollar-denominated syndicated credit facilities at such time contain (as a result of amendment or as originally executed), in lieu of a LIBOR-based rate, a term benchmark rate as a benchmark rate, and~~

~~(b) the Administrative Agent, in its sole discretion, and the Company jointly elect to trigger a fallback from the LIBO Rate and the provision, as applicable, by the Administrative Agent of written notice of such election to the Company and the Lenders.~~

"Other Connection Taxes" means, with respect to any Recipient, Taxes imposed as a result of a present or former connection between such Recipient and the jurisdiction imposing such Tax (other than connections arising from such Recipient having executed, delivered, become a party to, performed its obligations under, received payments under, received or perfected a security interest under, engaged in any other transaction pursuant to or enforced any Loan Document, or sold or assigned an interest in any Loan, Letter of Credit or Loan Document).

"Other Taxes" means all present or future stamp, court or documentary, intangible, recording, filing or similar Taxes that arise from any payment made under, from the execution, delivery, performance, enforcement or registration of, from the receipt or perfection of a security interest under, or otherwise with respect to, any Loan Document, except any such Taxes that are Other Connection Taxes imposed with respect to an assignment (other than an assignment made pursuant to Section 2.19).

"Overnight Bank Funding Rate" means, for any day, the rate comprised of both overnight federal funds and overnight eurodollar ~~borrowing~~ transactions denominated in Dollars by U.S.-managed banking offices of depository institutions, as such composite rate shall be determined by the NYFRB as set forth on the NYFRB's Website from time to time, and published on the next succeeding Business Day by the NYFRB as an overnight bank funding rate.

"Overnight Rate" means, for any day, (a) with respect to any amount denominated in Dollars, the NYFRB Rate and (b) with respect to any amount denominated in a Foreign Currency, an overnight rate determined by the Administrative Agent or the Issuing Bank, as the case may be, in accordance with banking industry rules on interbank compensation.

"Participant" has the meaning set forth in Section 9.04.

"Participant Register" has the meaning assigned to such term in Section 9.04(c)(ii).

"Participating Member State" means any member state of the European Union that adopts or has adopted the euro as its lawful currency in accordance with legislation of the European Union relating to economic and monetary union.

"Patriot Act" means the USA PATRIOT Act of 2001.

"Payment" has the meaning assigned to such term in Section 8.06(c).

"Payment Notice" has the meaning assigned to such term in Section 8.06(c).

"PBGC" means the Pension Benefit Guaranty Corporation referred to and defined in ERISA and any successor entity performing similar functions.

"Permitted Liens" is defined in Section 6.02.

"Permitted Precious Metals Agreements" means precious metals agreements and arrangements (whether styled as debt, a lease, a consignment or otherwise) entered into from time to time by the Company or any Subsidiary, but only to the extent that the aggregate Dollar Amount of the precious metals outstanding thereunder does not exceed ~~\$600,000,000~~ \$15,000,000. For purposes of this definition, "precious metals" shall include, without limitation, gold, silver, platinum, palladium, rhodium and copper (even though copper is not generally deemed to be a precious metal).

"Person" means any natural person, corporation, limited liability company, trust, joint venture, association, company, partnership, Governmental Authority or other entity.

"Plan" means any employee pension benefit plan (other than a Multiemployer Plan) subject to the provisions of Title IV of ERISA or Section 412 of the Code or Section 302 of ERISA, and in respect of which the Company or any ERISA Affiliate is (or, if such plan were terminated, would under Section 4069 of ERISA be deemed to be) an "employer" as defined in Section 3(5) of ERISA.

"Plan Asset Regulations" means 29 CFR § 2510.3-101 et seq., as modified by Section 3(42) of ERISA, as amended from time to time.

"Pledge Subsidiary" means (i) each Domestic Subsidiary which is a Material Subsidiary and (ii) each First Tier Foreign Subsidiary which is a Material Subsidiary.

"Pounds Sterling" means the lawful currency of the United Kingdom.

"Prepayment Event" means:

(a) any sale, transfer or other disposition of any property or asset of the Company or any Subsidiary pursuant to Section 6.03(a)(iv)(D) resulting in the receipt of Net Proceeds in excess of \$10,000,000; or

(b) any casualty or other insured damage to, or any taking under power of eminent domain or by condemnation or similar proceeding of, any property or asset of the Company or any Subsidiary resulting in the receipt of Net Proceeds in excess of \$10,000,000; or

(c) the incurrence by the Company or any Subsidiary of any Indebtedness (other than Loans), other than Indebtedness permitted under Section 6.01 or permitted by the Required Lenders pursuant to Section 9.02.

"Prime Rate" means the rate of interest last quoted by The Wall Street Journal as the "Prime Rate" in the U.S. or, if The Wall Street Journal ceases to quote such rate, the highest per annum interest rate published by the Board in Federal Reserve Statistical Release H.15 (519) (Selected Interest Rates) as the "bank prime loan" rate or, if such rate is no longer quoted therein, any similar rate quoted therein (as reasonably determined by the Administrative Agent) or any similar release by the Board (as

reasonably determined by the Administrative Agent). Each change in the Prime Rate shall be effective from and including the date such change is publicly announced or quoted as being effective.

“Precious Metals” means precious metal and copper, any and all inventory or work-in-process that contains precious metal or copper and any proceeds of the foregoing.

“Pro Forma Basis” means, with respect to any event, that the Company is in compliance to the reasonable satisfaction of the Administrative Agent on a pro forma basis with the applicable covenant, calculation or requirement herein recomputed as if the event with respect to which compliance on a Pro Forma Basis is being tested had occurred on the first day of the four Fiscal Quarter period most recently ended on or prior to such date and for which financial statements have been delivered pursuant to Section 5.01. “Pro Forma” shall have a correlative meaning.

“Property” of a Person means any and all property, whether real, personal, tangible, intangible, or mixed, of such Person; other assets owned by such Person; and to the extent of such Person’s interest therein, other assets leased or operated by such Person.

“PTE” means a prohibited transaction class exemption issued by the U.S. Department of Labor, as any such exemption may be amended from time to time.

“QFC” has the meaning assigned to the term “qualified financial contract” in, and shall be interpreted in accordance with, 12 U.S.C. 5390(c)(8)(D).

“QFC Credit Support” has the meaning assigned to it in Section 9.19.

“Qualified Cash” means, at any time the same is to be determined, unrestricted and unencumbered (other than Liens permitted under clauses (a), (b), (f), (t), (u)(i) and (u)(ii) of Section 6.02) cash, and Cash Equivalent Investments, of the Company or any Subsidiary as reflected on the most recent consolidated balance sheet of the Company and its Subsidiaries in each case at such time; provided that Qualified Cash shall not exceed \$25,000,000.

“Recipient” means (a) the Administrative Agent, (b) any Lender or (c) any Issuing Bank, as applicable.

“Reference Time” with respect to any setting of the then-current Benchmark means (i) if such Benchmark is the LIBO Term SOFR Rate, 11:00:00 a.m., London/Chicago time, on the day that is two (2) London banking days U.S. Government Securities Business Days preceding the date of such setting, (ii) if such Benchmark is the EURIBO Rate, 11:00 a.m., Brussels time, two (2) TARGET Days preceding the date of such setting, (iii) if such Benchmark is the TIBO Rate, 11:00 a.m., Japan time, two (2) Business Days preceding the date of such setting, (iv) if the RFR for such Benchmark is SONIA, then fivefour (54) RFR Business Days prior to such setting, (v) if the RFR for such Benchmark is SARON, then five (5) RFR Business Days prior to such setting, (vi) if the RFR for such Benchmark is Daily Simple SOFR, then four (4) RFR Business Days prior to such setting or (vii) if such Benchmark is none of the LIBO Term SOFR Rate, Daily Simple SOFR, the EURIBO Rate, the TIBO Rate, SONIA or SARON, the time determined by the Administrative Agent in its reasonable discretion.

“Register” has the meaning set forth in Section 9.04.

“Regulation D” means Regulation D of the Board, as in effect from time to time and all official rulings and interpretations thereunder or thereof.

“Regulation T” means Regulation T of the Board, as in effect from time to time and all official rulings and interpretations thereunder or thereof.

“Regulation U” means Regulation U of the Board, as in effect from time to time and all official rulings and interpretations thereunder or thereof.

“Regulation X” means Regulation X of the Board, as in effect from time to time and all official rulings and interpretations thereunder or thereof.

“Related Parties” means, with respect to any specified Person, such Person’s Affiliates and the respective directors, officers, employees, agents and advisors of such Person and such Person’s Affiliates.

“Relevant Governmental Body” shall mean (i) with respect to a Benchmark Replacement in respect of Loans denominated in Dollars, the Board and/or the NYFRB, or a committee officially endorsed or convened by the Board and/or the NYFRB or, in each case, any successor thereto, (ii) with respect to a Benchmark Replacement in respect of Loans denominated in Pounds Sterling, the Bank of England, or a committee officially endorsed or convened by the Bank of England or, in each case, any successor thereto, (iii) with respect to a Benchmark Replacement in respect of Loans denominated in euro, the European Central Bank, or a committee officially endorsed or convened by the European Central Bank or, in each case, any successor thereto, (iv) with respect to a Benchmark Replacement in respect of Loans denominated in Japanese Yen, the Bank of Japan, or a committee officially endorsed or convened by the Bank of Japan or, in each case, any successor thereto, (v) with respect to a Benchmark Replacement in respect of Loans denominated in Swiss Francs, the Swiss National Bank, or a committee officially endorsed or convened by the Swiss National Bank or, in each case, any successor thereto, and (vi) with respect to a Benchmark Replacement in respect of Loans denominated in any other currency, (a) the central bank for the currency in which such Benchmark Replacement is denominated or any central bank or other supervisor which is responsible for supervising either (1) such Benchmark Replacement or (2) the administrator of such Benchmark Replacement or (b) any working group or committee officially endorsed or convened by (1) the central bank for the currency in which such Benchmark Replacement is denominated, (2) any central bank or other supervisor that is responsible for supervising either (A) such Benchmark Replacement or (B) the administrator of such Benchmark Replacement, (3) a group of those central banks or other supervisors or (4) the Financial Stability Board or any part thereof.

“Relevant Rate” ~~shall mean~~ means (i) with respect to any Eurocurrency Term Benchmark Borrowing denominated in Dollars, the LIBO Adjusted Term SOFR Rate, (ii) with respect to any Eurocurrency Term Benchmark Borrowing denominated in euro, the Adjusted EURIBO Rate, (iii) with respect to any Eurocurrency Term Benchmark Borrowing denominated in Japanese Yen, the Adjusted TIBO Rate or (iv) with respect to any RFR Borrowing denominated in Pounds Sterling ~~or~~ Swiss Francs ~~or Dollars~~, the applicable Adjusted Daily Simple RFR, as applicable.

“Relevant Screen Rate” ~~shall mean~~ means (i) with respect to any Eurocurrency Term Benchmark Borrowing denominated in Dollars, the LIBO Screen Term SOFR Reference Rate, (ii) with respect to any Eurocurrency Term Benchmark Borrowing denominated in euro, the EURIBO Screen Rate or (iii) with respect to any Eurocurrency Term Benchmark Borrowing denominated in Japanese Yen, the TIBO Screen Rate, as applicable.

“Required Lenders” means, subject to Section 2.24, (a) at any time prior to the earlier of the Loans becoming due and payable pursuant to Section 7.02 or the Commitments terminating or expiring, Lenders having Credit Exposures and Unfunded Commitments representing more than 50% of the sum of the total Credit Exposure and Unfunded Commitments at such time; provided that, solely for

"Reuters" means, as applicable, Thomson Reuters Corp., Refinitiv, or any successor thereto.

"Revolving Commitment" means, with respect to each Revolving Lender, the amount set forth on Schedule 2.01 opposite such Revolving Lender's name under the heading "Revolving Commitment", or in the Assignment and Assumption or other documentation or record (as such term is defined in Section 9-102(a)(70) of the New York Uniform Commercial Code) contemplated hereby pursuant to which such Revolving Lender shall have assumed its Revolving Commitment, as applicable, and giving effect to (a) any reduction in such amount from time to time pursuant to Section 2.09, (b) any increase from time to time pursuant to Section 2.20 and (c) any reduction or increase in such amount from time to time pursuant to assignments by or to such Revolving Lender pursuant to Section 9.04; provided that at no time shall the Revolving Credit Exposure of any Revolving Lender exceed its Revolving Commitment. The initial aggregate amount of the Revolving Commitments on the Effective Date is \$375,000,000.

"Revolving Credit Availability Period" means the period from and including the Effective Date to but excluding the earlier of the Revolving Credit Maturity Date and the date of termination of the Revolving Commitments.

"Revolving Credit Exposure" means, with respect to any Revolving Lender at any time, the sum of the outstanding principal amount of such Revolving Lender's Revolving Loans, its LC Exposure and its Swingline Exposure at such time.

"Revolving Credit Maturity Date" means October 27, 2026, as extended (in the case of each Revolving Lender consenting thereto) pursuant to Section 2.25; provided, however, in each case, if such date is not a Business Day, the Revolving Credit Maturity Date shall be the next preceding Business Day.

"Revolving Lender" means, as of any date of determination, each Lender that has a Revolving Commitment or, if the Revolving Commitments have terminated or expired, a Lender with Revolving Credit Exposure.

"Revolving Loan" means a Loan made by a Revolving Lender pursuant to Section 2.01(a).

~~"RFR" when used in reference to a currency means, means, for any RFR Loan denominated in (a) Pounds Sterling and, SONIA, (b) Swiss Francs and, SARON and (c) Dollars, Daily Simple SOFR, and~~ when used in reference to any Loan or Borrowing, means that such Loan, or the Loans comprising such Borrowing, bears interest at a rate determined by reference to ~~(a) with respect to a Loan denominated in Pounds Sterling, SONIA and (b) with respect to a Loan denominated in Swiss Francs, SARON~~ the applicable Adjusted Daily Simple RFR.

~~"RFR Administrator" means the SONIA Administrator or the SARON Administrator.~~

"RFR Borrowing" means, as to any Borrowing, the RFR Loans comprising such Borrowing.

"RFR Business Day" means, for any Loan denominated in (a) Pounds Sterling, any day except for (i) a Saturday, (ii) a Sunday or (iii) a day on which banks are closed for general business in London ~~and~~, (b) Swiss Francs, any day except for (i) a Saturday, (ii) a Sunday or (iii) a day on which

banks are closed for the settlement of payments and foreign exchange transactions in Zurich and (c) Dollars, a U.S. Government Securities Business Day.

“RFR Interest Day” has the meaning specified in the definition of “Daily Simple RFR”.

“RFR Loan” ~~shall mean~~ means a Loan that bears interest at a rate based on the Adjusted Daily Simple RFR.

“S&P” means Standard & Poor’s Rating Services, a Standard & Poor’s Financial Services LLC business.

“Sale and Leaseback Transaction” means any sale or other transfer of Property by any Person with the intent to lease such Property as lessee.

“Sanctioned Country” means, at any time, a country, region or territory which is itself the subject or target of any Sanctions (including, at the time of ~~this Agreement~~, Amendment No. 1, the so-called Donetsk People’s Republic, the so-called Luhansk People’s Republic, the Crimea Region of Ukraine, Cuba, Iran, North Korea and Syria).

“Sanctioned Person” means, at any time, (a) any Person listed in any Sanctions-related list of designated Persons maintained by OFAC, the U.S. Department of State, the United Nations Security Council, the European Union, any European Union member state, ~~Her~~ His Majesty’s Treasury of the United Kingdom or other relevant sanctions authority, (b) any Person operating, organized or resident in a Sanctioned Country, (c) any Person owned or controlled by any such Person or Persons described in the foregoing clauses (a) or (b), or (d) any Person otherwise the subject of any Sanctions.

“Sanctions” means all economic or financial sanctions or trade embargoes imposed, administered or enforced from time to time by (a) the U.S. government, including those administered by OFAC or the U.S. Department of State or (b) the United Nations Security Council, the European Union, any European Union member state, ~~Her~~ His Majesty’s Treasury of the United Kingdom or other relevant sanctions authority.

“SARON” means, with respect to any Business Day, a rate per annum equal to the Swiss Average Rate Overnight for such Business Day published by the SARON Administrator on the SARON Administrator’s Website.

“SARON Administrator” means the SIX Swiss Exchange AG (or any successor administrator of the Swiss Average Rate Overnight).

“SARON Administrator’s Website” means the SIX Swiss Exchange AG’s website, currently at <https://www.six-group.com>, or any successor source for the Swiss Average Rate Overnight identified as such by the SARON Administrator from time to time.

“SEC” means the United States Securities and Exchange Commission.

“Secured Obligations” means all Obligations, together with all Swap Obligations and Banking Services Obligations owing to one or more Lenders or their respective Affiliates; provided that the definition of “Secured Obligations” shall not create any guarantee by any Loan Party of (or grant of security interest by any Loan Party to support, as applicable) any Excluded Swap Obligations of such Loan Party for purposes of determining any obligations of any Loan Party.

“Security Agreement” means the Domestic Security Agreement and/or the Dutch Security Agreements, as the context requires.

“SOFR” means ~~with respect to any Business Day~~, a rate ~~per annum~~ equal to the secured overnight financing rate ~~for such Business Day published~~ as administered by the SOFR Administrator ~~on the SOFR Administrator’s Website on the immediately succeeding Business Day~~.

“SOFR Administrator” means the NYFRB (or a successor administrator of the secured overnight financing rate).

“SOFR Administrator’s Website” means the NYFRB’s ~~website~~ Website, currently at <http://www.newyorkfed.org>, or any successor source for the secured overnight financing rate identified as such by the SOFR Administrator from time to time.

“SOFR Rate Day” has the meaning specified in the definition of “Daily Simple SOFR”.

“Solvent” means, in reference to any Person, (i) the fair value of the assets of such Person, at a fair valuation, will exceed its debts and liabilities, subordinated, contingent or otherwise; (ii) the present fair saleable value of the property of such Person will be greater than the amount that will be required to pay the probable liability of its debts and other liabilities, subordinated, contingent or otherwise, as such debts and other liabilities become absolute and matured; (iii) such Person will be able to pay its debts and liabilities, subordinated, contingent or otherwise, as such debts and liabilities become absolute and matured; and (iv) such Person will not have unreasonably small capital with which to conduct the business in which it is engaged as such business is now conducted and is proposed to be conducted after the Effective Date.

“SONIA” ~~shall mean~~ means, with respect to any Business Day, a rate per annum equal to the Sterling Overnight Index Average for such Business Day published by the SONIA Administrator on the SONIA Administrator’s Website on the immediately succeeding Business Day.

“SONIA Administrator” ~~shall mean~~ means the Bank of England (or any successor administrator of the Sterling Overnight Index Average).

“SONIA Administrator’s Website” ~~shall mean~~ means the Bank of England’s website, currently at <http://www.bankofengland.co.uk>, or any successor source for the Sterling Overnight Index Average identified as such by the SONIA Administrator from time to time.

“Specified Representations” means the representations and warranties of the Borrowers and the Subsidiary Guarantors set forth in the first sentence of Section 3.01 (solely with respect to the Borrowers and the Subsidiary Guarantors), Section 3.02 (solely with respect to the Borrowers and the Subsidiary Guarantors), Section 3.03(b) (solely with respect to no violation of the organizational documents of the Borrowers or any Subsidiary Guarantor), Sections 3.08, 3.12, 3.16(c), 3.18 (solely with respect to the Borrowers and the Subsidiary Guarantors and subject to the Omega Closing Date Limited Conditionality Provision) and the penultimate sentence of Section 3.19 of this Agreement.

“Specified Swap Obligation” means, with respect to any Loan Party, any obligation to pay or perform under any agreement, contract or transaction that constitutes a “swap” within the meaning of Section 1a(47) of the Commodity Exchange Act or any rules or regulations promulgated thereunder.

"Statutory Reserve Rate" means a fraction (expressed as a decimal), the numerator of which is the number one and the denominator of which is the number one minus the aggregate of the maximum reserve percentage (including any marginal, special, emergency or supplemental reserves) expressed as a decimal established by the Board to which the Administrative Agent is subject with respect to the Adjusted ~~LIBO Rate, Adjusted~~ EURIBO Rate or ~~the~~ Adjusted TIBO Rate, as applicable, for eurocurrency funding (currently referred to as "Eurocurrency liabilities" in Regulation D ~~of the Board~~) or any other reserve ratio or analogous requirement of any central banking or financial regulatory authority imposed in respect of the maintenance of the Commitments or the funding of the Loans. Such reserve percentage shall include those imposed pursuant to Regulation D ~~of the Board. Eurocurrency Loans. Term Benchmark Loans for which the associated Benchmark is adjusted by reference to the Statutory Reserve Rate (per the related definition of such Benchmark)~~ shall be deemed to constitute eurocurrency funding and to be subject to such reserve requirements without benefit of or credit for proration, exemptions or offsets that may be available from time to time to any Lender under Regulation D ~~of the Board~~ or any comparable regulation. The Statutory Reserve Rate shall be adjusted automatically on and as of the effective date of any change in any reserve percentage.

"Subordinated Indebtedness" means any Indebtedness of the Company or any Subsidiary, the payment of which is subordinated to payment of the Secured Obligations in a manner reasonably acceptable to the Administrative Agent (such acceptance not to be unreasonably withheld, delayed or conditioned).

"Subordinated Indebtedness Documents" means any document, agreement or instrument evidencing any Subordinated Indebtedness or entered into in connection with any Subordinated Indebtedness.

"subsidiary" means, with respect to any Person (the "parent") at any date, any corporation, limited liability company, partnership, association or other entity the accounts of which would be consolidated with those of the parent in the parent's consolidated financial statements if such financial statements were prepared in accordance with GAAP as of such date, as well as any other corporation, limited liability company, partnership, association or other entity (a) of which securities or other ownership interests representing more than 50% of the equity or more than 50% of the ordinary voting power or, in the case of a partnership, more than 50% of the general partnership interests are, as of such date, owned, Controlled or held, or (b) that is, as of such date, otherwise Controlled, by the parent or one or more subsidiaries of the parent or by the parent and one or more subsidiaries of the parent.

"Subsidiary" means any subsidiary of the Company.

"Subsidiary Guarantor" means each Domestic Subsidiary Guarantor and each Dutch Subsidiary Guarantor. The Subsidiary Guarantors on the Effective Date are identified as such in Schedule 3.01 hereto.

"Subsidiary Guaranty" means that certain Fourth Amended and Restated Guaranty dated as of the Effective Date (including any and all supplements thereto) and executed by each Subsidiary Guarantor party thereto, and, in the case of any guaranty by a Foreign Subsidiary, any other guaranty agreements executed by a Dutch Subsidiary Guarantor for the benefit of the Administrative Agent and the other Holders of Secured Obligations, in each case as amended, restated, supplemented or otherwise modified from time to time.

"Substantial Portion" means Property which represents more than 10% of the Consolidated Total Assets of the Company or Property which is responsible for more than 10% of the consolidated net sales or of the Consolidated Net Income of the Company, in each case, as would be

sales taxes, assessments, fees or other charges imposed by any Governmental Authority, including any interest, additions to tax or penalties applicable thereto.

“Term Benchmark”, when used in reference to any Loan or Borrowing, means that such Loan, or the Loans comprising such Borrowing, bears interest at a rate determined by reference to the Adjusted Term SOFR Rate, the Adjusted EURIBO Rate or the Adjusted TIBO Rate.

“Term Lender” means, as of any date of determination, each Lender having a Term Loan Commitment or that holds Term Loans.

“Term Loan Availability Period” means the period beginning on the Effective Date and ending on (and including) the Term Loan Commitment Expiration Date.

“Term Loan Commitment” means (a) with respect to any Term Lender, the amount set forth on Schedule 2.01 opposite such Term Lender’s name under the heading “Term Loan Commitment”, or in the Assignment and Assumption or other documentation or record (as such term is defined in Section 9-102(a)(70) of the New York Uniform Commercial Code) contemplated hereby pursuant to which such Term Lender shall have assumed its Term Loan Commitment, as applicable, and giving effect to (i) any reduction in such amount from time to time pursuant to Section 2.09 and (ii) any reduction or increase in such amount from time to time pursuant to assignments by or to such Term Lender pursuant to Section 9.04 and (b) as to all Term Lenders, the aggregate commitments of all Term Lenders to make Term Loans. After advancing the Term Loan, each reference to a Term Lender’s Term Loan Commitment shall refer to that Term Lender’s Applicable Percentage of the Term Loans. The initial aggregate amount of the Term Loan Commitments on the Effective Date is \$300,000,000.

“Term Loan Commitment Expiration Date” means the earliest of (i) 11:59 p.m., New York City time, five Business Days after the Termination Date (as defined in the Omega Purchase Agreement as in effect on September 19, 2021, and as such Termination Date may be extended pursuant to the final paragraph of Section 8.1 of the Omega Purchase Agreement as in effect on September 19, 2021), (ii) the closing of the Omega Acquisition with or without the use of the Omega Closing Date Loans and (iii) the termination of the Omega Purchase Agreement in accordance with the terms thereof prior to closing of the Omega Acquisition or the termination by the Company of the Company’s (or any of the Company’s Affiliates’) obligations under the Omega Purchase Agreement to consummate the Omega Acquisition in accordance with the terms thereof.

“Term Loan Maturity Date” means ~~the date that is the five-year anniversary of the Omega Closing Date~~ November 1, 2026, as extended (in the case of each Term Lender consenting thereto) pursuant to Section 2.25; provided, however, in each case, if such date is not a Business Day, the Term Loan Maturity Date shall be the next preceding Business Day.

“Term Loans” means the term loans made by the Term Lenders to the Company pursuant to Section 2.01(b).

~~“Term SOFR” shall mean, for the applicable Corresponding Tenor as of the applicable Reference Time, the forward-looking term rate based on SOFR that has been selected or recommended by the Relevant Governmental Body.~~

~~“Term SOFR Notice” shall mean a notification by the Administrative Agent to the Lenders and the Company of the occurrence of a Term SOFR Transition Event.~~ Determination Day” has the meaning assigned to it under the definition of Term SOFR Reference Rate.

~~“Term SOFR Transition Event” shall mean the determination by the Administrative Agent that (a) Term SOFR has been recommended for use by the Relevant Governmental Body, (b) the administration of Term SOFR is administratively feasible for the Administrative Agent and (c) a Benchmark Transition Event or an Early Opt-in Election, as applicable (and, for the avoidance of doubt, not in the case of an Other Benchmark Rate Election), has previously occurred resulting in a Benchmark Replacement in accordance with Section 2.14 that is not Term SOFR Rate” means, with respect to any Term Benchmark Borrowing denominated in Dollars and for any tenor comparable to the applicable Interest Period, the Term SOFR Reference Rate at approximately 5:00 a.m., Chicago time, two U.S. Government Securities Business Days prior to the commencement of such tenor comparable to the applicable Interest Period, as such rate is published by the CME Term SOFR Administrator.~~

~~“TIBO Interpolated Rate” shall mean, at any time, with respect to any Eurocurrency Borrowing denominated in Japanese Yen and for any Interest Period, the rate per annum determined by the Administrative Agent (which determination shall be conclusive and binding absent manifest error) to be equal to the rate that results from interpolating on a linear basis between: (a) the TIBO Screen Rate for the longest Interest Period (for which the TIBO Screen Rate is available for Japanese Yen) that is shorter than the Impacted TIBO Rate Interest Period; and (b) the TIBO Screen Rate for the shortest Interest Period (for which the TIBO Screen Rate is available for Japanese Yen) that exceeds the Impacted TIBO Rate Interest Period, in each case, at such time; provided that, if any TIBO Interpolated Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~

~~“Term SOFR Reference Rate” means, for any day and time (such day, the “Term SOFR Determination Day”), with respect to any Term Benchmark Borrowing denominated in Dollars and for any tenor comparable to the applicable Interest Period, the rate per annum published by the CME Term SOFR Administrator and identified by the Administrative Agent as the forward-looking term rate based on SOFR. If by 5:00 p.m. (New York City time) on such Term SOFR Determination Day, the “Term SOFR Reference Rate” for the applicable tenor has not been published by the CME Term SOFR Administrator and a Benchmark Replacement Date with respect to the Term SOFR Rate has not occurred, then, so long as such day is otherwise a U.S. Government Securities Business Day, the Term SOFR Reference Rate for such Term SOFR Determination Day will be the Term SOFR Reference Rate as published in respect of the first preceding U.S. Government Securities Business Day for which such Term SOFR Reference Rate was published by the CME Term SOFR Administrator, so long as such first preceding U.S. Government Securities Business Day is not more than five (5) U.S. Government Securities Business Days prior to such Term SOFR Determination Day.~~

~~“TIBO Rate” shall mean means, with respect to any Eurocurrency Term Benchmark Borrowing denominated in Japanese Yen and for any Interest Period, the TIBO Screen Rate at approximately 1:00 p.m., Japan time, two (2) Business Days prior to the commencement of such Interest Period; provided that, if the TIBO Screen Rate shall not be available at such time for such Interest Period (an “Impacted TIBO Rate Interest Period”) with respect to Japanese Yen then the TIBO Rate shall be the TIBO Interpolated Rate.~~

~~“TIBO Screen Rate” shall mean, for any day and time, with respect to any Eurocurrency Borrowing denominated in Japanese Yen and for any Interest Period, means the Tokyo interbank offered rate administered by the Ippan Shadan Hojin JBA TIBOR Administration (or any other person which takes over the administration of such rate) for Japanese Yen for the relevant period displayed on page DTIBOR01 of the Reuters screen (or, in the event such rate does not appear on such Reuters page or screen, on any successor or substitute page on such screen that displays such rate,~~

or on the appropriate page of such other information service that publishes such rate as selected by the Administrative Agent from time to time in its reasonable discretion). ~~If the TIBO Screen Rate as so determined would be less than zero, such rate shall be deemed to be zero for the purposes of this Agreement.~~ as published at approximately 1:00 p.m., Japan time, two (2) Business Days prior to the commencement of such Interest Period.

~~“TIBOR” has the meaning assigned to such term in Section 1.06.~~

“Total Revolving Credit Exposure” means, at any time, the sum of (a) the outstanding principal amount of the Revolving Loans and Swingline Loans at such time and (b) the total LC Exposure at such time.

“Trade Date” has the meaning assigned to such term in Section 9.04(e)(i).

“Transactions” means the execution, delivery and performance by the Loan Parties of this Agreement and the other Loan Documents, the borrowing of Loans and other credit extensions, the use of the proceeds thereof, and the issuance of Letters of Credit hereunder.

“Type”, when used in reference to any Loan or Borrowing, refers to whether the rate of interest on such Loan, or on the Loans comprising such Borrowing, is determined by reference to the Adjusted ~~LIBO~~ Term SOFR Rate, the Adjusted EURIBO Rate, the Adjusted TIBO Rate, the ~~Alternate Base Rate or the Adjusted~~ Daily Simple RFR, the Alternate Base Rate, the Japanese Prime Rate or the Central Bank Rate.

“UCC” means the Uniform Commercial Code as in effect from time to time in the State of New York or any other state the laws of which are required to be applied in connection with the issue of perfection of security interests.

“UK Financial Institution” means any BRRD Undertaking (as such term is defined under the PRA Rulebook (as amended from time to time) promulgated by the United Kingdom Prudential Regulation Authority) or any person falling within IFPRU 11.6 of the FCA Handbook (as amended from time to time) promulgated by the United Kingdom Financial Conduct Authority, which includes certain credit institutions and investment firms, and certain affiliates of such credit institutions or investment firms.

“UK Resolution Authority” means the Bank of England or any other public administrative authority having responsibility for the resolution of any UK Financial Institution.

“Unadjusted Benchmark Replacement” ~~shall mean~~ means the applicable Benchmark Replacement excluding the related Benchmark Replacement Adjustment.

“Unfunded Commitment” means, with respect to each Lender, the Commitment of such Lender less its Revolving Credit Exposure.

“United States” or “U.S.” mean the United States of America.

“Unliquidated Obligations” means, at any time, any Secured Obligations (or portion thereof) that are contingent in nature or unliquidated at such time, including any Secured Obligation that is: (i) an obligation to reimburse a bank for drawings not yet made under a letter of credit issued by it; (ii) any other obligation (including any guarantee) that is contingent in nature at such time; or (iii) an obligation to provide collateral to secure any of the foregoing types of obligations.

“U.S. Government Securities Business Day” means any day except for (i) a Saturday, (ii) a Sunday or (iii) a day on which the Securities Industry and Financial Markets Association recommends that the fixed income departments of its members be closed for the entire day for purposes of trading in United States government securities.

“U.S. Person” means a “United States person” within the meaning of Section 7701(a)(30) of the Code.

“U.S. Special Resolution Regime” has the meaning assigned to it in Section 9.19.

“U.S. Tax Compliance Certificate” has the meaning set forth in Section 2.17(e).

“Weighted Average Life to Maturity” means, when applied to any Indebtedness at any date, the number of years obtained by dividing: (i) the sum of the products obtained by multiplying (a) the amount of each then remaining installment, sinking fund, serial maturity or other required payments of principal, including payment at final maturity, in respect thereof, by (b) the number of years (calculated to the nearest one-twelfth) that will elapse between such date and the making of such payment by (ii) the then outstanding principal amount of such Indebtedness; provided that for purposes of determining the Weighted Average Life to Maturity of any Indebtedness that is being modified, refinanced, refunded, renewed, replaced or extended (the “Applicable Indebtedness”), the effect of any prepayments made on such Applicable Indebtedness prior to the date of the applicable modification, refinancing, refunding, renewal, replacement or extension shall be disregarded.

“Wholly-Owned” means, when used in reference to a subsidiary of any Person, that all the Equity Interests in such subsidiary (other than directors’ qualifying shares and other nominal amounts of Equity Interests that are required to be held by other Persons under applicable law) are owned, beneficially and of record, by such Person, another wholly-owned subsidiary of such Person or any combination thereof.

“Withdrawal Liability” means liability to a Multiemployer Plan as a result of a complete or partial withdrawal from such Multiemployer Plan, as such terms are defined in Part I of Subtitle E of Title IV of ERISA.

“Write-Down and Conversion Powers” means, (a) with respect to any EEA Resolution Authority, the write-down and conversion powers of such EEA Resolution Authority from time to time under the Bail-In Legislation for the applicable EEA Member Country, which write-down and conversion powers are described in the EU Bail-In Legislation Schedule, and (b) with respect to the United Kingdom, any powers of the applicable Resolution Authority under the Bail-In Legislation to cancel, reduce, modify or change the form of a liability of any UK Financial Institution or any contract or instrument under which that liability arises, to convert all or part of that liability into shares, securities or obligations of that person or any other person, to provide that any such contract or instrument is to have effect as if a right had been exercised under it or to suspend any obligation in respect of that liability or any of the powers under that Bail-In Legislation that are related to or ancillary to any of those powers.

SECTION 1.02. Classification of Loans and Borrowings. For purposes of this Agreement, Loans may be classified and referred to by Class (e.g., a “Revolving Loan”) or by Type (e.g., a “Eurocurrency Term Benchmark Loan” or an “RFR Loan”) or by Class and Type (e.g., a “Eurocurrency Term Benchmark Revolving Loan” or an “RFR Revolving Loan”). Borrowings also may be classified and referred to by Class (e.g., a “Revolving Borrowing”) or by Type (e.g., a

"Eurocurrency Term Benchmark Borrowing" or an "RFR Borrowing") or by Class and Type (e.g., a "Eurocurrency Term Benchmark Revolving Borrowing" or an "RFR Revolving Borrowing").

SECTION 1.03. Terms Generally. The definitions of terms herein shall apply equally to the singular and plural forms of the terms defined. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words "include", "includes" and "including" shall be deemed to be followed by the phrase "without limitation". The word "will" shall be construed to have the same meaning and effect as the word "shall". The word "law" shall be construed as referring to all statutes, rules, regulations, codes and other laws (including official rulings and interpretations thereunder having the force of law), and all judgments, orders and decrees, of all Governmental Authorities. Unless the context requires otherwise (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, restated, supplemented or otherwise modified (subject to any restrictions on such amendments, restatements, supplements or modifications set forth herein), (b) any definition of or reference to any law, statute, rule or regulation shall, unless otherwise specified, be construed as referring thereto as from time to time amended, supplemented or otherwise modified (including by succession of comparable successor laws), (c) any reference herein to any Person shall be construed to include such Person's successors and assigns (subject to any restrictions on assignment set forth herein) and, in the case of any Governmental Authority, any other Governmental Authority that shall have succeeded to any or all functions thereof, (d) the words "herein", "hereof" and "hereunder", and words of similar import, shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof, (e) all references herein to Articles, Sections, Exhibits and Schedules shall be construed to refer to Articles and Sections of, and Exhibits and Schedules to, this Agreement and (f) the words "asset" and "property" shall be construed to have the same meaning and effect and to refer to any and all tangible and intangible assets and properties, including cash, securities, accounts and contract rights.

SECTION 1.04. Accounting Terms; GAAP. Except as otherwise expressly provided herein (including the definitions of Capitalized Lease and Capitalized Lease Obligations), all terms of an accounting or financial nature shall be construed in accordance with GAAP, as in effect from time to time; provided that, if the Company notifies the Administrative Agent that the Company requests an amendment to any provision hereof to eliminate the effect of any change occurring after the date hereof in GAAP or in the application thereof on the operation of such provision (or if the Administrative Agent notifies the Company that the Required Lenders request an amendment to any provision hereof for such purpose), regardless of whether any such notice is given before or after such change in GAAP or in the application thereof, then such provision shall be interpreted on the basis of GAAP as in effect and applied immediately before such change shall have become effective until such notice shall have been withdrawn or such provision amended in accordance herewith. Notwithstanding any other provision contained herein, all terms of an accounting or financial nature used herein shall be construed, and all computations of amounts and ratios referred to herein shall be made (i) without giving effect to any election under Financial Accounting Standards Board Accounting Standards Codification 825 (or any other Accounting Standards Codification or Financial Accounting Standard having a similar result or effect) to value any Indebtedness or other liabilities of the Company or any Subsidiary at "fair value", as defined therein and (ii) without giving effect to any treatment of Indebtedness under Accounting Standards Codification 470-20 or 2015-03 (or any other Accounting Standards Codification or Financial Accounting Standard having a similar result or effect) to value any such Indebtedness in a reduced or bifurcated manner as described therein, and such Indebtedness shall at all times be valued at the full stated principal amount thereof. Notwithstanding anything to the contrary contained in this Section 1.04 or in the definition of "Capitalized Lease Obligations," any change in accounting for leases before or after the date hereof pursuant to GAAP resulting from the adoption of Financial Accounting Standards Board Accounting Standards Update No. 2016-02, Leases (Topic 842) ("FAS 842"), to the extent such

adoption would require treating any lease (or similar arrangement conveying the right to use) as a capital lease where such lease (or similar arrangement) would not have been required to be so treated under GAAP as in effect on December 31, 2015, such lease shall not be considered a capital lease, and all calculations and deliverables under this Agreement or any other Loan Document shall be made or delivered, as applicable, in accordance therewith.

SECTION 1.05. Amendment and Restatement of the Existing Credit Agreement. The parties to this Agreement agree that, upon (i) the execution and delivery by each of the parties hereto of this Agreement and (ii) satisfaction of the conditions set forth in Section 4.01, the terms and provisions of the Existing Credit Agreement shall be and hereby are amended, superseded and restated in their entirety by the terms and provisions of this Agreement. This Agreement is not intended to and shall not constitute a novation. All Loans made and Obligations incurred under the Existing Credit Agreement which are outstanding on the Effective Date shall continue as Loans and Obligations under (and, as of the Effective Date, shall be governed by the terms of) this Agreement and the other Loan Documents. Without limiting the foregoing, upon the effectiveness hereof: (a) all references in the "Loan Documents" (as defined in the Existing Credit Agreement) to the "Administrative Agent", the "Credit Agreement" and the "Loan Documents" shall be deemed to refer to the Administrative Agent, this Agreement and the Loan Documents, (b) the Existing Letters of Credit which remain outstanding on the Effective Date shall continue as Letters of Credit under (and, as of the Effective Date, shall be governed by the terms of) this Agreement, (c) all obligations constituting "Obligations" with any Lender or any Affiliate of any Lender which are outstanding on the Effective Date shall continue as Obligations under this Agreement and the other Loan Documents, (d) the Administrative Agent shall make such reallocations, sales, assignments or other relevant actions in respect of each Lender's credit exposure under the Existing Credit Agreement as are necessary in order that each such Lender's Revolving Credit Exposure and outstanding Revolving Loans hereunder reflect such Lender's Applicable Percentage of the outstanding aggregate Revolving Exposures on the Effective Date and (e) the Company hereby agrees to compensate each Lender for any and all losses, costs and expenses incurred by such Lender in connection with the sale and assignment of any Eurocurrency Loans (as defined in this Agreement as of the Effective Date) (including the "Eurocurrency Loans" under the Existing Credit Agreement) and such reallocation described above, in each case on the terms and in the manner set forth in Section 2.16 hereof of this Agreement as of the Effective Date.

SECTION 1.06. Interest Rates; LIBOR Benchmark Notification. The interest rate on a Loan denominated in an Agreed Dollars or a Foreign Currency may be derived from an interest rate benchmark that may be discontinued or is, or may in the future become, the subject of regulatory reform. ~~Regulators have signaled the need to use alternative benchmark reference rates for some of these interest rate benchmarks and, as a result, such interest rate benchmarks may cease to comply with applicable laws and regulations, may be permanently discontinued, and/or the basis on which they are calculated may change. The London interbank offered rate ("LIBOR") is intended to represent the rate at which contributing banks may obtain short-term borrowings from each other in the London interbank market. On March 5, 2021, the U.K. Financial Conduct Authority ("FCA") publicly announced that: (a) immediately after December 31, 2021, publication of all seven euro LIBOR settings, all seven Swiss Franc LIBOR settings, the spot next, 1-week, 2-month and 12-month Japanese Yen LIBOR settings, the overnight, 1-week, 2-month and 12-month Pound Sterling LIBOR settings, and the 1-week and 2-month U.S. Dollar LIBOR settings will permanently cease; immediately after June 30, 2023, publication of the overnight and 12-month U.S. Dollar LIBOR settings will permanently cease; immediately after December 31, 2021, the 1-month, 3-month and 6-month Japanese Yen LIBOR settings and the 1-month, 3-month and 6-month Pound Sterling LIBOR settings will cease to be provided or, subject to consultation by the FCA, be provided on a changed methodology (or "synthetic") basis and no longer be representative of the underlying market and economic reality they are intended to measure and that~~

~~representativeness will not be restored; and immediately after June 30, 2023, the 1-month, 3-month and 6-month U.S. Dollar LIBOR settings will cease to be provided or, subject to the FCA's consideration of the case, be provided on a synthetic basis and no longer be representative of the underlying market and economic reality they are intended to measure and that representativeness will not be restored. There is no assurance that dates announced by the FCA will not change or that the administrator of LIBOR and/or regulators will not take further action that could impact the availability, composition, or characteristics of LIBOR or the currencies and/or tenors for which LIBOR is published. Each party to this agreement should consult its own advisors to stay informed of any such developments. Public and private sector industry initiatives are currently underway to identify new or alternative reference rates to be used in place of LIBOR. Upon the occurrence of a Benchmark Transition Event, a Term SOFR Transition Event, an Early Opt in Election or an Other Benchmark Rate Election, Section 2.14(b) and Section 2.14(c) provide~~provides a mechanism for determining an alternative rate of interest. The ~~Administrative Agent will promptly notify the Company, pursuant to Section 2.14(e), of any change to the reference rate upon which the interest rate on Eurocurrency Loans is based. However, the~~ Administrative Agent does not warrant or accept any responsibility for, and shall not have any liability with respect to, the administration, submission, performance or any other matter related to ~~the Daily Simple RFR, LIBOR, EURIBOR or other rates in the definition of "LIBO Rate" (or "EURIBO Rate", or "TIBO Rate", as applicable) or any interest rate used in this Agreement, or~~ with respect to any alternative or successor rate thereto, or replacement rate thereof ~~(including, without limitation, (i) any such alternative, successor or replacement rate implemented pursuant to Section 2.14(b) or Section 2.14(c), whether upon the occurrence of a Benchmark Transition Event, a Term SOFR Transition Event, an Early Opt in Election or an Other Benchmark Rate Election, and (ii) the implementation of any Benchmark Replacement Conforming Changes pursuant to Section 2.14(d)), including without limitation, whether the composition or characteristics of any such alternative, successor or replacement reference rate will be similar to, or produce the same value or economic equivalence of, the Daily Simple RFR, the LIBO Rate (or the EURIBO Rate, or the TIBO Rate, as applicable) existing~~existing interest rate being replaced or have the same volume or liquidity as did ~~LIBOR (or the euro interbank offered rate ("EURIBOR"), or the Tokyo interbank offered rate ("TIBOR"), as applicable) any existing interest rate~~ prior to its discontinuance or unavailability. The Administrative Agent and its affiliates and/or other related entities may engage in transactions that affect the calculation of any ~~Daily Simple RFR, interest rate used in this Agreement or~~ any alternative, successor or alternative rate (including any Benchmark Replacement) and/or any relevant adjustments thereto, in each case, in a manner adverse to the Company. The Administrative Agent may select information sources or services in its reasonable discretion to ascertain any ~~RFR, Daily Simple RFR or any rate with respect to any Eurocurrency Loan~~interest rate used in this Agreement, any component thereof, or rates referenced in the definition thereof, in each case pursuant to the terms of this Agreement, and shall have no liability to the Company, any Lender or any other person or entity for damages of any kind, including direct or indirect, special, punitive, incidental or consequential damages, costs, losses or expenses (whether in tort, contract or otherwise and whether at law or in equity), for any error or calculation of any such rate (or component thereof) provided by any such information source or service.

SECTION 1.07. Divisions. For all purposes under the Loan Documents, in connection with any division or plan of division under Delaware law (or any comparable event under a different jurisdiction's laws): (a) if any asset, right, obligation or liability of any Person becomes the asset, right, obligation or liability of a different Person, then it shall be deemed to have been transferred from the original Person to the subsequent Person, and (b) if any new Person comes into existence, such new Person shall be deemed to have been organized and acquired on the first date of its existence by the holders of its Equity Interests at such time.

SECTION 1.08. Pro Forma Adjustments for Acquisitions and Dispositions. To the extent the Company or any Subsidiary makes any Acquisition or Investment permitted pursuant to Section 6.04 or disposition of assets outside the ordinary course of business permitted by Section 6.03 during the period of four Fiscal Quarters of the Company most recently ended, the Leverage Ratio, the First Lien Leverage Ratio and Interest Coverage Ratio, and any other financial covenant or definition, shall be calculated after giving Pro Forma effect thereto, as if such Acquisition or Investment or such disposition (and any related incurrence, repayment or assumption of Indebtedness) had occurred in the first day of such four Fiscal Quarter period.

SECTION 1.09. Certain Calculations. For purposes of calculating any "net" ratio test utilized in any debt incurrence test (including any amounts permitted to be incurred pursuant to Section 2.20), such ratio shall be calculated after giving effect to any such incurrence on a Pro Forma Basis, and, in each case, with respect to any revolving credit commitments being established utilizing a debt incurrence test (including any Incremental Revolving Commitment), assuming a borrowing of the maximum amount of such revolving credit commitment (but for the avoidance of doubt, no other previously established revolving commitment), and such calculation shall be made excluding the cash proceeds from such incurrence from the amount of cash and Cash Equivalents that may be netted in the calculation of pro forma Leverage Ratio or First Lien Leverage Ratio, as applicable.

SECTION 1.10. Exchange Rates; Currency Equivalents.

(a) The Administrative Agent or the Issuing Bank, as applicable, shall determine the Dollar Amount of Borrowings or Letters of Credit denominated in Foreign Currencies on each Computation Date. Such Dollar Amount shall become effective as of such Computation Date and shall be the Dollar Amount of such amounts until the next Computation Date to occur. Except for purposes of financial statements delivered by the Company hereunder or calculating financial covenants hereunder or except as otherwise provided herein, the applicable amount of any Agreed Currency (other than Dollars) for purposes of the Loan Documents shall be such Dollar Amount as so determined by the Administrative Agent or the Issuing Bank, as applicable.

(b) Wherever in this Agreement in connection with a Borrowing, conversion, continuation or prepayment of a Eurocurrency Term Benchmark Loan or an RFR Loan or the issuance, amendment or extension of a Letter of Credit, an amount, such as a required minimum or multiple amount, is expressed in Dollars, but such Borrowing, Loan or Letter of Credit is denominated in a Foreign Currency, such amount shall be the Dollar Amount of such amount (rounded to the nearest unit of such Foreign Currency, with 0.5 of a unit being rounded upward), as determined by the Administrative Agent or the Issuing Bank, as the case may be.

ARTICLE II

The Credits

SECTION 2.01. Commitments. Prior to the Effective Date, certain loans were previously made to the Borrowers under the Existing Credit Agreement which remain outstanding as of the date of this Agreement (such outstanding loans being hereinafter referred to as the "Existing Loans"). Subject to the terms and conditions set forth in this Agreement, the Borrowers and each of the Lenders agree that on the Effective Date but subject to the satisfaction of the conditions precedent set forth in Section 4.01 and the reallocation and other transactions described in Section 1.05, the Existing Loans shall, as of the Effective Date, be reevidenced as Revolving Loans under this Agreement and the terms of the Existing Loans shall be restated in their entirety and shall be evidenced by this Agreement. Subject to the terms and conditions set forth herein, (a) each Revolving Lender (severally and not jointly) agrees

to make Revolving Loans to the Borrowers in Agreed Currencies from time to time during the Revolving Credit Availability Period in an aggregate principal amount that will not result (after giving effect to any application of proceeds of such Borrowing to any Swingline Loans outstanding pursuant to [Section 2.10\(a\)](#)) in, subject to [Sections 2.04](#) and [2.11\(b\)](#), (i) the Dollar Amount of such Lender's Revolving Credit Exposure exceeding such Lender's Revolving Commitment, (ii) the Dollar Amount of the Total Revolving Credit Exposure exceeding the aggregate Revolving Commitments, (iii) the Dollar Amount of the total outstanding Revolving Loans and LC Exposure, in each case denominated in Foreign Currencies, exceeding the Foreign Currency Sublimit or (iv) the total Revolving Credit Exposures in respect of Foreign Subsidiary Borrowers exceeding the Foreign Subsidiary Borrower Sublimit and (b) each Term Lender with a Term Loan Commitment (severally and not jointly) agrees to make a Term Loan to the Company in Dollars in a single drawing during the Term Loan Availability Period on the Omega Closing Date, in an amount equal to such Lender's Term Loan Commitment by making immediately available funds available to the Administrative Agent's designated account, not later than the time specified by the Administrative Agent. Within the foregoing limits and subject to the terms and conditions set forth herein, the Borrowers may borrow, prepay and reborrow Revolving Loans. Amounts repaid or prepaid in respect of Term Loans may not be reborrowed.

SECTION 2.02. [Loans and Borrowings](#). (a) Each Loan (other than a Swingline Loan) shall be made as part of a Borrowing consisting of Loans [of the same Class and Type](#) made by the applicable Lenders ratably in accordance with their respective Commitments of the applicable Class. The failure of any Lender to make any Loan required to be made by it shall not relieve any other Lender of its obligations hereunder; provided that the Commitments of the Lenders are several and no Lender shall be responsible for any other Lender's failure to make Loans as required. Any Swingline Loan shall be made in accordance with the procedures set forth in [Section 2.05](#). The Term Loans shall amortize as set forth in [Section 2.10](#).

(b) Subject to [Section 2.14](#), each Borrowing shall be comprised (i) in the case of Borrowings in Dollars, entirely of ABR Loans or [Eurocurrency Term Benchmark](#) Loans and (ii) in the case of Borrowings in any other Agreed Currency, entirely of [Eurocurrency Term Benchmark](#) Loans or RFR Loans, as applicable, in each case of the same Agreed Currency, as the relevant Borrower may request in accordance herewith; provided that each ABR Loan shall only be made in Dollars. Each Swingline Loan shall be an ABR Loan. Each Lender at its option may make any Loan by causing any domestic or foreign branch or Affiliate of such Lender to make such Loan (and in the case of an Affiliate, the provisions of [Sections 2.14](#), [2.15](#), [2.16](#) and [2.17](#) shall apply to such Affiliate to the same extent as to such Lender); provided that any exercise of such option shall not affect the obligation of the relevant Borrower to repay such Loan in accordance with the terms of this Agreement.

(c) At the commencement of each Interest Period for any [Eurocurrency Term Benchmark](#) Revolving Borrowing that is made to the Company, such Borrowing shall be in an aggregate amount that is an integral multiple of \$1,000,000 (or, if such Borrowing is denominated in (i) Japanese Yen, JPY 100,000,000 or (ii) a Foreign Currency other than Japanese Yen, 1,000,000 units of such currency) and not less than \$3,000,000 (or, if such Borrowing is denominated in (i) Japanese Yen, JPY 300,000,000 or (ii) a Foreign Currency other than Japanese Yen, 3,000,000 units of such currency). Subject to [paragraph \(e\)](#) of this [Section](#), at the commencement of each Interest Period for any [Eurocurrency Term Benchmark](#) Revolving Borrowing that is made to a Foreign Subsidiary Borrower, such Borrowing shall be in an aggregate amount that is an integral multiple of \$100,000 (or, if such Borrowing is denominated in (i) Japanese Yen, JPY 10,000,000 or (ii) a Foreign Currency other than Japanese Yen, 100,000 units of such currency) and not less than \$100,000 (or, if such Borrowing is denominated in (i) Japanese Yen, JPY 10,000,000 or (ii) a Foreign Currency other than Japanese Yen, 100,000 units of such currency). At the time that each ABR Revolving Borrowing and/or RFR Borrowing is made, such Borrowing shall be in an aggregate Dollar Amount that is an integral multiple

of \$500,000 and not less than \$1,000,000; provided that an ABR Revolving Borrowing may be in an aggregate amount that is equal to the entire unused balance of the aggregate Revolving Commitments or that is required to finance the reimbursement of an LC Disbursement as contemplated by Section 2.06(e). Each Swingline Loan shall be in an amount that is an integral multiple of \$500,000 and not less than \$500,000. Borrowings of more than one Type and Class may be outstanding at the same time; provided that there shall not at any time be more than a total of eight (8) EurocurrencyTerm Benchmark Borrowings or RFR Borrowings outstanding.

(d) Notwithstanding any other provision of this Agreement, no Borrower shall be entitled to request, or to elect to convert or continue, any Borrowing if the Interest Period requested with respect thereto would end after the applicable Maturity Date.

(e) An initial Borrowing from any Lender, and (to the extent before such initial Borrowing) any initial Letter of Credit issued under Section 2.06 by the Issuing Bank, to any Borrower that is organized under the laws of the Netherlands shall at all times be provided by a Lender that is a Dutch Non-Public Lender.

SECTION 2.03. Requests for Borrowings. To request a Borrowing, the applicable Borrower, or the Company on behalf of the applicable Borrower, shall notify the Administrative Agent of such request by irrevocable written notice (via a written Borrowing Request signed by the applicable Borrower, or the Company on behalf of the applicable Borrower) (a)(i) in the case of a EurocurrencyTerm Benchmark Borrowing denominated in Dollars, not later than 12:00 noon, New York City time, three (3) U.S. Government Securities Business Days before the date of the proposed Borrowing, (ii) in the case of a EurocurrencyTerm Benchmark Borrowing denominated in euro or Japanese Yen, not later than 12:00 noon, New York City time, three (3) Business Days before the date of the proposed Borrowing, (iii) in the case of an RFR Borrowing denominated in Pounds Sterling, not later than 11:00 a.m., New York City time, five (5) RFR Business Days before the date of the proposed Borrowing and (iv) in the case of an RFR Borrowing denominated in Swiss Francs, not later than 11:00 a.m., New York City time, five (5) RFR Business Days before the date of the proposed Borrowing or (b) in the case of an ABR Borrowing, not later than 11:00 a.m., Chicago time, on the Business Day of the proposed Borrowing; provided that any such notice of an ABR Revolving Borrowing to finance the reimbursement of an LC Disbursement as contemplated by Section 2.06(e) may be given not later than 10:00 a.m., Chicago time, on the date of the proposed Borrowing. Each Borrowing Request to fund an Acquisition permitted hereunder or other transaction may be conditioned upon such Acquisition or transaction, provided that any such conditioning shall not avoid any payment that may be owed under Section 2.16. Each such Borrowing Request shall specify the following information in compliance with Section 2.02:

- (i) the name of the applicable Borrower;
- (ii) the Agreed Currency and aggregate principal amount of the requested Borrowing;
- (iii) the date of such Borrowing, which shall be a Business Day;
- (iv) whether such Borrowing is to be an ABR Borrowing, a EurocurrencyTerm Benchmark Borrowing or an RFR Borrowing, and whether such Borrowing is to be a Revolving Borrowing or a Term Loan Borrowing;

(v) in the case of a Eurocurrency Term Benchmark Borrowing, the ~~Agreed Currency and~~ initial Interest Period to be applicable thereto, which shall be a period contemplated by the definition of the term "Interest Period"; and

(vi) the location and number of the applicable Borrower's account to which funds are to be disbursed, which shall comply with the requirements of Section 2.07.

If no election as to the currency of a Borrowing is specified, then the requested Borrowing shall be made in Dollars. If no election as to the Type of Borrowing is specified, then, in the case of a Borrowing denominated in Dollars, the requested Borrowing shall be an ABR Borrowing. If no Interest Period is specified with respect to any requested Eurocurrency Term Benchmark Borrowing, then the relevant Borrower shall be deemed to have selected an Interest Period of one (1) month's duration. Promptly following receipt of a Borrowing Request in accordance with this Section, the Administrative Agent shall advise each Lender of the details thereof and of the amount of such Lender's Loan to be made as part of the requested Borrowing. Notwithstanding anything to the contrary in this Section 2.03, any request for Omega Closing Date Loans to be made on the Omega Closing Date may be conditioned upon the consummation of the Omega Acquisition on such date.

SECTION 2.04. Determination of Dollar Amounts. The Administrative Agent or the Issuing Bank, as applicable, will determine the Dollar Amount of:

(a) any Loan denominated in a Foreign Currency, on each of the following: (i) the date of the Borrowing of such Loan and (ii) (A) with respect to any Term Benchmark Loan, each date of a conversion or continuation of such Loan pursuant to the terms of this Agreement, and (B) with respect to any RFR Loan, each date that is on the numerically corresponding day in each calendar month that is one month after the Borrowing of such Loan (or, if there is no such numerically corresponding day in such month, then the last day of such month).

(b) any Letter of Credit denominated in a Foreign Currency, on each of the following: (i) the date on which such Letter of Credit is issued, (ii) the first Business Day of each calendar month and (iii) the date of any amendment of such Letter of Credit that has the effect of increasing the face amount thereof, and

(c) any Credit Event, on any additional date as the Administrative Agent may determine at any time when an Event of Default exists.

Each day upon or as of which the Administrative Agent (or the Issuing Bank, as applicable) determines Dollar Amounts as described in the preceding clauses (a), (b) and (c) is herein described as a "Computation Date" with respect to each Credit Event for which a Dollar Amount is determined on or as of such day.

SECTION 2.05. Swingline Loans. (a) Subject to the terms and conditions set forth herein, the Swingline Lender may agree, but shall have no obligation, to make Swingline Loans in Dollars to the Company from time to time during the Revolving Credit Availability Period, in an aggregate principal amount at any time outstanding that will not result in (i) the aggregate principal amount of outstanding Swingline Loans exceeding \$30,000,000, (ii) the Swingline Lender's Revolving Credit Exposure exceeding its Revolving Commitment or (iii) the Dollar Amount of the Total Revolving Credit Exposure exceeding the aggregate Revolving Commitments; provided that the Swingline Lender shall not be required to make a Swingline Loan to refinance an outstanding Swingline Loan. Within the

Administrative Agent in Dollars the Dollar Amount equal to such LC Disbursement, calculated as of the date the Issuing Bank made such LC Disbursement (or if the Issuing Bank shall so elect in its sole discretion by notice to the Company, in such other Agreed Currency which was paid by the Issuing Bank pursuant to such LC Disbursement in an amount equal to such LC Disbursement) not later than 12:00 noon, Local Time, on the date that such LC Disbursement is made, if the Company shall have received notice of such LC Disbursement prior to 10:00 a.m., Local Time, on such date, or, if such notice has not been received by the Company prior to 10:00 a.m., Local Time on such date, then not later than 12:00 noon, Local Time, on the Business Day immediately following the day that the Company receives such notice; provided that, if such LC Disbursement is not less than the Dollar Amount of \$1,000,000, the Company may, subject to the conditions to borrowing set forth herein, request in accordance with Section 2.03 or 2.05 that such payment be financed with (i) to the extent such LC Disbursement was made in Dollars, an ABR Revolving Borrowing, EurocurrencyTerm Benchmark Revolving Borrowing or Swingline Loan in Dollars in an amount equal to such LC Disbursement or (ii) to the extent that such LC Disbursement was made in a Foreign Currency, a EurocurrencyTerm Benchmark Revolving Borrowing or an RFR Revolving Borrowing in such Foreign Currency in an amount equal to such LC Disbursement and, in each case, to the extent so financed, the Company's obligation to make such payment shall be discharged and replaced by the resulting ABR Revolving Borrowing, EurocurrencyTerm Benchmark Revolving Borrowing, RFR Revolving Borrowing or Swingline Loan, as applicable. If the Company fails to make such payment when due, the Administrative Agent shall notify each Revolving Lender of the applicable LC Disbursement, the payment then due from the Company in respect thereof and such Revolving Lender's Applicable Percentage thereof. Promptly following receipt of such notice, each Revolving Lender shall pay to the Administrative Agent its Applicable Percentage of the payment then due from the Company, in the same manner as provided in Section 2.07 with respect to Loans made by such Revolving Lender (and Section 2.07 shall apply, mutatis mutandis, to the payment obligations of the Revolving Lenders), and the Administrative Agent shall promptly pay to the Issuing Bank the amounts so received by it from the Revolving Lenders. Promptly following receipt by the Administrative Agent of any payment from the Company pursuant to this paragraph, the Administrative Agent shall distribute such payment to the Issuing Bank or, to the extent that Revolving Lenders have made payments pursuant to this paragraph to reimburse the Issuing Bank, then to such Revolving Lenders and the Issuing Bank as their interests may appear. Any payment made by a Revolving Lender pursuant to this paragraph to reimburse the Issuing Bank for any LC Disbursement (other than the funding of Revolving Loans or a Swingline Loan as contemplated above) shall not constitute a Loan and shall not relieve the Company of its obligation to reimburse such LC Disbursement. If the Company's reimbursement of, or obligation to reimburse, any amounts in any Foreign Currency would subject the Administrative Agent, the Issuing Bank or any Revolving Lender to any stamp duty, ad valorem charge or similar tax that would not be payable if such reimbursement were made or required to be made in Dollars, the Company shall, at its option, either (x) pay the amount of any such tax requested by the Administrative Agent, the Issuing Bank or the relevant Revolving Lender or (y) reimburse each LC Disbursement made in such Foreign Currency in Dollars, in an amount equal to the Dollar Amount thereof calculated on the date such LC Disbursement is made.

(f) Obligations Absolute. The Company's obligation to reimburse LC Disbursements as provided in paragraph (e) of this Section shall be absolute, unconditional and irrevocable, and shall be performed strictly in accordance with the terms of this Agreement under any and all circumstances whatsoever and irrespective of (i) any lack of validity or enforceability of any Letter of Credit, any Letter of Credit Agreement or this Agreement, or any term or provision therein or herein, (ii) any draft or other document presented under a Letter of Credit proving to be forged, fraudulent or invalid in any respect or any statement therein being untrue or inaccurate in any respect, (iii) any payment by the Issuing Bank under a Letter of Credit against presentation of a draft or other document that does not comply with the terms of such Letter of Credit, (iv) any other event or circumstance whatsoever, whether or not similar to any of the foregoing, that might, but for the

provisions of this Section, constitute a legal or equitable discharge of, or provide a right of setoff against, the Company's obligations hereunder or (v) any adverse change in the relevant exchange rates or in the availability of the relevant Foreign Currency to the Company or any Subsidiary or in the relevant currency markets generally. Neither the Administrative Agent, the Revolving Lenders nor the Issuing Bank, nor any of their respective Related Parties, shall have any liability or responsibility by reason of or in connection with the issuance or transfer of any Letter of Credit or any payment or failure to make any payment thereunder (irrespective of any of the circumstances referred to in the preceding sentence), or any error, omission, interruption, loss or delay in transmission or delivery of any draft, notice or other communication under or relating to any Letter of Credit (including any document required to make a drawing thereunder), any error in interpretation of technical terms, any error in translation or any consequence arising from causes beyond the control of the Issuing Bank. Notwithstanding anything to the contrary in this paragraph, nothing herein shall be construed to excuse the Issuing Bank from liability to the Company to the extent of any direct damages (as opposed to special, indirect, consequential or punitive damages, claims in respect of which are hereby waived by the Company to the extent permitted by applicable law) suffered by the Company that are caused by the Issuing Bank's failure to exercise care when determining whether drafts and other documents presented under a Letter of Credit comply with the terms thereof. The parties hereto expressly agree that, in the absence of gross negligence or willful misconduct on the part of the Issuing Bank (as finally determined by a court of competent jurisdiction), the Issuing Bank shall be deemed to have exercised care in each such determination. In furtherance of the foregoing and without limiting the generality thereof, the parties agree that, with respect to documents presented which appear on their face to be in substantial compliance with the terms of a Letter of Credit, the Issuing Bank may, in its sole discretion, either accept and make payment upon such documents without responsibility for further investigation, regardless of any notice or information to the contrary, or refuse to accept and make payment upon such documents if such documents are not in strict compliance with the terms of such Letter of Credit.

(g) Disbursement Procedures. The Issuing Bank shall, within the time allowed by applicable law or the specific terms of the applicable Letter of Credit following its receipt thereof, examine all documents purporting to represent a demand for payment under a Letter of Credit. The Issuing Bank shall promptly after such examination notify the Administrative Agent and the Company by telephone (confirmed by teletype or electronic mail) of such demand for payment and whether the Issuing Bank has made or will make an LC Disbursement thereunder; provided that any failure to give or delay in giving such notice shall not relieve the Company of its obligation to reimburse the Issuing Bank and the Revolving Lenders with respect to any such LC Disbursement.

(h) Interim Interest. If the Issuing Bank shall make any LC Disbursement, then, unless the Company shall reimburse such LC Disbursement in full on the date such LC Disbursement is made, the unpaid amount thereof shall bear interest, for each day from and including the date such LC Disbursement is made to but excluding the date that the Company reimburses such LC Disbursement, at the rate per annum then applicable to ABR Revolving Loans (or in the case such LC Disbursement is denominated in a Foreign Currency, at the Overnight Rate for such Agreed Currency plus the then effective Applicable Rate with respect to Eurocurrency Term Benchmark Revolving Loans); provided that, if the Company fails to reimburse such LC Disbursement when due pursuant to paragraph (e) of this Section, then Section 2.13(d) shall apply. Interest accrued pursuant to this paragraph shall be for the account of the Issuing Bank, except that interest accrued on and after the date of payment by any Revolving Lender pursuant to paragraph (e) of this Section to reimburse the Issuing Bank for such LC Disbursement shall be for the account of such Revolving Lender to the extent of such payment.

(i) Replacement and Resignation of the Issuing Bank. (A) The Issuing Bank may be replaced at any time by written agreement among the Company, the Administrative Agent, the replaced Issuing Bank and the successor Issuing Bank. The Administrative Agent shall notify the Revolving

occurrence of an Event of Default, such amount (to the extent not applied as aforesaid) shall be returned to the Company within three (3) Business Days after all such Events of Default have been cured or waived.

(k) Conversion. In the event that the Revolving Loans become immediately due and payable on any date pursuant to Article VII, all amounts (i) that the Company is at the time or thereafter becomes required to reimburse or otherwise pay to the Administrative Agent in respect of LC Disbursements made under any Foreign Currency Letter of Credit (other than amounts in respect of which the Company has deposited cash collateral pursuant to paragraph (j) above, if such cash collateral was deposited in the applicable Foreign Currency to the extent so deposited or applied), (ii) that the Revolving Lenders are at the time or thereafter become required to pay to the Administrative Agent and the Administrative Agent is at the time or thereafter becomes required to distribute to the Issuing Bank pursuant to paragraph (e) of this Section in respect of unreimbursed LC Disbursements made under any Foreign Currency Letter of Credit and (iii) of each Revolving Lender's participation in any Foreign Currency Letter of Credit under which an LC Disbursement has been made shall, automatically and with no further action required, be converted into the Dollar Amount thereof on such date (or in the case of any LC Disbursement made after such date, on the date such LC Disbursement is made), of such amounts. On and after such conversion, all amounts accruing and owed to the Administrative Agent, the Issuing Bank or any Revolving Lender in respect of the obligations described in this paragraph shall accrue and be payable in Dollars at the rates otherwise applicable hereunder.

(l) Letter of Credit Amounts. Unless otherwise specified herein, the amount of a Letter of Credit at any time shall be deemed to be the amount of such Letter of Credit available to be drawn at such time; provided that with respect to any Letter of Credit that, by its terms or the terms of any Letter of Credit Agreement related thereto, provides for one or more automatic increases in the available amount thereof, the amount of such Letter of Credit shall be deemed to be the maximum amount of such Letter of Credit after giving effect to all such increases, whether or not such maximum amount is available to be drawn at such time.

(m) Letters of Credit Issued for Account of Subsidiaries. Notwithstanding that a Letter of Credit issued or outstanding hereunder supports any obligations of, or is for the account of, a Subsidiary, or states that a Subsidiary is the "account party," "applicant," "customer," "instructing party," or the like of or for such Letter of Credit, and without derogating from any rights of the Issuing Bank (whether arising by contract, at law, in equity or otherwise) against such Subsidiary in respect of such Letter of Credit, the Company (i) shall reimburse, indemnify and compensate the Issuing Bank hereunder for such Letter of Credit (including to reimburse any and all drawings thereunder) as if such Letter of Credit had been issued solely for the account of the Company and (ii) irrevocably waives any and all defenses that might otherwise be available to it as a guarantor or surety of any or all of the obligations of such Subsidiary in respect of such Letter of Credit (other than the defense of payment and performance in full in cash). The Company hereby acknowledges that the issuance of such Letters of Credit for its Subsidiaries inures to the benefit of the Company, and that the Company's business derives substantial benefits from the businesses of such Subsidiaries.

SECTION 2.07. Funding of Borrowings. (a) Each Lender shall make each Loan to be made by it hereunder on the proposed date thereof (which shall be the Omega Closing Date in the case of the Term Loans) solely by wire transfer of immediately available funds (i) in the case of Loans denominated in Dollars, by 12:00 noon, Chicago time, to the account of the Administrative Agent most recently designated by it for such purpose by notice to the Lenders and (ii) in the case of each Loan denominated in a Foreign Currency, by 12:00 noon, Local Time, in the city of the Administrative Agent's Eurocurrency Foreign Currency Payment Office for such currency and at such Eurocurrency Foreign Currency Payment Office for such currency; provided (i) Term Loans shall be made as provided in

Section 2.01(b) and (ii) that Swingline Loans shall be made as provided in Section 2.05. Except in respect of the provisions of this Agreement covering the reimbursement of Letters of Credit, the Administrative Agent will make such Loans available to the relevant Borrower by promptly crediting the funds so received in the aforesaid account of the Administrative Agent to (x) an account of such Borrower maintained with the Administrative Agent in New York City or Chicago and designated by such Borrower in the applicable Borrowing Request, in the case of Loans denominated in Dollars and (y) an account of such Borrower in the relevant jurisdiction and designated by such Borrower in the applicable Borrowing Request, in the case of Loans denominated in a Foreign Currency; provided that Revolving Loans made to finance the reimbursement of an LC Disbursement as provided in Section 2.06(e) shall be remitted by the Administrative Agent to the Issuing Bank.

(b) Unless the Administrative Agent shall have received notice from a Lender prior to the proposed date of any Borrowing (or in the case of an ABR Borrowing, prior to 12:00 noon, Chicago time, on the date of such Borrowing) that such Lender will not make available to the Administrative Agent such Lender's share of such Borrowing, the Administrative Agent may assume that such Lender has made such share available on such date in accordance with paragraph (a) of this Section and may, in reliance upon such assumption, make available to the relevant Borrower a corresponding amount. In such event, if a Lender has not in fact made its share of the applicable Borrowing available to the Administrative Agent, then the applicable Lender and such Borrower severally agree to pay to the Administrative Agent forthwith on demand such corresponding amount with interest thereon, for each day from and including the date such amount is made available to such Borrower to but excluding the date of payment to the Administrative Agent, at (i) in the case of such Lender, the greater of the applicable Overnight Rate and a rate determined by the Administrative Agent in accordance with banking industry rules on interbank compensation or (ii) in the case of such Borrower, the interest rate applicable to ABR Loans, or in the case of Foreign Currencies, in accordance with such market practice, in each case, as applicable. If such Lender pays such amount to the Administrative Agent, then such amount shall constitute such Lender's Loan included in such Borrowing.

SECTION 2.08. Interest Elections. (a) Each Borrowing initially shall be of the Type and Agreed Currency specified in the applicable Borrowing Request and, in the case of a Eurocurrency Term Benchmark Borrowing, shall have an initial Interest Period as specified in such Borrowing Request. Thereafter, the relevant Borrower may elect to convert such Borrowing to a different Type or to continue such Borrowing and, in the case of a Eurocurrency Term Benchmark Borrowing, may elect Interest Periods therefor, all as provided in this Section. A Borrower may elect different options with respect to different portions of the affected Borrowing, in which case each such portion shall be allocated ratably among the Lenders holding the Loans comprising such Borrowing, and the Loans comprising each such portion shall be considered a separate Borrowing. This Section shall not apply to Swingline Borrowings, which may not be converted or continued.

(b) To make an election pursuant to this Section, a Borrower, or the Company on its behalf, shall notify the Administrative Agent of such election (by irrevocable written notice via an Interest Election Request signed by such Borrower, or the Company on its behalf) by the time that a Borrowing Request would be required under Section 2.03 if such Borrower were requesting a Borrowing of the Type resulting from such election to be made on the effective date of such election. Notwithstanding any contrary provision herein, this Section shall not be construed to permit any Borrower to (i) change the currency of any Borrowing, (ii) elect an Interest Period for Eurocurrency Term Benchmark Loans that does not comply with Section 2.02(d) or (iii) convert any Borrowing to a Borrowing of a Type not available under the Class of Commitments pursuant to which such Borrowing was made.

(c) Each Interest Election Request shall specify the following information in compliance with Section 2.02:

(i) the name of the applicable Borrower, the Agreed Currency and principal amount of the Borrowing to which such Interest Election Request applies and, if different options are being elected with respect to different portions thereof, the portions thereof to be allocated to each resulting Borrowing (in which case the information to be specified pursuant to clauses (iii) and (iv) below shall be specified for each resulting Borrowing);

(ii) the effective date of the election made pursuant to such Interest Election Request, which shall be a Business Day;

(iii) whether the resulting Borrowing is to be an ABR Borrowing ~~or a Eurocurrency~~(in the case of Borrowings denominated in Dollars), a Term Benchmark Borrowing or an RFR Borrowing; and

(iv) if the resulting Borrowing is a ~~Eurocurrency~~Term Benchmark Borrowing, the Interest Period ~~and Agreed Currency~~ to be applicable thereto after giving effect to such election, which Interest Period shall be a period contemplated by the definition of the term "Interest Period".

If any such Interest Election Request requests a ~~Eurocurrency~~Term Benchmark Borrowing but does not specify an Interest Period, then the applicable Borrower shall be deemed to have selected an Interest Period of one month's duration.

(d) Promptly following receipt of an Interest Election Request, the Administrative Agent shall advise each Lender of the details thereof and of such Lender's portion of each resulting Borrowing.

(e) If the relevant Borrower fails to deliver a timely Interest Election Request with respect to a ~~Eurocurrency~~Term Benchmark Borrowing denominated in Dollars prior to the end of the Interest Period applicable thereto, then, unless such Borrowing is repaid as provided herein, at the end of such Interest Period such Borrowing shall be converted to an ABR Borrowing at the end of such Interest Period. If the relevant Borrower fails to deliver a timely and complete Interest Election Request with respect to a ~~Eurocurrency~~Term Benchmark Borrowing denominated in a Foreign Currency prior to the end of the Interest Period applicable thereto, then, unless such Term Benchmark Borrowing is repaid as provided herein, the relevant Borrower shall be deemed to have selected that such ~~Eurocurrency~~Term Benchmark Borrowing shall automatically be continued as a ~~Eurocurrency~~Term Benchmark Borrowing in its original Agreed Currency with an Interest Period of one (1) month at the end of such Interest Period. Notwithstanding any contrary provision hereof, if an Event of Default has occurred and is continuing and the Administrative Agent, at the request of the Required Lenders, so notifies the Company, then, so long as an Event of Default is continuing (i) no outstanding Borrowing may be converted to or continued as a ~~Eurocurrency~~Term Benchmark Borrowing and (ii) unless repaid, ~~(xv)~~ each ~~Eurocurrency~~Term Benchmark Borrowing and each RFR Borrowing, in each case, denominated in Dollars shall be converted to an ABR Borrowing (in the case of a Term Benchmark Borrowing) at the end of the Interest Period applicable thereto or (in the case of an RFR Borrowing) on the next Interest Payment Date in respect thereof and (y) each EurocurrencyTerm Benchmark Borrowing and each RFR Borrowing, in each case, denominated in a Foreign Currency shall bear interest at the Central Bank Rate for the applicable Agreed Currency plus the CBR Spread (or in the case of Japanese Yen, the Japanese Prime Rate plus the Applicable Rate applicable to ABR Revolving Loans); provided that, if the Administrative Agent determines (which determination shall be

conclusive and binding absent manifest error) that the Central Bank Rate for the applicable Agreed Currency (or in the case of Japanese Yen, the Japanese Prime Rate) cannot be determined, any outstanding affected Eurocurrency Term Benchmark Loans or RFR Loans denominated in any Foreign Currency shall either be (A) converted to an ABR Borrowing denominated in Dollars (in an amount equal to the Dollar Amount of such Foreign Currency) at the end of the Interest Period or on the Interest Payment Date, as applicable, therefor or (B) prepaid at the end of the applicable Interest Period or on the Interest Payment Date, as applicable, in full; provided that if no election is made by the relevant Borrower by the earlier of (x) the date that is three (3) Business Days after receipt by the relevant Borrower of such notice and (y) the last day of the current Interest Period for the applicable Eurocurrency Term Benchmark Loan, the relevant Borrower shall be deemed to have elected clause (A) above.

(f) Notwithstanding anything in this Agreement or any other Loan Document to the contrary, interest on all "Eurocurrency Loans" (as defined in this Agreement immediately prior to the Amendment No. 1 Effective Date) denominated in Dollars outstanding under this Agreement immediately prior to the Amendment No. 1 Effective Date shall continue to accrue and be paid based upon the "Adjusted LIBO Rate" (as defined in this Agreement immediately prior to the Amendment No. 1 Effective Date) applicable pursuant to the terms of this Agreement immediately prior to the Amendment No. 1 Effective Date solely until the expiration of the current "Interest Period" (as defined in this Agreement immediately prior to the Amendment No. 1 Effective Date) applicable thereto (at which time such Loans may be reborrowed as or converted to ABR Borrowings or Term Benchmark Borrowings, as applicable, in accordance with this Section 2.08).

SECTION 2.09. Termination and Reduction of Commitments. (a) Unless previously terminated, (i) the Term Loan Commitments shall terminate on the Term Loan Commitment Expiration Date and (ii) the Revolving Commitments shall terminate on the Revolving Credit Maturity Date. On the Omega Closing Date (after giving effect to the funding of the Term Loans to be made on such date), the Term Loan Commitment of each Lender shall terminate.

(b) The Company may at any time terminate, or from time to time reduce, the Commitments; provided that (i) each reduction of the Revolving Commitments or the Term Loan Commitments, as applicable, shall be in an amount that is an integral multiple of \$5,000,000 and not less than \$10,000,000 (or, if less, the remaining amount of the Revolving Commitments or the Term Loan Commitments, as applicable) and (ii) the Company shall not terminate or reduce the Revolving Commitments if, after giving effect to any concurrent prepayment of the Revolving Loans in accordance with Section 2.11, (A) the Dollar Amount of any Lender's Revolving Credit Exposure would exceed its Revolving Commitment or (B) the Dollar Amount of the Total Revolving Credit Exposure would exceed the aggregate Revolving Commitments.

(c) The Company shall notify the Administrative Agent of any election to terminate or reduce the Revolving Commitments or the Term Loan Commitments under paragraph (b) of this Section at least three (3) Business Days prior to the effective date of such termination or reduction, specifying such election and the effective date thereof. Promptly following receipt of any notice, the Administrative Agent shall advise the Lenders of the applicable Class of the contents thereof. Each notice delivered by the Company pursuant to this Section shall be irrevocable; provided that a notice of termination of the Revolving Commitments or the Term Loan Commitments delivered by the Company may state that such notice is conditioned upon the effectiveness of other credit facilities or other transactions specified therein, in which case such notice may be revoked by the Company (by notice to the Administrative Agent on or prior to the specified effective date) if such condition is not satisfied. Any termination or reduction of the Commitments shall be permanent. Each reduction of the

shall use commercially reasonable efforts to cause each such promissory note be returned to the applicable Borrower at the request of such Borrower.

SECTION 2.11. Prepayment of Loans.

(a) Any Borrower shall have the right at any time and from time to time to prepay any Borrowing in whole or in part without premium or penalty (except as provided in Section 2.16) and any such payment shall be applied as directed by the Company, subject to prior notice in accordance with the provisions of this Section 2.11(a). The applicable Borrower, or the Company on behalf of the applicable Borrower, shall notify the Administrative Agent (and, in the case of prepayment of a Swingline Loan, the Swingline Lender) by written notice of any prepayment hereunder (i)(w) in the case of prepayment of a Eurocurrency Term Benchmark Borrowing denominated in Dollars, not later than 11:00 a.m., Local Time, 12:00 noon, New York City time, three (3) Business Days before the date of prepayment, (x) in the case of prepayment of a Eurocurrency Term Benchmark Borrowing denominated in euro or Japanese Yen, not later than 12:00 noon, New York City time, ~~four~~three (43) Business Days before the date of prepayment, (y) in the case of prepayment of an RFR Borrowing denominated in Pounds Sterling, not later than 12:00 noon, New York City time, five (5) RFR Business Days before the date of prepayment and (z) in the case of prepayment of an RFR Borrowing denominated in Swiss Francs, not later than 12:00 noon, New York City time, five (5) RFR Business Days before the date of prepayment, (ii) in the case of prepayment of an ABR Borrowing, not later than 11:00 a.m., Chicago time, on the date of prepayment or (iii) in the case of prepayment of a Swingline Loan, not later than 12:00 noon, Chicago time, on the date of prepayment. Each such notice shall be irrevocable and shall specify the prepayment date and the principal amount of each Borrowing or portion thereof to be prepaid; provided that, if a notice of prepayment is given in connection with a conditional notice of termination of the Commitments as contemplated by Section 2.09, then such notice of prepayment may be revoked if such notice of termination is revoked in accordance with Section 2.09. Promptly following receipt of any such notice relating to a Borrowing, the Administrative Agent shall advise the Lenders of the contents thereof. Each partial prepayment of any Borrowing shall be in an amount that would be permitted in the case of an advance of a Borrowing of the same Type as provided in Section 2.02. Each prepayment of a Revolving Borrowing shall be applied ratably to the Revolving Loans included in the prepaid Revolving Borrowing, each voluntary prepayment of a Term Loan Borrowing shall be applied ratably to the Term Loans included in the prepaid Term Loan Borrowing in such order of application as directed by the Company, and each mandatory prepayment of a Term Loan Borrowing shall be applied in accordance with Section 2.11(d). Prepayments shall be accompanied by (i) accrued interest to the extent required by Section 2.13 and (ii) any break funding payments required by Section 2.16.

(b) If at any time, (i) other than as a result of fluctuations in currency exchange rates, (A) the aggregate principal Dollar Amount of the Total Revolving Credit Exposure (calculated, with respect to those Credit Events denominated in Foreign Currencies, as of the most recent Computation Date with respect to each such Credit Event) exceeds the aggregate Revolving Commitments or such sum in respect of Foreign Subsidiary Borrowers exceeds the Foreign Subsidiary Borrower Sublimit or (B) the aggregate principal Dollar Amount of the Total Revolving Credit Exposure denominated in Foreign Currencies (the "Foreign Currency Exposure") (so calculated), as of the most recent Computation Date with respect to each such Credit Event, exceeds the Foreign Currency Sublimit or (ii) solely as a result of fluctuations in currency exchange rates, (A) the aggregate principal Dollar Amount of the Total Revolving Credit Exposure (so calculated) exceeds 105% of the aggregate Revolving Commitments or such sum in respect of Foreign Subsidiary Borrowers exceeds 105% of the Foreign Subsidiary Borrower Sublimit or (B) the Foreign Currency Exposure, as of the most recent Computation Date with respect to each such Credit Event, exceeds 105% of the Foreign Currency Sublimit, the Borrowers shall in each case immediately repay Revolving Borrowings or, if required after the payment of all Borrowings, cash collateralize LC Exposure in an account with the Administrative

SECTION 2.12. **Fees.** (a) The Company agrees to pay to the Administrative Agent for the account of each Revolving Lender a commitment fee, which shall accrue at the Applicable Rate on the average daily unused Dollar Amount of the Revolving Commitment of such Revolving Lender during the period from and including the Effective Date to but excluding the date on which such Revolving Commitment terminates. Accrued commitment fees shall be payable in arrears on the fifteenth (15th) day immediately following the last day of March, June, September and December of each year and on the date on which the Revolving Commitments terminate, commencing on the first such date to occur after the date hereof. All commitment fees shall be computed on the basis of a year of 360 days and shall be payable for the actual number of days elapsed (including the first day and the last day of each period but excluding the date on which the Revolving Commitments terminate). For purposes of computing commitment fees, (i) the Revolving Commitment of a Revolving Lender (other than the Swingline Lender) shall be deemed to be used to the extent of the outstanding Revolving Loans and LC Exposure of such Revolving Lender, and (ii) the Revolving Commitment of the Revolving Lender acting as Swingline Lender shall be deemed to be used to the extent of the outstanding Revolving Loans, LC Exposure and Swingline Loans of such Revolving Lender.

(b) The Company agrees to pay (i) to the Administrative Agent for the account of each Revolving Lender a participation fee with respect to its participations in each outstanding Letter of Credit, which shall accrue on the daily maximum amount then available to be drawn under such Letter of Credit at the same Applicable Rate used to determine the interest rate applicable to [Eurocurrency Term Benchmark](#) Revolving Loans, during the period from and including the Effective Date to but excluding the later of the date on which such Revolving Lender's Revolving Commitment terminates and the date on which such Revolving Lender ceases to have any LC Exposure, and (ii) to the Issuing Bank for its own account a fronting fee, which shall accrue at the rate of 0.125% per annum on the daily maximum amount then available to be drawn under each Letter of Credit during the period from and including the Effective Date to but excluding the later of the date of termination of the Revolving Commitments and the date on which there ceases to be any LC Exposure, as well as the Issuing Bank's standard fees with respect to the issuance, amendment or extension of any Letter of Credit and other processing fees, and other standard costs and charges, of such Issuing Bank relating to the Letters of Credit as from time to time in effect. Unless otherwise specified above, participation fees and fronting fees accrued through and including the last day of March, June, September and December of each year shall be payable on the fifteenth (15th) day following such last day, commencing on the first such date to occur after the Effective Date; provided that all such fees shall be payable on the date on which the Revolving Commitments terminate and any such fees accruing after the date on which the Revolving Commitments terminate shall be payable on demand. Any other fees payable to the Issuing Bank pursuant to this paragraph shall be payable within ten (10) days after invoice. All participation fees and fronting fees shall be computed on the basis of a year of 360 days and shall be payable for the actual number of days elapsed (including the first day but excluding the last day). Participation fees and fronting fees in respect of Letters of Credit denominated in Dollars shall be paid in Dollars, and participation fees and fronting fees in respect of Letters of Credit denominated in a Foreign Currency shall be paid in Dollars in the Dollar Amount thereof.

(c) The Company agrees to pay to the Administrative Agent, for its own account, fees payable in the amounts and at the times separately agreed upon between the Company and the Administrative Agent.

(d) All fees payable hereunder shall be paid on the dates due, in Dollars and immediately available funds, to the Administrative Agent (or to the Issuing Bank, in the case of fees payable to it) for distribution, in the case of commitment fees and participation fees, to the applicable Lenders. Fees paid shall not be refundable under any circumstances.

SECTION 2.13. Interest. (a) The Loans comprising each ABR Borrowing (including each Swingline Loan) shall bear interest at the Alternate Base Rate plus the Applicable Rate.

(b) The Loans comprising each Eurocurrency Term Benchmark Borrowing shall bear interest at the Adjusted LIBO Term SOFR Rate, the Adjusted EURIBO Rate or the Adjusted TIBO Rate, as applicable, for the Interest Period in effect for such Borrowing plus the Applicable Rate.

(c) Each RFR Loan shall bear interest at a rate per annum equal to the applicable Adjusted Daily Simple RFR plus the Applicable Rate.

(d) Notwithstanding the foregoing, if any principal of or interest on any Loan or any fee or other amount payable by any Borrower hereunder is not paid when due, whether at stated maturity, upon acceleration or otherwise, such overdue amount shall bear interest, after as well as before judgment, at a rate per annum equal to (i) in the case of overdue principal of any Loan, 2% plus the rate otherwise applicable to such Loan as provided in the preceding paragraphs of this Section or (ii) in the case of any other amount, 2% plus the rate applicable to ABR Loans as provided in paragraph (a) of this Section.

(e) Accrued interest on each Loan shall be payable in arrears on each Interest Payment Date for such Loan and, (x) in the case of Revolving Loans, upon termination of the Revolving Commitments and (y) in the case of Term Loans, on the Term Loan Maturity Date; provided that (i) interest accrued pursuant to paragraph (d) of this Section shall be payable on demand, (ii) in the event of any repayment or prepayment of any Loan (other than a prepayment of an ABR Loan prior to the end of the Revolving Credit Availability Period or the Term Loan Maturity Date, as applicable), accrued interest on the principal amount repaid or prepaid shall be payable on the date of such repayment or prepayment and (iii) in the event of any conversion of any Eurocurrency Term Benchmark Loan prior to the end of the current Interest Period therefor, accrued interest on such Loan shall be payable on the effective date of such conversion.

(f) ~~Interest computed by reference to the LIBO Rate, the EURIBO Rate or Daily Simple RFR with respect to Swiss Francs~~ All interest hereunder shall be computed on the basis of a year of 360 days ~~—Interest, except that interest~~ computed by reference to the Daily Simple RFR with respect to Pounds Sterling, the TIBO Rate or the Alternate Base Rate only at times when the Alternate Base Rate is based on the Prime Rate shall be computed on the basis of a year of 365 days (or 366 days in a leap year). In each case interest shall be payable for the actual number of days elapsed (including the first day but excluding the last day). All interest hereunder on any Loan shall be computed on a daily basis based upon the outstanding principal amount of such Loan as of the applicable date of determination. ~~The~~ A determination of the applicable Alternate Base Rate, Adjusted LIBO Term SOFR Rate, LIBO Term SOFR Rate, Adjusted EURIBO Rate, EURIBO Rate, Adjusted TIBO Rate, TIBO Rate ~~or, Adjusted~~ Daily Simple RFR, Daily Simple RFR or Japanese Prime Rate shall be determined by the Administrative Agent, and such determination shall be conclusive absent manifest error.

(g) Interest in respect of Loans denominated in Dollars shall be paid in Dollars, and interest in respect of Loans denominated in a Foreign Currency shall be paid in such Foreign Currency.

SECTION 2.14. Alternate Rate of Interest.

(a) Subject to clauses (b), (c), (d), (e), and (f) and (g) of this Section 2.14.2.14, if:

(i) ~~if~~ the Administrative Agent reasonably determines (which determination shall be conclusive absent manifest error) (A) prior to the commencement of any Interest Period for a

Eurocurrency Term Benchmark Borrowing, that adequate and reasonable means do not exist for ascertaining the Adjusted ~~LIBO Rate, the LIBO Term SOFR~~ Rate, the Adjusted EURIBO Rate, ~~the EURIBO Rate, or~~ the Adjusted ~~TIBO Rate or the~~ TIBO Rate (including because the Relevant Screen Rate is not available or published on a current basis); for the applicable Agreed Currency and such Interest Period or (B) at any time, that adequate and reasonable means do not exist for ascertaining the applicable Adjusted Daily Simple RFR ~~or RFR~~ for the applicable Agreed Currency; or

(ii) ~~if~~ the Administrative Agent is advised by the Required Lenders that (A) prior to the commencement of any Interest Period for a Eurocurrency Term Benchmark Borrowing, the Adjusted ~~LIBO Rate, the LIBO Term SOFR~~ Rate, the Adjusted EURIBO Rate, ~~the EURIBO Rate, or~~ the Adjusted ~~TIBO Rate or the~~ TIBO Rate for the applicable Agreed Currency and such Interest Period will not adequately and fairly reflect the cost to such Lenders of making or maintaining their Loans included in such Borrowing for the applicable Agreed Currency and such Interest Period or (B) at any time, the applicable Adjusted Daily Simple RFR ~~or RFR~~ for the applicable Agreed Currency will not adequately and fairly reflect the cost to such Lenders of making or maintaining their Loans included in such Borrowing for the applicable Agreed Currency;

then the Administrative Agent shall give notice thereof to the Company and the Lenders by telephone, telecopy or electronic mail as promptly as practicable thereafter and, until (x) the Administrative Agent notifies the Company and the Lenders that the circumstances giving rise to such notice no longer exist; ~~(i) with respect to the relevant Benchmark and (y) the applicable Borrower delivers a new Interest Election Request in accordance with the terms of Section 2.08 or a new Borrowing Request in accordance with the terms of Section 2.03, (A) for Loans denominated in Dollars, any Interest Election Request that requests the conversion of any Borrowing to, or continuation of any Borrowing as, a Eurocurrency Term Benchmark Borrowing shall be ineffective, (ii) if and~~ any Borrowing Request ~~that~~ requests a ~~Eurocurrency Borrowing in Dollars, such Borrowing shall be made as an ABR Borrowing and (iii) if~~ Term Benchmark Borrowing shall instead be deemed to be an Interest Election Request or a Borrowing Request, as applicable, for (x) an RFR Borrowing denominated in Dollars so long as the Adjusted Daily Simple RFR for Dollar Borrowings is not also the subject of Section 2.14(a)(i) or (ii) above or (y) an ABR Borrowing if the Adjusted Daily Simple RFR for Dollar Borrowings also is the subject of Section 2.14(a)(i) or (ii) above and (B) for Loans denominated in a Foreign Currency, any Interest Election Request that requests the conversion of any Borrowing to, or continuation of any Borrowing as, a Term Benchmark Borrowing and any Borrowing Request that requests a Eurocurrency Term Benchmark Borrowing or an RFR Borrowing, in each case, for the relevant rate above in a Foreign Currency, then such request shall be Benchmark, shall be ineffective; provided that if the circumstances giving rise to such notice affect only one Type of ~~Borrowings~~ Borrowing, then all other Types of Borrowings shall be permitted. Furthermore, if any Eurocurrency Term Benchmark Loan or RFR Loan in any Agreed Currency is outstanding on the date of the Company's receipt of the notice from the Administrative Agent referred to in this Section 2.14(a) with respect to a Relevant Rate applicable to such Eurocurrency Term Benchmark Loan or RFR Loan, then until (x) the Administrative Agent notifies the Company and the Lenders that the circumstances giving rise to such notice no longer exist; ~~(1) if such Eurocurrency Loan is with respect to the relevant Benchmark and (y) the applicable Borrower delivers a new Interest Election Request in accordance with the terms of Section 2.08 or a new Borrowing Request in accordance with the terms of Section 2.03, (A) for Loans denominated in Dollars, then any Term Benchmark Loan shall~~ on the last day of the Interest Period applicable to such ~~Eurocurrency Loan (or the next succeeding Business Day if such day is not a Business Day), such Eurocurrency Loan, be converted by the Administrative Agent to, and shall constitute, (x) an RFR Borrowing denominated in Dollars so long as the Adjusted Daily Simple RFR for Dollar Borrowings is not~~

also the subject of Section 2.14(a)(i) or (ii) above or (y) an ABR Loan if the Adjusted Daily Simple RFR for Dollar Borrowings also is the subject of Section 2.14(a)(i) or (ii) above, on such day, (B) for Term Benchmark Loans denominated in Japanese Yen, on the last day of the Interest Period applicable to such Term Benchmark Loan such Term Benchmark Loan shall be converted by the Administrative Agent to, and shall constitute, an ABRa Loan denominated in Dollars on such day, (2) if such Eurocurrency Loan is denominated in any Agreed that bears interest at the Japanese Prime Rate plus the Applicable Rate applicable to ABR Revolving Loans and (C) for Loans denominated in a Foreign Currency other than Dollars, then such Eurocurrency Japanese Yen, (1) any Term Benchmark Loan shall, on the last day of the Interest Period applicable to such Eurocurrency Loan (or the next succeeding Business Day if such day is not a Business Day) bear interest at the Central Bank Rate for the applicable Agreed Foreign Currency plus the Applicable Rate CBR Spread; provided that, if the Administrative Agent determines (which determination shall be conclusive and binding absent manifest error) that the Central Bank Rate for the applicable Agreed Foreign Currency (or in the case of Japanese Yen, the Japanese Prime Rate) cannot be determined, any outstanding affected Eurocurrency Term Benchmark Loans denominated in any Agreed such Foreign Currency other than Dollars shall, at the applicable Borrower's election prior to such day: (A) be prepaid by such the applicable Borrower on such day or (B) solely for the purpose of calculating the interest rate applicable to such Eurocurrency Term Benchmark Loan, such Eurocurrency Term Benchmark Loan denominated in any Agreed such Foreign Currency other than Dollars shall be deemed to be a Eurocurrency Term Benchmark Loan denominated in Dollars and shall accrue interest at the same interest rate applicable to Eurocurrency Term Benchmark Loans denominated in Dollars at such time or and (32) if such RFR Loan is denominated in any Agreed Currency other than Dollars, then such any RFR Loan shall bear interest at the Central Bank Rate for the applicable Agreed Foreign Currency plus the Applicable Rate CBR Spread; provided that, if the Administrative Agent determines (which determination shall be conclusive and binding absent manifest error) that the Central Bank Rate for the applicable Agreed Foreign Currency cannot be determined, any outstanding affected RFR Loans denominated in any Agreed Foreign Currency, at the applicable Borrower's election, shall either (xA) be converted into ABR Loans denominated in Dollars (in an amount equal to the Dollar Amount of such Foreign Currency) immediately or (yB) be prepaid in full immediately.

(b) Notwithstanding anything to the contrary herein or in any other Loan Document, if a Benchmark Transition Event, ~~an Early Opt-in Election or an Other Benchmark Rate Election, as applicable,~~ and its related Benchmark Replacement Date have occurred prior to the Reference Time in respect of any setting of the then-current Benchmark, then (x) if a Benchmark Replacement is determined in accordance with clause (1) ~~or (2)~~ of the definition of "Benchmark Replacement" with respect to Dollars for such Benchmark Replacement Date, such Benchmark Replacement will replace such Benchmark for all purposes hereunder and under any Loan Document in respect of such Benchmark setting and subsequent Benchmark settings without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document and (y) if a Benchmark Replacement is determined in accordance with clause (32) of the definition of "Benchmark Replacement" with respect to any Agreed Currency for such Benchmark Replacement Date, such Benchmark Replacement will replace such Benchmark for all purposes hereunder and under any Loan Document in respect of any Benchmark setting at or after 5:00 p.m., New York City time, on the fifth (5th) Business Day after the date notice of such Benchmark Replacement is provided to the Lenders without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document so long as the Administrative Agent has not received, by such time, written notice of objection to such Benchmark Replacement from Lenders comprising the Required Lenders.

~~(c) Notwithstanding anything to the contrary herein or in any other Loan Document and subject to the proviso below in this paragraph, with respect to a Loan denominated in Dollars, if a Term SOFR Transition Event and its related Benchmark Replacement Date have~~

~~occurred prior to the Reference Time in respect of any setting of the then-current Benchmark; then the applicable Benchmark Replacement will replace the then-current Benchmark for all purposes hereunder or under any Loan Document in respect of such Benchmark setting and subsequent Benchmark settings, without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document; provided that, this clause (c) shall not be effective unless the Administrative Agent has delivered to the Lenders and the Company a Term SOFR Notice. For the avoidance of doubt, the Administrative Agent shall not be required to deliver a Term SOFR Notice after the occurrence of a Term SOFR Transition Event and may do so in its sole discretion.~~

~~(c)~~ ~~(d)~~ In connection with the implementation of a Benchmark Replacement, the Administrative Agent will have the right to make Benchmark Replacement Conforming Changes from time to time and, notwithstanding anything to the contrary herein or in any other Loan Document, any amendments implementing such Benchmark Replacement Conforming Changes will become effective without any further action or consent of any other party to this Agreement or any other Loan Document.

~~(d)~~ ~~(e)~~ The Administrative Agent will promptly notify the Company and the Lenders of (i) any occurrence of a Benchmark Transition Event, ~~an Early Opt-in Election or an Other Benchmark Rate Election, as applicable,~~ (ii) the implementation of any Benchmark Replacement, (iii) the effectiveness of any Benchmark Replacement Conforming Changes, (iv) the removal or reinstatement of any tenor of a Benchmark pursuant to clause ~~(e)~~ below and (v) the commencement or conclusion of any Benchmark Unavailability Period. Any determination, decision or election that may be made by the Administrative Agent or, if applicable, any Lender (or group of Lenders) pursuant to this Section 2.14, including any determination with respect to a tenor, rate or adjustment or of the occurrence or non-occurrence of an event, circumstance or date and any decision to take or refrain from taking any action or any selection, will be conclusive and binding absent manifest error and may be made in its or their sole discretion and without consent from any other party to this Agreement or any other Loan Document, except, in each case, as expressly required pursuant to this Section 2.14.

~~(e)~~ ~~(f)~~ Notwithstanding anything to the contrary herein or in any other Loan Document, at any time (including in connection with the implementation of a Benchmark Replacement), (i) if the then-current Benchmark is a term rate (including the Term SOFR, ~~the LIBO~~ Rate, the EURIBO Rate or the TIBO Rate) and either (A) any tenor for such Benchmark is not displayed on a screen or other information service that publishes such rate from time to time as selected by the Administrative Agent in its reasonable discretion or (B) the regulatory supervisor for the administrator of such Benchmark has provided a public statement or publication of information announcing that any tenor for such Benchmark is or will be no longer representative, then the Administrative Agent may modify the definition of "Interest Period" for any Benchmark settings at or after such time to remove such unavailable or non-representative tenor and (ii) if a tenor that was removed pursuant to clause (i) above either (A) is subsequently displayed on a screen or information service for a Benchmark (including a Benchmark Replacement) or (B) is not, or is no longer, subject to an announcement that it is or will no longer be representative for a Benchmark (including a Benchmark Replacement), then the Administrative Agent may modify the definition of "Interest Period" for all Benchmark settings at or after such time to reinstate such previously removed tenor.

~~(f)~~ ~~(g)~~ Upon the Company's receipt of notice of the commencement of a Benchmark Unavailability Period, the applicable Borrower may revoke any request for a Eurocurrency Term Benchmark Borrowing or RFR Borrowing of, conversion to or continuation of Eurocurrency Term Benchmark Loans to be made, converted or continued during any Benchmark Unavailability Period and, failing that, either (x) the applicable Borrower will be deemed to have converted any request for a Eurocurrency Term Benchmark Borrowing denominated in Dollars into a request for a Borrowing of

or conversion to ~~ABR Loans~~ (A) an RFR Borrowing denominated in Dollars so long as the Adjusted Daily Simple RFR for Dollar Borrowings is not the subject of a Benchmark Transition Event or (B) an ABR Borrowing if the Adjusted Daily Simple RFR for Dollar Borrowings is the subject of a Benchmark Transition Event or (y) any request for a Eurocurrency Term Benchmark Borrowing or ~~an~~ RFR Borrowing denominated in a Foreign Currency shall be ineffective. During any Benchmark Unavailability Period or at any time that a tenor for the then-current Benchmark is not an Available Tenor, the component of ABR based upon the then-current Benchmark or such tenor for such Benchmark, as applicable, will not be used in any determination of ABR. Furthermore, if any Eurocurrency Term Benchmark Loan or RFR Loan in any Agreed Currency is outstanding on the date of the Company's receipt of notice of the commencement of a Benchmark Unavailability Period with respect to a Relevant Rate applicable to such Eurocurrency Term Benchmark Loan or RFR Loan, then until such time as a Benchmark Replacement for such Agreed Currency is implemented pursuant to this Section 2.14, ~~(iA) if such Eurocurrency Loan is for Loans~~ denominated in Dollars, then any Term Benchmark Loan shall on the last day of the Interest Period applicable to such Eurocurrency Loan (or the next succeeding Business Day if such day is not a Business Day), such Eurocurrency Loan, be converted by the Administrative Agent to, and shall constitute, (x) an RFR Borrowing denominated in Dollars so long as the Adjusted Daily Simple RFR for Dollar Borrowings is not the subject of a Benchmark Transition Event or (y) an ABR Loan if the Adjusted Daily Simple RFR for Dollar Borrowings is the subject of a Benchmark Transition Event, on such day, (B) for Loans denominated in Japanese Yen, on the last day of the Interest Period applicable to such Term Benchmark Loan such Term Benchmark Loan shall be converted by the Administrative Agent to, and shall constitute, an ABRa Loan that bears interest at the Japanese Prime Rate plus the Applicable Rate applicable to ABR Loans and (C) for Loans denominated in ~~Dollars on such day, (ii) if such Eurocurrency Loan is denominated in any Agreed~~ a Foreign Currency other than ~~Dollars, then such Eurocurrency Japanese Yen, (1) any Term Benchmark Loan shall, on the last day of the Interest Period applicable to such Eurocurrency Loan (or the next succeeding Business Day if such day is not a Business Day) bear interest at the Central Bank Rate for the applicable Agreed Foreign Currency plus the Applicable Rate CBR Spread; provided that, if the Administrative Agent determines (which determination shall be conclusive and binding absent manifest error) that the Central Bank Rate for the applicable Agreed Foreign Currency (or in the case of Japanese Yen, the Japanese Prime Rate) cannot be determined, any outstanding affected Eurocurrency Term Benchmark Loans denominated in any Agreed Foreign Currency ~~other than Dollars~~ shall, at the applicable Borrower's election prior to such day: (A) be prepaid by the applicable Borrower on such day or (B) solely for the purpose of calculating the interest rate applicable to such Eurocurrency Term Benchmark Loan, such Eurocurrency Term Benchmark Loan denominated in any Agreed Foreign Currency ~~other than Dollars~~ shall be deemed to be a Eurocurrency Term Benchmark Loan denominated in Dollars and shall accrue interest at the same interest rate applicable to Eurocurrency Term Benchmark Loans denominated in Dollars at such time ~~or (iii) if such RFR Loan is denominated in any Agreed Currency other than Dollars, then such~~ and (2) any RFR Loan shall bear interest at the Central Bank Rate for the applicable Agreed Foreign Currency plus the Applicable Rate CBR Spread; provided that, if the Administrative Agent determines (which determination shall be conclusive and binding absent manifest error) that the Central Bank Rate for the applicable Agreed Foreign Currency cannot be determined, any outstanding affected RFR Loans denominated in any Agreed Foreign Currency, at the applicable Borrower's election, shall either (A) be converted into ABR Loans denominated in Dollars (in an amount equal to the Dollar Amount of such Foreign Currency) immediately or (B) be prepaid in full immediately.~~

SECTION 2.15. Increased Costs. (a) If any Change in Law shall:

(i) impose, modify or deem applicable any reserve, special deposit, liquidity or similar requirement (including any compulsory loan requirement, insurance charge or other

assessment) against assets of, deposits with or for the account of, or credit extended by, any Lender (except any such reserve requirement reflected in the Adjusted ~~LIBO Rate~~, the Adjusted EURIBO Rate or the Adjusted TIBO Rate, as applicable) or the Issuing Bank;

(ii) impose on any Lender or the Issuing Bank or the London or other applicable offshore interbank market for the applicable Agreed Currency any other condition, cost or expense affecting this Agreement or Loans made by such Lender or any Letter of Credit or participation therein; or

(iii) subject any Recipient to any Taxes on its loans, loan principal, letters of credit, commitments, or other obligations, or its deposits, reserves, other liabilities or capital attributable thereto (other than the imposition or change in rate of any (A) Indemnified Taxes, (B) Excluded Taxes or (C) Other Taxes);

and the result of any of the foregoing shall be to increase the cost to such Person of making, continuing, converting or maintaining any Loan or of maintaining its obligation to make any such Loan or to increase the cost to such Person of participating in, issuing or maintaining any Letter of Credit or to reduce the amount of any sum received or receivable by such Person hereunder, whether of principal, interest or otherwise, then the applicable Borrower will pay to such Person such additional amount or amounts as will compensate such Person for such additional costs incurred or reduction suffered as reasonably determined by such Person (which determination shall be made in good faith (and not on an arbitrary or capricious basis) and generally consistent with similarly situation customers of such Person and in each case as determined by such Person) under agreements having provisions similar to this Section 2.15, after consideration of such factors as such Person then reasonably determines to be relevant.

(b) If any Lender or the Issuing Bank reasonably determines that any Change in Law regarding capital or liquidity requirements has or would have the effect of reducing the rate of return on such Lender's or the Issuing Bank's capital or on the capital of such Lender's or the Issuing Bank's holding company, if any, as a consequence of this Agreement or the Loans made by, or participations in Letters of Credit or Swingline Loans held by, such Lender, or the Letters of Credit issued by the Issuing Bank, to a level below that which such Lender or the Issuing Bank or such Lender's or the Issuing Bank's holding company could have achieved with respect thereto but for such Change in Law (taking into consideration such Lender's or the Issuing Bank's policies and the policies of such Lender's or the Issuing Bank's holding company with respect to capital adequacy and liquidity), then from time to time the applicable Borrower will pay to such Lender or the Issuing Bank, as the case may be, such additional amount or amounts as will compensate such Lender or the Issuing Bank or such Lender's or the Issuing Bank's holding company for any such reduction suffered as reasonably determined by such Lender or the Issuing Bank (which determination shall be made in good faith (and not on an arbitrary or capricious basis) and generally consistent with similarly situated customers of such Lender or the Issuing Bank, as applicable and in each case as determined by such Lender or the Issuing Bank under agreements having provisions similar to this Section 2.15, after consideration of such factors as such Lender or the Issuing Bank, as applicable, then reasonably determines to be relevant).

(c) A certificate of a Lender or the Issuing Bank describing the Change in Law in reasonable detail and setting forth the amount or amounts necessary to compensate such Lender or the Issuing Bank or its holding company, as the case may be, as specified in paragraph (a) or (b) of this Section shall be delivered to the Company and shall be conclusive absent manifest error. The Company shall pay, or cause the other Borrowers to pay, such Lender or the Issuing Bank, as the case may be, the amount shown as due on any such certificate within 30 days after receipt thereof.

(d) Failure or delay on the part of any Lender or the Issuing Bank to demand compensation pursuant to this Section shall not constitute a waiver of such Lender's or the Issuing Bank's right to demand such compensation; provided that the Company shall not be required to compensate a Lender or the Issuing Bank pursuant to this Section for any increased costs or reductions incurred more than 180 days prior to the date that such Lender or the Issuing Bank, as the case may be, notifies the Company of the Change in Law giving rise to such increased costs or reductions and of such Lender's or the Issuing Bank's intention to claim compensation therefor; provided further that, if the Change in Law giving rise to such increased costs or reductions is retroactive, then the 180-day period referred to above shall be extended to include the period of retroactive effect thereof.

SECTION 2.16. Break Funding Payments.

(a) With respect to ~~Loans that are not RFR~~ Term Benchmark Loans, in the event of (i) the payment of any principal of any Eurocurrency Term Benchmark Loan other than on the last day of an Interest Period applicable thereto (including as a result of an Event of Default or as a result of any prepayment pursuant to Section 2.11), (ii) the conversion of any Eurocurrency Term Benchmark Loan other than on the last day of the Interest Period applicable thereto, (iii) the failure to borrow, convert, continue or prepay any Eurocurrency Term Benchmark Loan on the date specified in any notice delivered pursuant hereto (regardless of whether such notice may be revoked under Section 2.11(a) and is revoked in accordance therewith), (iv) the assignment of any Eurocurrency Term Benchmark Loan other than on the last day of the Interest Period applicable thereto as a result of a request by the Company pursuant to Section 2.19 or 9.02(e) or (v) the failure by any Borrower to make any payment of any Loan or drawing under any Letter of Credit (or interest due thereof) denominated in a Foreign Currency on its scheduled due date or any payment thereof in a different currency, then, in any such event, the Borrowers shall compensate each Lender for the loss, cost and expense attributable to such event; provided that each such Lender shall use reasonable efforts to mitigate such loss, cost and expense in accordance with Section 2.19. Such loss, cost or expense to any Lender shall be deemed to include an amount determined by such Lender to be the excess, if any, of (x) the amount of interest which would have accrued on the principal amount of such Loan had such event not occurred, at the Adjusted ~~LIBO Rate, the Adjusted~~ EURIBO Rate or the Adjusted TIBO Rate, as applicable, that would have been applicable to such Loan, for the period from the date of such event to the last day of the then current Interest Period therefor (or, in the case of a failure to borrow, convert or continue, for the period that would have been the Interest Period for such Loan), over (y) the amount of interest which would accrue on such principal amount for such period at the interest rate which such Lender would bid were it to bid, at the commencement of such period, for deposits in the relevant Agreed Currency of a comparable amount and period from other banks in the applicable offshore market for such Agreement Currency, whether or not such Eurocurrency Term Benchmark Loan was in fact so funded. A certificate of any Lender setting forth any amount or amounts that such Lender is entitled to receive pursuant to this Section, including, if requested by the Company, a description in reasonable detail of the basis for such compensation and a calculation of such amount or amounts (but excluding any confidential or proprietary information of such Lender), shall be delivered to the applicable Borrower and shall be conclusive absent manifest error. The applicable Borrower shall pay such Lender the amount shown as due on any such certificate within thirty (30) days after receipt thereof.

(b) With respect to RFR Loans, in the event of (i) the payment of any principal of any RFR Loan other than on the Interest Payment Date applicable thereto (including as a result of an Event of Default or as a result of any prepayment pursuant to Section 2.11), (ii) the failure to borrow, ~~convert, continue~~ or prepay any RFR Loan on the date specified in any notice delivered pursuant hereto (regardless of whether such notice may be revoked under Section 2.11(a) and is revoked in accordance therewith), (iii) the assignment of any RFR Loan other than on the Interest Payment Date applicable thereto as a result of a request by the Company pursuant to Section 2.19 or 9.02(e) or (iv) the failure by

Participant Register) and any reasonable expenses arising therefrom or with respect thereto, whether or not such amounts were correctly or legally imposed or asserted by the relevant Governmental Authority. The indemnity under this Section 2.17(g) shall be paid within ten (10) days after the Administrative Agent delivers to the applicable Lender a certificate stating the amount so paid or payable by the Administrative Agent. Such certificate shall be conclusive of the amount so paid or payable absent manifest error. Each Lender hereby authorizes the Administrative Agent to set off and apply any and all amounts at any time owing to such Lender under any Loan Document or otherwise payable by the Administrative Agent to the Lender from any other source against any amount due to the Administrative Agent under this paragraph (g).

(h) If a payment made to a Lender under this Agreement would be subject to U.S. federal withholding Tax imposed by FATCA if such Lender were to fail to comply with the applicable reporting requirements of FATCA (including those contained in Section 1471(b) or 1472(b) of the Code, as applicable), such Lender shall deliver to the Company and the Administrative Agent, at the time or times prescribed by law and at such time or times reasonably requested by the Company or the Administrative Agent, such documentation prescribed by applicable law (including as prescribed by Section 1471(b)(3)(C)(i) of the Code) and such additional documentation reasonably requested by the Company or the Administrative Agent as may be necessary for each Borrower and the Administrative Agent to comply with its obligations under FATCA, to determine that such Lender has or has not complied with such Lender's obligations under FATCA or, as necessary, to determine the amount to deduct and withhold from such payment. Solely for purposes of this Section 2.17(h), "FATCA" shall include any amendments made to FATCA after the date of this Agreement.

(i) For purposes of determining withholding Taxes imposed under FATCA, the Borrowers and the Administrative Agent shall treat (and the Lenders hereby authorize the Administrative Agent to treat) this Agreement and the Loans as not qualifying as "grandfathered obligations" within the meaning of Treasury Regulation Section 1.1471-2(b)(2)(i).

(j) For the purposes of this Section 2.17, references to "Lender" includes the Issuing Bank.

SECTION 2.18. Payments Generally; Allocation of Proceeds; Pro Rata Treatment; Sharing of Set-offs.

(a) (i) Except with respect to principal of and interest on Loans denominated in a Foreign Currency, each Borrower shall make each payment required to be made by it hereunder (whether of principal, interest, fees or reimbursement of LC Disbursements, or of amounts payable under Section 2.15, 2.16 or 2.17, or otherwise) in Dollars prior to 12:00 noon, Chicago time, on the date when due or the date fixed for any prepayment hereunder and (ii) all payments with respect to principal and interest on Loans denominated in a Foreign Currency shall be made in such Foreign Currency not later than the Applicable Time specified by the Administrative Agent on the dates specified herein, in each case, in immediately available funds, without setoff, recoupment or counterclaim (but without prejudice to any Borrowers' rights with respect to any Defaulting Lender hereunder). Any amounts received after such time on any date may, in the discretion of the Administrative Agent, be deemed to have been received on the next succeeding Business Day for purposes of calculating interest thereon. All such payments shall be made (i) in the same currency in which the applicable Credit Event was made (or where such currency has been converted to euro, in euro) and (ii) to the Administrative Agent at its offices at 10 South Dearborn Street, Chicago, Illinois 60603 or, in the case of a Credit Event denominated in a Foreign Currency, the Administrative Agent's ~~Eurocurrency~~Foreign Currency Payment Office for such currency, except payments to be made directly to the Issuing Bank or the Swingline Lender as expressly provided herein and except that payments pursuant to Sections 2.15, 2.16,

2.17 and 9.03 shall be made directly to the Persons entitled thereto. The Administrative Agent shall distribute any such payments denominated in the same currency received by it for the account of any other Person to the appropriate recipient promptly following receipt thereof. If any payment hereunder shall be due on a day that is not a Business Day, the date for payment shall be extended to the next succeeding Business Day, and, in the case of any payment accruing interest, interest thereon shall be payable for the period of such extension. Notwithstanding the foregoing provisions of this Section, if, after the making of any Credit Event in any Foreign Currency, currency control or exchange regulations are imposed in the country which issues such currency with the result that the type of currency in which the Credit Event was made (the "Original Currency") no longer exists or any Borrower is not able to make payment to the Administrative Agent for the account of the Lenders in such Original Currency, then all payments to be made by such Borrower hereunder in such currency shall instead be made when due in Dollars in an amount equal to the Dollar Amount (as of the date of repayment) of such payment due, it being the intention of the parties hereto that the Borrowers take all risks of the imposition of any such currency control or exchange regulations.

(b) All payments and any proceeds of Collateral received by the Administrative Agent (i) not constituting either (A) a specific payment of principal, interest, fees or other sum payable under the Loan Documents (which shall be applied as specified by the Company) or (B) a mandatory prepayment (which shall be applied in accordance with Section 2.11) or (ii) after an Event of Default has occurred and is continuing and the Administrative Agent so elects or the Required Lenders so direct, shall be applied ratably first, to pay any fees, indemnities, or expense reimbursements including amounts then due to the Administrative Agent and the Issuing Bank from any Borrower, second, to pay any fees or expense reimbursements then due to the Lenders from any Borrower, third, to pay interest then due and payable on the Loans ratably, fourth, to prepay principal on the Loans and unreimbursed LC Disbursements and any other amounts owing with respect to Banking Services Obligations and Swap Obligations ratably, fifth, to pay an amount to the Administrative Agent equal to one hundred five percent (105%) of the aggregate undrawn face amount of all outstanding Letters of Credit and the aggregate amount of any unpaid LC Disbursements, to be held as cash collateral for such Obligations, and sixth, to the payment of any other Secured Obligation due to the Administrative Agent or any Lender by any Borrower. Notwithstanding the foregoing, amounts received from any Loan Party shall not be applied to any Excluded Swap Obligation of such Loan Party. Notwithstanding anything to the contrary contained in this Agreement, unless so directed by the Company, or unless an Event of Default is in existence, none of the Administrative Agent or any Lender shall apply any payment which it receives to any Eurocurrency Term Benchmark Loan of a Class, except (a) on the expiration date of the Interest Period applicable to any such Eurocurrency Term Benchmark Loan or (b) in the event, and only to the extent, that there are no outstanding ABR Loans of the same Class and, in any event, the Borrowers shall pay the break funding payment required in accordance with Section 2.16. The Administrative Agent and the Lenders shall have the continuing and exclusive right to apply and reverse and reapply any and all such proceeds and payments to any portion of the Secured Obligations. Notwithstanding the foregoing, (x) any such applicable proceeds from property of the Domestic Loan Parties shall be applied to the Secured Obligations (other than the Foreign Secured Obligations and the Secured Obligations that constitute a Guarantee of the Foreign Secured Obligations) before being applied to any of the Foreign Secured Obligations and (y) the application of any such applicable proceeds from Collateral securing solely the Foreign Secured Obligations shall only be made in respect of the Foreign Secured Obligations in the same order set forth above.

(c) At the election of the Administrative Agent, all payments of principal, interest, LC Disbursements, fees, premiums, reimbursable expenses (including, without limitation, all reimbursement for fees and expenses pursuant to Section 9.03), and other sums payable under the Loan Documents, may be paid from the proceeds of Borrowings made hereunder whether made following a request by a Borrower (or the Company on behalf of a Borrower) pursuant to Section 2.03 or a deemed

request as provided in this Section or may be deducted from any deposit account of such Borrower maintained with the Administrative Agent. Each Borrower hereby irrevocably authorizes (i) the Administrative Agent to make a Borrowing for the purpose of paying each payment of principal, interest and fees as it becomes due hereunder or any other amount due under the Loan Documents and agrees that all such amounts charged shall constitute Loans (including Swingline Loans) and that all such Borrowings shall be deemed to have been requested pursuant to Section 2.03 or 2.05, as applicable, and (ii) if an Event of Default exists or the Company agrees in writing, the Administrative Agent to charge any deposit account of the relevant Borrower maintained with the Administrative Agent for each payment of principal, interest and fees as it becomes due hereunder or any other amount due under the Loan Documents.

(d) If any Lender shall, by exercising any right of set-off or counterclaim or otherwise, obtain payment in respect of any principal of or interest on any of its Loans or participations in LC Disbursements or Swingline Loans resulting in such Lender receiving payment of a greater proportion of the aggregate amount of its Loans and participations in LC Disbursements and Swingline Loans and accrued interest thereon than the proportion received by any other Lender, then the Lender receiving such greater proportion shall purchase (for cash at face value) participations in the Loans and participations in LC Disbursements and Swingline Loans of other Lenders to the extent necessary so that the benefit of all such payments shall be shared by the Lenders ratably in accordance with the aggregate amount of principal of and accrued interest on their respective Loans and participations in LC Disbursements and Swingline Loans; provided that (i) if any such participations are purchased and all or any portion of the payment giving rise thereto is recovered, such participations shall be rescinded and the purchase price restored to the extent of such recovery, without interest, and (ii) the provisions of this paragraph shall not be construed to apply to any payment made by any Borrower pursuant to and in accordance with the express terms of this Agreement or any payment obtained by a Lender as consideration for the assignment of or sale of a participation in any of its Loans or participations in LC Disbursements and Swingline Loans to any assignee or participant, other than to the Company or any Subsidiary or Affiliate thereof (as to which the provisions of this paragraph shall apply). Each Borrower consents to the foregoing and agrees, to the extent it may effectively do so under applicable law, that any Lender acquiring a participation pursuant to the foregoing arrangements may exercise against such Borrower rights of set-off and counterclaim with respect to such participation as fully as if such Lender were a direct creditor of such Borrower under this Agreement in the amount of such participation.

(e) Unless the Administrative Agent shall have received, prior to any date on which any payment is due to the Administrative Agent for the account of the relevant Lenders or the Issuing Bank pursuant to the terms of this Agreement or any other Loan Document (including any date that is fixed for prepayments by notice from the applicable Borrower to the Administrative Agent pursuant to Section 2.11(ba)), notice from the applicable Borrower that such Borrower will not make such payment or prepayment, the Administrative Agent may assume that such Borrower has made such payment on such date in accordance herewith and may, in reliance upon such assumption, distribute to the relevant Lenders or the Issuing Bank, as the case may be, the amount due. In such event, if such Borrower has not in fact made such payment, then each of the relevant Lenders or the Issuing Bank, as the case may be, severally agrees to repay to the Administrative Agent forthwith on demand the amount so distributed to such Lender or Issuing Bank with interest thereon, for each day from and including the date such amount is distributed to it to but excluding the date of payment to the Administrative Agent, at the applicable Overnight Rate.

(f) If any Lender shall fail to make any payment required to be made by it pursuant to Section 2.05(c), 2.06(d) or (e), 2.07(b), 2.18(e) or 9.03(c), then the Administrative Agent may, in its discretion (notwithstanding any contrary provision hereof), (i) apply any amounts thereafter received by the Administrative Agent for the account of such Lender and for the benefit of the Administrative Agent,

organizational power and authority of the Borrowers to borrow hereunder after giving effect to such increase or Incremental Term Loan and (y) reaffirmations from the Loan Parties; provided that no Incremental Term Loans in respect of a Limited Conditionality Acquisition shall become effective unless (1) as of the date of execution of the Limited Conditionality Acquisition Agreement by the parties thereto, no Default or Event of Default shall have occurred and be continuing or would result from entry into the Limited Conditionality Acquisition Agreement, (2) as of the date of the borrowing of such Incremental Term Loans, no Event of Default under [Section 7.01\(a\), \(b\), \(h\), \(i\) or \(j\)](#) is in existence immediately before or after giving effect (including on a Pro Forma Basis) to such borrowing and to any concurrent transactions and any substantially concurrent use of proceeds thereof, (3) the representations and warranties of each Loan Party set forth in the Loan Documents shall be true and correct in all material respects (or, in the case of any representation or warranty qualified by materiality or Material Adverse Effect, in all respects) as of the date of execution of the applicable Limited Conditionality Acquisition Agreement by the parties thereto, (4) as of the date of the borrowing of such Incremental Term Loans, customary "Sungard" representations and warranties (with such representations and warranties to be reasonably determined by the Lenders providing such Incremental Term Loans) shall be true and correct in all material respects (or, in the case of any representation or warranty qualified by materiality or Material Adverse Effect, in all respects) immediately prior to, and after giving effect to, the incurrence of such Incremental Term Loans and (5) as of the date of execution of the related Limited Conditionality Acquisition Agreement by the parties thereto, the Company shall be in compliance (on a Pro Forma Basis) with the covenants contained in [Section 6.11](#). On the effective date of any increase in the Revolving Commitments or any Incremental Term Loans being made, (i) each relevant Increasing Lender and Augmenting Lender shall make available to the Administrative Agent such amounts in immediately available funds as the Administrative Agent shall determine, for the benefit of the other Lenders, as being required in order to cause, after giving effect to such increase and the use of such amounts to make payments to such other Lenders, each Lender's portion of the outstanding Revolving Loans of all the Lenders to equal its Applicable Percentage of such outstanding Revolving Loans, and (ii) except in the case of any Incremental Term Loans, the Borrowers shall be deemed to have repaid and reborrowed all outstanding Revolving Loans as of the date of any increase in the Revolving Commitments (with such reborrowing to consist of the Types of Revolving Loans, with related Interest Periods if applicable, specified in a notice delivered by the applicable Borrower, or the Company on behalf of the applicable Borrower, in accordance with the requirements of [Section 2.03](#)). The deemed payments made pursuant to clause (ii) of the immediately preceding sentence shall be accompanied by payment of all accrued interest on the amount prepaid and, in respect of each [Eurocurrency Term Benchmark](#) Loan, shall be subject to indemnification by the Borrowers pursuant to the provisions of [Section 2.16](#) if the deemed payment occurs other than on the last day of the related Interest Periods. The Incremental Term Loans (a) shall rank pari passu or junior in right of payment and/or security, as applicable, with the Revolving Loans and the initial Term Loans, (b) shall not be guaranteed by any Person which is not a Loan Party or secured by any assets other than the Collateral, (c) shall not mature earlier than the Term Loan Maturity Date (without giving effect to any prepayment thereof), (d) shall not have a shorter the Weighted Average Life to Maturity than the remaining Weighted Average Life to Maturity of any then-existing tranche of Term Loans (but, in case of clauses (c) and (d) above, may have amortization and customary prepayment requirements prior to such date) and (e) shall otherwise be treated substantially the same as (and in any event no more favorably than) the Revolving Loans and the initial Term Loans; provided that (i) the terms and conditions applicable to any tranche of Incremental Term Loans maturing after the Term Loan Maturity Date may provide for material additional or different financial or other covenants applicable only during periods after the Term Loan Maturity Date, (ii) the Incremental Term Loans may be priced (including as to any fees, original issue discount and interest) differently than the Revolving Loans and the initial Term Loans, as determined by the Company and the applicable Increasing Lenders and/or Augmenting Lenders at such time and (iii) to the extent the terms and conditions applicable to any tranche of Incremental Term Loans are not consistent with the existing Revolving Commitments or Term Loans (except to the extent permitted by [clauses \(c\) or \(d\)](#) above or

clauses (i) or (ii) to this proviso), they shall be reasonably satisfactory to the Administrative Agent. Incremental Term Loans may be made hereunder pursuant to an amendment or restatement (an "Incremental Term Loan Amendment") of this Agreement and, as appropriate, the other Loan Documents, executed by the Borrowers, each Increasing Lender participating in such tranche, each Augmenting Lender participating in such tranche, if any, and the Administrative Agent. The proceeds of the Incremental Facilities shall be used for general corporate purposes of the Company and its subsidiaries, including permitted acquisitions, investments and other uses not prohibited by the Loan Documents. The Incremental Term Loan Amendment may, without the consent of any other Lenders, effect such amendments to this Agreement and the other Loan Documents as may be necessary or appropriate, in the reasonable opinion of the Administrative Agent, to effect the provisions of this Section 2.20. Nothing contained in this Section 2.20 shall constitute, or otherwise be deemed to be, a commitment on the part of any Lender to increase its Revolving Commitment hereunder, or provide Incremental Term Loans, at any time.

SECTION 2.21. Market Disruption. Notwithstanding the satisfaction of all conditions referred to in Article II and Article IV with respect to any Credit Event to be effected in any Foreign Currency, if (i) there shall occur on or prior to the date of such Credit Event any change in national or international financial, political or economic conditions or currency exchange rates or exchange controls which would in the reasonable opinion of the Administrative Agent, the Issuing Bank (if such Credit Event is a Letter of Credit) or the Required Lenders make it impracticable for the Eurocurrency Term Benchmark Borrowings or Letters of Credit comprising such Credit Event to be denominated in the Agreed Currency specified by the applicable Borrower or (ii) the Dollar Amount of such currency is not readily calculable, then the Administrative Agent shall forthwith give notice thereof to such Borrower, the Lenders and, if such Credit Event is a Letter of Credit, the Issuing Bank, and such Credit Events shall not be denominated in such Agreed Currency but shall, except as otherwise set forth in Section 2.07, be made on the date of such Credit Event in Dollars, (a) if such Credit Event is a Borrowing, in an aggregate principal amount equal to the Dollar Amount of the aggregate principal amount specified in the related Credit Event Request or Interest Election Request, as the case may be, as ABR Loans, unless such Borrower notifies the Administrative Agent at least one Business Day before such date that (i) it elects not to borrow on such date or (ii) it elects to borrow on such date in a different Agreed Currency, as the case may be, in which the denomination of such Loans would in the reasonable opinion of the Administrative Agent and the Required Lenders be practicable and in an aggregate principal amount equal to the Dollar Amount of the aggregate principal amount specified in the related Credit Event Request or Interest Election Request, as the case may be or (b) if such Credit Event is a Letter of Credit, in a face amount equal to the Dollar Amount of the face amount specified in the related request or application for such Letter of Credit, unless such Borrower notifies the Administrative Agent at least one (1) Business Day before such date that (i) it elects not to request the issuance of such Letter of Credit on such date or (ii) it elects to have such Letter of Credit issued on such date in a different Agreed Currency, as the case may be, in which the denomination of such Letter of Credit would in the reasonable opinion of the Issuing Bank, the Administrative Agent and the Required Lenders be practicable and in face amount equal to the Dollar Amount of the face amount specified in the related request or application for such Letter of Credit, as the case may be.

SECTION 2.22. Judgment Currency. If for the purposes of obtaining judgment in any court it is necessary to convert a sum due from any Borrower hereunder in the currency expressed to be payable herein (the "specified currency") into another currency, the parties hereto agree, to the fullest extent that they may effectively do so, that the rate of exchange used shall be that at which in accordance with normal banking procedures the Administrative Agent could purchase the specified currency with such other currency at the Administrative Agent's main New York City office on the Business Day preceding that on which final, non appealable judgment is given. The obligations of each Borrower in respect of any sum due to any Lender or the Administrative Agent hereunder shall, notwithstanding any

obligation is expressly permitted elsewhere in this Section 6.01, and (iv) under the Beryllium Contracts;

(g) Indebtedness arising under Swap Agreements having a Net Mark-to-Market Exposure not exceeding \$50,000,000 at any time, which amount shall include the Swap Agreements in existence on the Effective Date;

(h) Indebtedness arising under Permitted Precious Metals Agreements in an aggregate principal amount not to exceed ~~\$600,000,000~~ \$615,000,000 at any time outstanding;

(i) unsecured Indebtedness of the Company (including unsecured Subordinated Indebtedness to the extent subordinated to the Secured Obligations on terms reasonably acceptable to the Administrative Agent) in the form of publicly issued notes, to the extent not otherwise permitted under this Section 6.01, and any Indebtedness of the Company constituting refinancings, renewals or replacements of any such Indebtedness; provided that (i) both immediately prior to and after giving effect (including giving effect on a Pro Forma Basis) thereto, no Default or Event of Default shall exist or would result therefrom, (ii) such Indebtedness matures after, and does not require any scheduled amortization or other scheduled payments of principal prior to, the date that is 181 days after any Revolving Credit Maturity Date, any Term Loan Maturity Date and any maturity date of any Incremental Term Loan in effect on the date of incurrence of such Indebtedness (it being understood that any provision requiring an offer to purchase such Indebtedness as a result of change of control or asset sale shall not violate the foregoing restriction), (iii) such Indebtedness is not guaranteed by any Subsidiary of the Company other than the Subsidiary Guarantors (which guarantees, if such Indebtedness is subordinated, shall be expressly subordinated to the Secured Obligations on terms not less favorable to the Lenders than the subordination terms of such Subordinated Indebtedness), (iv) the covenants applicable to such Indebtedness are not more onerous or more restrictive in any material respect (taken as a whole) than the applicable covenants set forth in this Agreement and (v) both immediately prior to and after giving effect (including giving effect on a Pro Forma Basis) thereto, the Company is in compliance with Section 6.11;

(j) Indebtedness of the Company or any Domestic Subsidiary incurred to finance the acquisition of any equipment to be used in the United States and extensions, renewals, refinancings and replacements of any such Indebtedness that do not increase the outstanding principal amount thereof (other than attributable to the accretion of original issue discount, interest, capitalization of interest or payment premiums in respect of the Indebtedness being extended, renewed, refinanced or replaced and costs and expenses related thereto); provided that the aggregate principal amount of Indebtedness incurred pursuant to this clause (j) shall not exceed \$75,000,000 at any time outstanding;

(k) Indebtedness (including obligations in respect of letters of credit or bank guarantees or similar instruments) owed to any Person providing workers' compensation, health, disability or other employee benefits or property, casualty or liability insurance, pursuant to reimbursement or indemnification obligations to such Person, in each case incurred in the ordinary course of business;

(l) Indebtedness in respect of performance bonds, performance and completion guarantees, bid bonds, customs and appeal bonds, surety bonds and similar obligations or obligations in respect of letters of credit related thereto, in each case provided in the ordinary

Investments by Subsidiaries that are not Domestic Loan Parties in Domestic Loan Parties, shall not exceed \$80,000,000 in the aggregate at any time outstanding;

(j) Investments of any Person existing at the time such Person becomes a Subsidiary of the Company or consolidates or merges with the Company or any of its Subsidiaries (including in connection with an Acquisition permitted under this [Section 6.04](#)), so long as such Investments were not made in contemplation of such Person becoming a Subsidiary or of such merger;

(k) Investments received in connection with the disposition of assets permitted by [Section 6.03](#);

(l) Investments consisting of endorsements of instruments for collection or deposit in the ordinary course of business;

(m) Investments (including debt obligations and Equity Interests) received in connection with the bankruptcy or reorganization of any Person and in settlement of obligations of, or disputes with, any Person arising and upon foreclosure with respect to any secured Investment or other transfer of title with respect to any secured Investment;

(n) Guarantees (i) by the Company or any of its Subsidiaries of leases (other than Capitalized Leases) or of other obligations that do not constitute Indebtedness, in each case entered into in the ordinary course of business or (ii) permitted under [Section 6.01](#);

(o) to the extent constituting Investments, Restricted Payments permitted by [Section 6.07](#), fundamental changes permitted by [Section 6.03](#) and dispositions permitted by [Section 6.03](#);

(p) Acquisitions made by any Foreign Subsidiary that is not a Loan Party; and

(q) other Investments not to exceed \$50,000,000 at any time outstanding.

SECTION 6.05. [Swap Agreements.](#) The Company will not, and will not permit any of its Subsidiaries to, enter into any Swap Agreement, except (a) Swap Agreements entered into to hedge or mitigate risks to which the Company or any Subsidiary has actual exposure (other than those in respect of Equity Interests of the Company or any of its Subsidiaries), and (b) Swap Agreements entered into in order to effectively cap, collar or exchange interest rates (from fixed to floating rates, from one floating rate to another floating rate or otherwise) with respect to any interest-bearing liability or investment of the Company or any Subsidiary.

SECTION 6.06. [Transactions with Affiliates.](#) The Company will not, and will not permit any of its Subsidiaries to, sell, lease or otherwise transfer any property or assets to, or purchase, lease or otherwise acquire any property or assets from, or otherwise engage in any other transactions with, any of its Affiliates, except (a) at prices and on terms and conditions, when taken as a whole, not materially less favorable to the Company or such Subsidiary than could be obtained on an arm's-length basis from unrelated third parties, (b) transactions between or among the Company and its Wholly-Owned Subsidiaries not involving any other Affiliate, (c) any Restricted Payment permitted by [Section 6.07](#), (d) loans or advances to employees permitted under [Section 6.04\(d\)](#), and (e) the payment of reasonable fees to directors of the Company or any Subsidiary who are not employees of the Company or any Subsidiary, and compensation and employee benefit arrangements paid to, and indemnities provided for the benefit of, directors, officers or employees of the Company or its Subsidiaries in the ordinary course of business.

purpose for which given. Without limiting the generality of the foregoing, the making of a Loan or issuance of a Letter of Credit shall not be construed as a waiver of any Default, regardless of whether the Administrative Agent, any Lender or the Issuing Bank may have had notice or knowledge of such Default at the time.

(b) Except as provided in Section 2.20 with respect to an Incremental Term Loan Amendment, Section 2.25 with respect to an extension of the applicable Maturity Date or as provided in Section 2.14(b); and Section 2.14(c) ~~and Section 2.14(d)~~, neither this Agreement nor any provision hereof may be waived, amended or modified except pursuant to an agreement or agreements in writing entered into by the Borrowers and the Required Lenders or by the Borrowers and the Administrative Agent with the consent of the Required Lenders; provided that no such agreement shall (i) increase the Commitment of any Lender without the written consent of such Lender, (ii) reduce the principal amount of any Loan or LC Disbursement or reduce the rate of interest thereon, or reduce any fees payable hereunder, without the written consent of each Lender directly affected thereby (except that (x) any amendment or modification of the financial covenants in this Agreement (or defined terms used in the financial covenants in this Agreement) shall not constitute a reduction in the rate of interest or fees for purposes of this clause (ii) and (y) only the consent of the Required Lenders shall be necessary to reduce or waive any obligation of any Borrower to pay interest or any other amount at the applicable default rate set forth in Section 2.13(d) or to amend Section 2.13(d)), (iii) postpone the scheduled date of payment (including any scheduled date of amortization payment) of the principal amount of any Loan or LC Disbursement, or any interest thereon, or any fees payable hereunder, or reduce the amount of, waive or excuse any such payment, or postpone the scheduled date of expiration of any Commitment, without the written consent of each Lender directly affected thereby (other than (x) any reduction of the amount of, or any extension of the payment date for, the mandatory prepayments required under Section 2.11(b), which shall only require the approval of the Required Revolving Lenders, (y) any reduction of the amount of, or any extension of the payment date for, the mandatory prepayments required under Section 2.11(c), which shall only require the approval of the Required Term Lenders, and (z) with respect to the matters set forth in clauses (ii)(x) and (ii)(y) above), (iv) change Section 2.09(c) or 2.18(b) or (d) in a manner that would alter the ratable reduction of Commitments or the pro rata sharing of payments required thereby, without the written consent of each Lender (other than any Defaulting Lender), (v) change the payment waterfall provisions of Section 2.18(b) or 2.24(b) without the written consent of each Lender, (vi) change any of the provisions of this Section or the definition of "Required Lenders", "Required Revolving Lenders", "Required Term Lenders" or any other provision hereof specifying the number or percentage of Lenders required to waive, amend or modify any rights hereunder or make any determination or grant any consent hereunder, without the written consent of each Lender of the applicable Class (other than any Defaulting Lender) (it being understood that, solely with the consent of the parties prescribed by Section 2.20 to be parties to an Incremental Term Loan Amendment, Incremental Term Loans may be included in the determination of Required Lenders on substantially the same basis as the Commitments and the Loans are included on the Effective Date), (vii) release the Company or all or substantially all of the Subsidiary Guarantors from their obligations under Article X or the Subsidiary Guaranty, in each case, without the written consent of each Lender (other than any Defaulting Lender), (viii) (x) waive any condition set forth in Section 4.03 in respect of the making of a Revolving Loan without the written consent of the Required Revolving Lenders or (y) waive any condition set forth in Section 4.02 in respect of the making of a Term Loan without the written consent of the Required Term Lenders (it being understood and agreed that any amendment or waiver of, or any consent with respect to, any provision of this Agreement (other than any waiver expressly relating to Section 4.02 or Section 4.03, as applicable) or any other Loan Document, including any amendment of any affirmative or negative covenant set forth herein or in any other Loan Document or any waiver of a Default or an Event of Default, shall not be deemed to be a waiver of a condition set forth in Section 4.02 or Section 4.03, as applicable, for purposes of this Section 9.02), or (ix) except as provided in clause (d) of this Section or in any Collateral Document, release all or substantially all of the Collateral, without the

irrevocably authorizes the Administrative Agent, at its option and in its discretion, (i) to subordinate any Lien on any assets granted to or held by the Administrative Agent under any Loan Document to the holder of any Lien on such property that is permitted by Section 6.02(e) or (m) or (ii) in the event that the Company shall have advised the Administrative Agent that, notwithstanding the use by the Company of commercially reasonable efforts to obtain the consent of such holder (but without the requirement to pay any sums to obtain such consent) to permit the Administrative Agent to retain its liens (on a subordinated basis as contemplated by clause (i) above), the holder of such other Indebtedness requires, as a condition to the extension of such credit, that the Liens on such assets granted to or held by the Administrative Agent under any Loan Document be released, to release the Administrative Agent's Liens on such assets.

(e) If, in connection with any proposed amendment, waiver or consent requiring the consent of "each Lender" or "each Lender directly affected thereby," the consent of the Required Lenders is obtained, but the consent of other necessary Lenders is not obtained (any such Lender whose consent is necessary but not obtained being referred to herein as a "Non-Consenting Lender"), then the Company may elect to replace a Non-Consenting Lender as a Lender party to this Agreement, provided that, concurrently with such replacement, (i) another bank or other entity which is reasonably satisfactory to the Company and the Administrative Agent shall agree, as of such date, to purchase for cash the Loans and other Obligations due to the Non-Consenting Lender pursuant to an Assignment and Assumption and to become a Lender for all purposes under this Agreement and to assume all obligations of the Non-Consenting Lender to be terminated as of such date and to comply with the requirements of clause (b) of Section 9.04, (ii) each Borrower shall pay to such Non-Consenting Lender in same day funds on the day of such replacement (1) all interest, fees and other amounts then accrued but unpaid to such Non-Consenting Lender by such Borrower hereunder to and including the date of termination, including without limitation payments due to such Non-Consenting Lender under Sections 2.15 and 2.17, and (2) an amount, if any, equal to the payment which would have been due to such Lender on the day of such replacement under Section 2.16 had the Loans of such Non-Consenting Lender been prepaid on such date rather than sold to the replacement Lender and (iii) such Non-Consenting Lender shall have received the outstanding principal amount of its Loans and participations in LC Disbursements. Each party hereto agrees that (i) an assignment required pursuant to this paragraph may be effected pursuant to an Assignment and Assumption executed by the Company, the Administrative Agent and the assignee (or, to the extent applicable, an agreement incorporating an Assignment and Assumption by reference pursuant to an Approved Electronic Platform as to which the Administrative Agent and such parties are participants), and (ii) the Lender required to make such assignment need not be a party thereto in order for such assignment to be effective and shall be deemed to have consented to and be bound by the terms thereof; provided that, following the effectiveness of any such assignment, the other parties to such assignment agree to execute and deliver such documents necessary to evidence such assignment as reasonably requested by the applicable Lender, provided that any such documents shall be without recourse to or warranty by the parties thereto.

(f) Notwithstanding anything herein to the contrary, as to any amendment or amendment and restatement otherwise approved in accordance with this Section, it shall not be necessary to obtain the consent or approval of any Lender that, upon giving effect to such amendment or amendment and restatement, would have no Commitment or outstanding Loans so long as such Lender receives payment in full of the principal of and interest accrued on each Loan made by, and all other amounts owing to, such Lender or accrued for the account of such Lender under this Agreement and the other Loan Documents at the time such amendment, amendment and restatement or other modification becomes effective.

(g) ~~(f)~~ Notwithstanding anything to the contrary herein the Administrative Agent may, with the consent of the Borrowers only, amend, modify or supplement this Agreement or any of the other Loan Documents to cure any ambiguity, omission, mistake, defect or inconsistency.

SECTION 9.03. Expenses; Limitation of Liability; Indemnity. (a) The Company shall pay (i) all reasonable and documented out-of-pocket expenses incurred by the Administrative Agent and its Affiliates (which shall be limited, in the case of legal fees and expenses, to the reasonable and documented fees, disbursements and other charges of one primary counsel and one local counsel in each relevant jurisdiction) in connection with the syndication and distribution (including, without limitation, via the internet or through a service such as Intralinks) of the credit facilities provided for herein, the preparation and administration of this Agreement and the other Loan Documents or any amendments, modifications or waivers of the provisions hereof or thereof (whether or not the transactions contemplated hereby or thereby shall be consummated), (ii) all reasonable and documented out-of-pocket expenses incurred by the Issuing Bank in connection with the issuance, amendment or extension of any Letter of Credit or any demand for payment thereunder and (iii) all reasonable and documented out-of-pocket expenses incurred by the Administrative Agent, the Issuing Bank or any Lender (which shall be limited, in the case of legal fees and expenses, to the reasonable and documented fees, disbursements and other charges of (x) one primary counsel to the Administrative Agent (and one local counsel to the Administrative Agent in each relevant jurisdiction), (y) one counsel to all of the other Lenders taken as a whole (and one local counsel to all of the other Lenders taken as a whole in each relevant jurisdiction) and (z) solely in the event of an actual or reasonably perceived conflict of interest, one additional counsel (and one local counsel in each relevant jurisdiction) for each group of similarly affected Lenders taken as a whole) in connection with the enforcement or protection of its rights in connection with this Agreement and any other Loan Document, including its rights under this Section, or in connection with the Loans made or Letters of Credit issued hereunder, including all such out-of-pocket expenses (subject to the foregoing limitations with respect to legal fees and expenses) incurred during any workout, restructuring or negotiations in respect of such Loans or Letters of Credit.

(b) Limitation of Liability. To the extent permitted by applicable law the Company and any other Loan Party shall not assert, and the Company and each other Loan Party hereby waives (i) any claim against the Administrative Agent, any Arranger, any Co-Syndication Agent, the Documentation Agent, the Issuing Bank and any Lender, and any Related Party of any of the foregoing Persons (each such Person being called a "Lender-Related Person") for any Liabilities arising from the use by others of information or other materials (including, without limitation, any personal data) obtained through telecommunications, electronic or other information transmission systems (including the Internet), and (ii) any Liabilities against any Lender-Related Person, on any theory of liability, for special, indirect, consequential or punitive damages (as opposed to direct or actual damages) incurred by the Company or any of its Subsidiaries arising out of, in connection with, or as a result of, this Agreement, any other Loan Document, or any agreement or instrument contemplated hereby or thereby, the Transactions, any Loan or Letter of Credit or the use of the proceeds thereof; provided that, nothing in this Section 9.03(b) shall relieve the Company or any other Loan Party of any obligation it may have to indemnify an Indemnitee, as provided in Section 9.03(c), against any special, indirect, consequential or punitive damages asserted against such Indemnitee by a third party.

(c) The Company shall indemnify the Administrative Agent, each Arranger, the Issuing Bank and each Lender, and each Related Party of any of the foregoing Persons (each such Person being called an "Indemnitee") against, and hold each Indemnitee harmless from, any and all Liabilities and related expenses, including the reasonable fees, charges and disbursements of any counsel for any Indemnitee (which shall be limited, in the case of legal fees and expenses, to the reasonable and documented fees, disbursements and other charges of one primary counsel, and one local counsel in each applicable jurisdiction, for the Administrative Agent, and not more than one outside counsel, and one

other Loan Document, any Swap Agreement, any Banking Services Agreement or any other agreement; (d) any default, failure or delay, willful or otherwise, in the performance of any of the Secured Obligations; (e) the failure of the Administrative Agent (or any applicable Lender (or any of its Affiliates)) to take any steps to perfect and maintain any security interest in, or to preserve any rights to, any security or collateral for the Secured Obligations, if any; (f) any change in the corporate, partnership or other existence, structure or ownership of any Subsidiary or any other guarantor of any of the Secured Obligations; (g) the enforceability or validity of the Secured Obligations or any part thereof or the genuineness, enforceability or validity of any agreement relating thereto or with respect to any collateral securing the Secured Obligations or any part thereof, or any other invalidity or unenforceability relating to or against any Subsidiary or any other guarantor of any of the Secured Obligations, for any reason related to this Agreement, any other Loan Document, any Swap Agreement, any Banking Services Agreement, or any provision of applicable law, decree, order or regulation of any jurisdiction purporting to prohibit the payment by such Subsidiary or any other guarantor of the Secured Obligations, of any of the Secured Obligations or otherwise affecting any term of any of the Secured Obligations; or (h) any other act, omission or delay to do any other act which may or might in any manner or to any extent vary the risk of the Company or otherwise operate as a discharge of a guarantor as a matter of law or equity or which would impair or eliminate any right of the Company to subrogation.

The Company further agrees that its agreement hereunder constitutes a guarantee of payment when due (whether or not any bankruptcy or similar proceeding shall have stayed the accrual or collection of any of the Secured Obligations or operated as a discharge thereof) and not merely of collection, and waives any right to require that any resort be had by the Administrative Agent, the Issuing Bank or any Lender (or any of its Affiliates) to any balance of any deposit account or credit on the books of the Administrative Agent, the Issuing Bank or any Lender in favor of any Subsidiary or any other Person.

The obligations of the Company hereunder shall not be subject to any reduction, limitation, impairment or termination for any reason, and shall not be subject to any defense or set-off, counterclaim, recoupment or termination whatsoever, by reason of the invalidity, illegality or unenforceability of any of the Secured Obligations, any impossibility in the performance of any of the Secured Obligations or otherwise (other than the defense of payment and performance in full in cash).

The Company further agrees that its obligations hereunder shall constitute a continuing and irrevocable guarantee of all Secured Obligations now or hereafter existing and shall continue to be effective or be reinstated, as the case may be, if at any time payment, or any part thereof, of any Secured Obligation (including a payment effected through exercise of a right of setoff) is rescinded, or is or must otherwise be restored or returned by the Administrative Agent, the Issuing Bank or any Lender (or any of its Affiliates) upon the insolvency, bankruptcy or reorganization of any Subsidiary or otherwise (including pursuant to any settlement entered into by a holder of Secured Obligations in its discretion).

In furtherance of the foregoing and not in limitation of any other right which the Administrative Agent, the Issuing Bank or any Lender (or any of its Affiliates) may have at law or in equity against the Company by virtue hereof, upon the failure of any Subsidiary to pay any Secured Obligation when and as the same shall become due, whether at maturity, by acceleration, after notice of prepayment or otherwise, the Company hereby promises to and will, upon receipt of written demand by the Administrative Agent, the Issuing Bank or any Lender (or any of its Affiliates), forthwith pay, or cause to be paid, to the Administrative Agent, the Issuing Bank or such Lender (or any of such Lender's Affiliates) in cash an amount equal to the unpaid principal amount of the Secured Obligations then due, together with accrued and unpaid interest thereon. The Company further agrees that if payment in respect of any Secured Obligation shall be due in a currency other than Dollars and/or at a place of payment other than New York, Chicago or any other ~~European~~Foreign Currency Payment Office

and if, by reason of any Change in Law, disruption of currency or foreign exchange markets, war or civil disturbance or other event, payment of such Secured Obligation in such currency or at such place of payment shall be impossible or, in the reasonable judgment of the Administrative Agent, the Issuing Bank or any Lender (or any of its Affiliates), disadvantageous to the Administrative Agent, the Issuing Bank or such Lender (or any of such Lender's Affiliates) in any material respect, then, at the election of the Administrative Agent or such Lender, the Company shall make payment of such Secured Obligation in Dollars (based upon the Dollar Amount thereof on the date of payment) and/or in New York, Chicago or such other ~~Eurocurrency~~Foreign Currency Payment Office as is designated by the Administrative Agent or such Lender and, as a separate and independent obligation, shall indemnify the Administrative Agent, the Issuing Bank and such Lender (and such Lender's Affiliates), as applicable, against any losses or reasonable out-of-pocket expenses that it shall sustain as a result of such alternative payment.

Upon payment by the Company of any sums as provided above, all rights of the Company against any Subsidiary arising as a result thereof by way of right of subrogation or otherwise shall in all respects be subordinated and junior in right of payment to the prior indefeasible payment in full in cash of all the Secured Obligations owed by such Subsidiary.

Nothing shall discharge or satisfy the liability of the Company hereunder except the full performance and payment in cash of the Secured Obligations.

[Signature Pages Follow]


CONSENT AND REAFFIRMATION

Each of the undersigned hereby acknowledges receipt of a copy of the foregoing Amendment No. 1 to the Fourth Amended and Restated Credit Agreement dated as of October 27, 2021 (as the same may be amended, restated, supplemented or otherwise modified from time to time, the "Credit Agreement") by and among Materion Corporation, Materion Netherlands B.V., the other Foreign Subsidiary Borrowers from time to time party thereto, the financial institutions from time to time party thereto (the "Lenders") and JPMorgan Chase Bank, N.A., as Administrative Agent (the "Administrative Agent"), which Amendment No. 1 is dated as of January 13, 2023 (the "Amendment"). Capitalized terms used in this Consent and Reaffirmation and not defined herein shall have the meanings given to them in the Credit Agreement. Without in any way establishing a course of dealing by the Administrative Agent or any Lender, each of the undersigned consents to the Amendment and reaffirms the terms and conditions of the Subsidiary Guaranty and any other Loan Document executed by it and acknowledges and agrees that the Subsidiary Guaranty and each and every such Loan Document executed by the undersigned in connection with the Credit Agreement remains in full force and effect and is hereby reaffirmed, ratified and confirmed. All references to the Credit Agreement contained in the above-referenced documents shall be a reference to the Credit Agreement as so modified by the Amendment.


Dated: January 13, 2023

[Signature Page Follows]


MATERION ADVANCED MATERIALS
TECHNOLOGIES AND SERVICES INC.

By: 
Name: Christopher E. Eberhardt
Title: Vice President and Treasurer

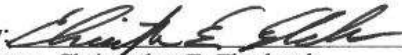
MATERION BRUSH INC.

By: 
Name: Christopher E. Eberhardt
Title: Vice President and Treasurer

MATERION NATURAL RESOURCES INC.

By: 
Name: Christopher E. Eberhardt
Title: Treasurer

MATERION NEWTON INC.

By: 
Name: Christopher E. Eberhardt
Title: Vice President and Treasurer

Subsidiaries of Registrant

The Company has the following subsidiaries, all of which are wholly owned and included in the consolidated financial statements.

Name of Subsidiary	State or Country of Incorporation
Egbert Corp.	Ohio
Materion Newton, Inc.	Massachusetts
Materion Advanced Chemicals Inc.	Wisconsin
Materion Netherlands B.V.	Netherlands
Materion Advanced Materials Technologies and Services Suzhou Ltd.	China
Materion Advanced Materials Technologies and Services Corp.	New Mexico
Materion Singapore PTE. Ltd.	Singapore
Materion Advanced Materials Technologies and Services Inc.	New York
Materion Taiwan Co. Ltd.	Taiwan
Materion Advanced Materials Germany GmbH	Germany
Materion Japan Ltd.	Japan
Materion Brush GmbH	Germany
Materion Brush Inc.	Ohio
Materion Brush Singapore Shanghai	China
Materion Brush Singapore India SRO	India
Materion Czech S.R.O.	Czech Republic
Materion Ireland Ltd.	Ireland
Materion Large Area Coatings LLC	Delaware
Materion Natural Resources Inc.	Utah
Materion Korea Ltd.	Korea
Materion Precision Optics (Shanghai) Limited	China
Materion UK Limited	England
Materion Precision Optics and Thin Film Coatings Inc.	Massachusetts
Materion Services Inc.	Ohio
Materion Technical Materials Inc.	Ohio
Materion Singapore PTE Ltd. (Philippines Branch)	Philippines
Materion Singapore PTE Ltd. (Hong Kong Rep Office)	Hong Kong
Materion Shanghai Co. Ltd.	China
Optics Balzers AG	Liechtenstein
Optics Balzers GmbH	Germany
Optics Balzers Jena GmbH	Germany
Optics Balzers Malaysia Sdn. Bhd.	Malaysia
Optics Balzers USA Inc.	United States

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statement Number 333-88994 on Form S-8 dated May 24, 2002;
- (2) Registration Statement Number 333-127130 on Form S-8 dated August 3, 2005;
- (3) Registration Statement Number 333-133428 on Form S-8 dated April 20, 2006;
- (4) Registration Statement Number 333-133429 on Form S-8 dated April 20, 2006;
- (5) Registration Statement Number 333-145149 on Form S-8 dated August 6, 2007;
- (6) Registration Statement Number 333-173915 on Form S-8 dated May 4, 2011;
- (7) Registration Statement Number 333-173916 on Form S-8 dated May 4, 2011;
- (8) Registration Statement Number 333-173917 on Form S-8 dated May 4, 2011;
- (9) Registration Statement Number 333-195761 on Form S-8 dated May 7, 2014;
- (10) Registration Statement Number 333-195762 on Form S-8 dated May 7, 2014;
- (11) Registration Statement Number 333-217633 on Form S-8 dated May 3, 2017; and
- (12) Registration Statement Number 333-217618 on Form S-8 dated May 3, 2017;

of our reports dated February 16, 2023, with respect to the consolidated financial statements and financial statement schedule of Materion Corporation and subsidiaries and the effectiveness of internal control over financial reporting of Materion Corporation and subsidiaries, included in this Annual Report (Form 10-K) of Materion Corporation and subsidiaries for the year ended December 31, 2022.

/s/ Ernst & Young LLP
Cleveland, Ohio
February 16, 2023

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each of the undersigned directors and officers of MATERION CORPORATION, an Ohio corporation (the "Corporation"), hereby constitutes and appoints Jugal K. Vijayvargiya, Shelly M. Chadwick, Gregory R. Chemnitz, and Michael J. Solecki, and each of them, their true and lawful attorney or attorneys-in-fact, with full power of substitution and revocation, for them and in their names, place and stead, to sign on their behalf as a director or officer, or both, as the case may be, of the Corporation, an Annual Report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 on Form 10-K for the fiscal year ended December 31, 2022, and to sign any and all amendments to such Annual Report, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission granting unto said attorney or attorneys-in-fact, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as they might or could do in person, hereby ratifying and confirming all that said attorney or attorneys-in-fact or any of them or their substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, the undersigned have hereunto set their hands as of the 1st day of February, 2023.

/s/ JUGAL K. VIJAYVARGIYA

Jugal K. Vijayvargiya, President,
Chief Executive Officer and Director
(Principal Executive Officer)

/s/ SHELLY M. CHADWICK

Shelly M. Chadwick, Vice President, Finance
and Chief Financial Officer
(Principal Financial Officer)

/s/ VINOD M. KHLNANI

Vinod M. Khilnani, Director

/s/ EMILY M. LIGGETT

Emily M. Liggett, Director

/s/ ROBERT J. PHILLIPPY

Robert J. Phillippy, Director

/s/ PATRICK PREVOST

Patrick Prevost, Director

/s/ N. MOHAN REDDY

N. Mohan Reddy, Director

/s/ CRAIG S. SHULAR

Craig S. Shular, Director

/s/ DARLENE J. S. SOLOMON

Darlene J. S. Solomon, Director

/s/ ROBERT B. TOTH

Robert B. Toth, Director

CERTIFICATIONS

I, Jugal K. Vijayvargiya, certify that:

- 1) I have reviewed this annual report on Form 10-K of Materion Corporation (the “registrant”);
- 2) Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
- 3) Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
- 4) The registrant’s other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - c) evaluated the effectiveness of the registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant’s internal control over financial reporting that occurred during the registrant’s most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant’s internal control over financial reporting; and
- 5) The registrant’s other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant’s auditors and the audit committee of the registrant’s board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant’s ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant’s internal control over financial reporting.

Dated: February 16, 2023

/s/ Jugal K. Vijayvargiya

Jugal K. Vijayvargiya
President and Chief Executive Officer

CERTIFICATIONS

I, Shelly M. Chadwick, certify that:

- 1) I have reviewed this annual report on Form 10-K of Materion Corporation (the “registrant”);
- 2) Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
- 3) Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
- 4) The registrant’s other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - c) evaluated the effectiveness of the registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant’s internal control over financial reporting that occurred during the registrant’s most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant’s internal control over financial reporting; and
- 5) The registrant’s other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant’s auditors and the audit committee of the registrant’s board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant’s ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant’s internal control over financial reporting.

Dated: February 16, 2023

/s/ Shelly M. Chadwick

Shelly M. Chadwick
Vice President, Finance and
Chief Financial Officer

Certification Pursuant to
18 U.S.C. Section 1350,
As Adopted Pursuant to
Section 906 of the Sarbanes-Oxley Act of 2002

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, in connection with the filing of the Annual Report on Form 10-K of Materion Corporation (the "Company") for the year ended December 31, 2021, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of the Company certifies, that, to such officer's knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m or 78o(d)), and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company as of the dates and for the periods expressed in the Report.

Dated: February 16, 2023

/s/ Jugal K. Vijayvargiya

Jugal K. Vijayvargiya
President and Chief Executive Officer

/s/ Shelly M. Chadwick

Shelly M. Chadwick
Vice President, Finance and
Chief Financial Officer

Materion Corporation

**Mine Safety Disclosure Pursuant to Section 1503(a) of the Dodd-Frank Wall Street Reform and
Consumer Protection Act for the Year Ended December 31, 2022**

Materion Natural Resources Inc., a wholly owned subsidiary, operates a beryllium mining complex in the State of Utah which is regulated by both the U.S. Mine Safety and Health Administration (“MSHA”) and state regulatory agencies. We endeavor to conduct our mining and other operations in compliance with all applicable federal, state and local laws and regulations. We present information below regarding certain mining safety and health citations which MSHA has levied with respect to our mining operations.

Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act (“Section 1503(a)”) requires the Company to present certain information regarding mining safety in its periodic reports filed with the Securities and Exchange Commission.

The following table reflects citations, orders and notices issued to Materion Natural Resources Inc. by MSHA during the year ended December 31, 2022 (the “Reporting Period”) and contains certain additional information as required by Section 1503(a) and Item 104 of Regulation S-K, including information regarding mining-related fatalities, proposed assessments from MSHA and legal actions (“Legal Actions”) before the Federal Mine Safety and Health Review Commission, an independent adjudicative agency that provides administrative trial and appellate review of legal disputes arising under the Mine Act.

Included below is the information required by Section 1503(a) with respect to the beryllium mining complex (MSHA Identification Number 4200706) for the Reporting Period:

(A)	Total number of alleged violations of mandatory health or safety standards that could significantly and substantially contribute to the cause and effect of a mine safety or health hazard under Section 104 of the Mine Act for which Materion Natural Resources Inc. received a citation from MSHA	0
(B)	Total number of orders issued under Section 104(b) of the Mine Act	0
(C)	Total number of citations and orders for alleged unwarrantable failure by Materion Natural Resources Inc. to comply with mandatory health or safety standards under Section 104(d) of the Mine Act	0
(D)	Total number of alleged flagrant violations under Section 110(b)(2) of the Mine Act	0
(E)	Total number of imminent danger orders issued under Section 107(a) of the Mine Act	0
(F)	Total dollar value of proposed assessments from MSHA under the Mine Act	\$665
(G)	Total number of mining-related fatalities	0
(H)	Received notice from MSHA of a pattern of violations under Section 104(e) of the Mine Act	No
(I)	Received notice from MSHA of the potential to have a pattern of violations under Section 104(e) of the Mine Act	No
(J)	Total number of Legal Actions pending as of the last day of the Reporting Period	0
(K)	Total number of Legal Actions instituted during the Reporting Period	0
(L)	Total number of Legal Actions resolved during the Reporting Period	0