EMI Shielding from Schlegel®

YOUR GLOBAL PROVIDER OF INNOVATIVE HIGH QUALITY SHIELDING SOLUTIONS.

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Think Schlegel for Shielding

Contents

THINK SCHLEGEL®
FOR SHIELDING.

EMI Shielding
Products

Schlegel®

www.schlegel.com

Contents

THINK SCHLEGEL®
FOR SHIELDING.

EMI Shielding
Products

Schlegel®

www.schlegel.com

THINK SCHLEGEL® FOR SHIELDING.

Schlegel EMI has adapted with the times since its founding in the 1800s. From its early days as a maker of trims for the transportation and clothing industries, the company has become renowned for developing a wide range of innovative solutions that meet the demanding needs of customers around the world. Today, Schlegel EMI produces a broad array of sealing products for the electronics, building, copier and transportation industries in ten locations throughout the world.

Schlegel EMI is the preeminent manufacturer of electromagnetic interference (EMI) shielding products with a primary concentration in the computer and electronics industries. Schlegel EMI's innovation lies within a sophisticated research and development facility at the company's worldwide headquarters located in Rochester, NY.

Schlegel's headquarters is located in Rochester, New York.

As the inventor of highly conductive fabric-over-foam shielding gaskets in 1987, Schlegel EMI was responsible for a major breakthrough for the electromagnetic interference shielding of electronic enclosures. Today, Schlegel EMI offers a full range of EMI shielding products—including BeCu Fingerstock Gaskets, Conductive Elastomer Seals, Wire Mesh Gaskets, Honeycomb Vent Panels...Highly Conductive Tapes and Laminates—that enable the computer, telecommunications and electronics industries to meet global requirements for electromagnetic compatibility (EMC).

From concept to production, Schlegel EMI's signature portfolio of fabric-over-foam shielding products combines highly conductive materials with flexible foams and patented coatings to provide the latest EMI containment solutions. The company's world-renowned EMI shielding gaskets are available in hundreds of profiles and unique designs, with attachment options that include mechanical self-attaching clip, rivet and a variety of pressure-sensitive adhesives.

SCHLEGEL EMI SHIELDING BASICS

About EMI[1] and EMC

Electromagnetic compatibility is defined as "the ability of a device, equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment."[2] In terms of equipment designed for radio transmission and reception, EMC is maintained partially by the assignment and enforcement of discrete frequency bands. EMC has not always been achieved, however. Examples, such as the interference between a notebook PC and testing equipment, a printer and a desktop PC, or a cellular telephone and medical devices are today's common examples of interference at higher frequencies. This problem is recognized as electromagnetic interference, or EMI.

Maintaining electromagnetic compatibility can be an increasing challenge for the designers of today's electronic and electrical products. The demand for faster performance, expanded peripheral capabilities and compact designs requires engineers to build more in less space. To control electromagnetic interference, shielding products are more important than ever.[3]

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[1] A measure of electromagnetic radiation from equipment. IEEE C37.1-1987.

[2] IEEE C63.12-1987.

[3] A number of good sources are available for basic information on EMI shielding theory and practice. Schlegel EMI presents seminars at exhibitions and customer sites, focusing on the basics. Contact your local Schlegel EMI representative to request a seminar for your facility. Schlegel EMI also recommends the following books: *Engineering Electromagnetic Compatibility,* V. Prasad Kodali — New York USA: IEEE Press, 1996; and *Introduction to Electromagnetic Compatibility,* C. R. Paul — New York USA: John Wiley & Sons, 1992.

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That's where Schlegel EMI comes in. Schlegel EMI shielding products are comprised of the industry's most reliable and effective materials.

- A choice of highly conductive claddings—based on the history of our high quality silver woven fabrics, we now offer claddings of woven-silver monel and nickel-copper fabrics—depending on the shielding effectiveness required.
- A range of resilient urethane foam cores, among others, that resist compression set better than competitive elastomeric gaskets and meet today's stringent industry safety requirements.
- A wide array of coatings, including patented C2, Schlegel EMI's original coating, along with our C70 and C12 coatings, for protection against corrosion and abrasion resistance.
- Attachment options including mechanical self-attaching, clip, push-rivet and pressure-sensitive adhesive backings with wide release liners for easy attachment and durability.

At the core of Schlegel EMI fabric-over-foam shielding gaskets is resilient, open-cell polyurethane foam. This unique foam formulation allows the gasket to fit snugly into uneven gaps and joints. The springy foam yields low closure forces in operation. With Schlegel EMI's foam formulation and selected material claddings, the company's EMI gaskets are recognized UL 94 V-0 under the component program of Underwriters Laboratories, Inc.[4]

Schlegel's sophisticated processes make the platings on its materials highly conductive and durable.

Common RF joint measurements require specialized equipment, such as the SAE ARP 1705 transfer impedance cell combined with a broadband spectrum or network analyzer.

All Schlegel EMI's foam shielding products start with durable, metal-plated fabrics. These highly conductive materials not only provide customers with the reliability they need to meet industry requirements for EMC compliance, but they address the public's increasing concerns regarding the safety of electronic equipment. By themselves, these fabrics provide highly effective shielding properties. When combined with open-cell polyurethane foam, additional beneficial mechanical properties are added.

Schlegel EMI's Material Advantages

Cladding includes the choice of highly conductive materials to meet customer requirements. Schlegel EMI introduced the Fabric-Clad-Foam EMI gasket to the market with our legendary highly conductive silver-plated, woven nylon ripstop fabric. In addition to adhering extremely well to nylon substrates, silver is a superior conductor to other metals, so a thinner layer is all that is necessary to achieve high levels of shielding performance. The galvanic compatibility of the original Silver plated fabric was enhanced with the addition of Schlegel EMI's exclusive C2 coating. The knowledge and plating advances gained with our original Silver-C2 product can now be found in our woven Nickel-Copper and Silver-Monel conductive claddings.

[4] UL and Underwriters Laboratories are registered trademarks of Underwriters Laboratories, Inc.

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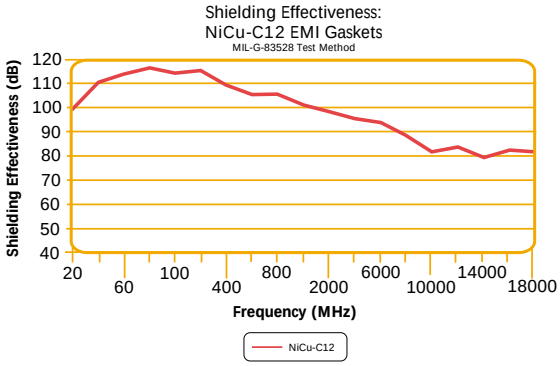
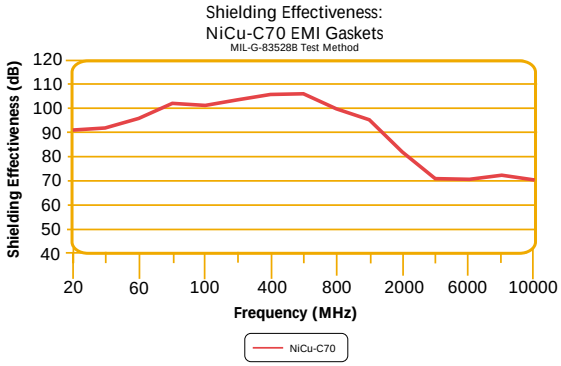
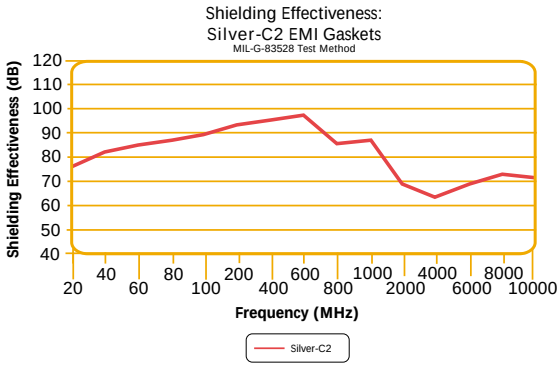
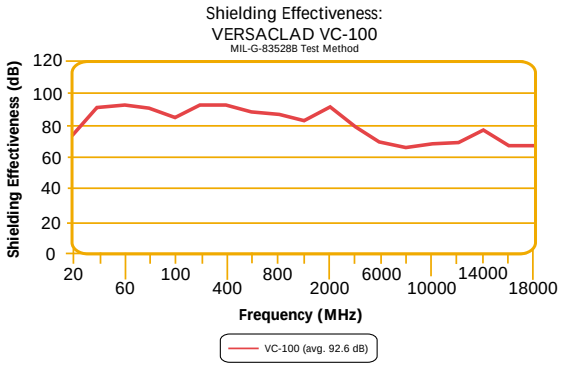
As the shielding effectiveness (SE) charts here illustrate, Schlegel EMI provides high conductive fabrics to attenuate EMI across the most critical portion of the RF spectrum. The MIL-G-83528B test method was used to calculate shielding effectiveness over a range of 20 MHz to 10 GHz; Schlegel EMI routinely tests the company's gaskets beyond the normal 1 GHz limit.[5] This is critical now that system base clock frequencies and their associated harmonics are well over 1 GHz.



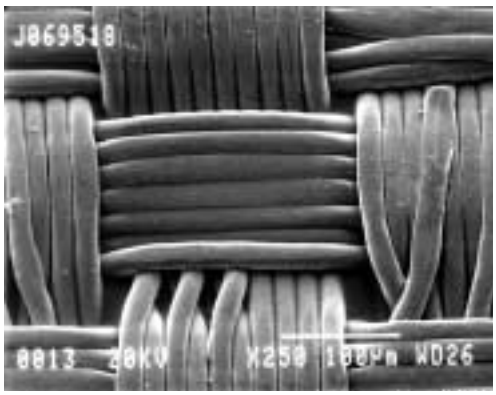


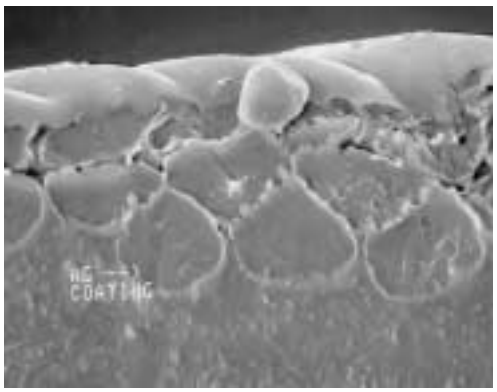




To evaluate performance, Schlegel EMI has studied a variety of fabrics using Scanning Electron Microscopy (SEM).[6] Metallic surfaces will appear gray in color in these samples. Organic or non-metallic surfaces, such as nylon or coatings, will glow white. The durability of the silver plating and overall coverage of the top coating assures highly conductive, long-lasting, safe and reliable performance.

The top and end views of the silver coated material are shown below. The end view photo clearly shows that each fiber of the woven nylon fabric is completely metallized. Schlegel EMI's proprietary plating process assures a high-quality metal deposition on all of the company's plated fabrics.





Top and end views of SCHLEGEL Silver C[2] coated material shown through Scanning Electron Microscopy (SEM).

[5] Testing method MIL-G 83528B measures Shielding Effectiveness (dB) = P(dBm) through a 24" opening minus Pr(dBm) with gasketed cover over the opening.

[6] Scanning Electron Microscopy (SEM) is a means of obtaining high resolution three-dimensional likenesses of solid shapes.Variations in the surface topography of a material are depicted as variations in gray scale in the scan. Details as small as 70 angstroms can be resolved on most samples.

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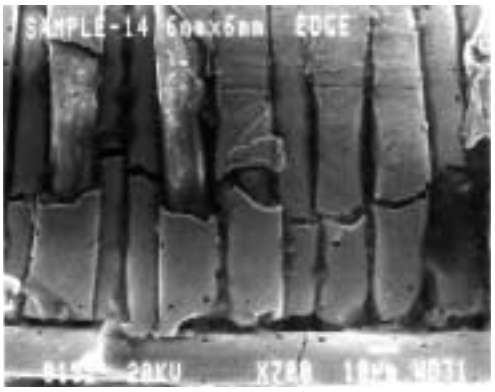
The plating process is one of the most crucial steps in the production of fabric-clad gaskets. Poorly plated fabrics will produce inconsistent and, in some cases, hazardous gasket products, as in the case of nickel flaking. An example of non-Schlegel EMI material shown here illustrates a case where the flaking of nickel particles has occurred.



This non-Schlegel material shows an example of nickel particle flaking.

An alternative to silver-plated nylon fabrics is nickel-copper fabric. Shielding effectiveness with nickel-copper fabric varies widely, depending on the technology and the quality of the plating employed.

Nickel can fracture due to its relative hardness compared to that of copper, silver or other more malleable metals. A key to a quality Nickel plating process is the thoroughness of the pre-plating process that includes a high capacity and clean rinse process. Nickel plating in contaminated tanks will result in poor adhesion of the nickel to the base metal substrate. The results of a low quality plating process along with the low malleability of the nickel layer in a nickel-copper or nickel-silver plated surface causes the nickel to fracture on the edges of the gasket during the early stages of the gasket's manufacturing, with severe fracturing occurring when the gasket is employed in a high-cycle (dynamic) EMI joint.

Quick and reliable fabric analysis is performed using Schlegel EMI ' TEM cell test fixtures. To ensure quality, all fabrics are routinely tested.

In addition to superior plating, Schlegel EMI employs patented coatings to protect against abrasion and keep metal surfaces such as nickel locked into the fabric. This provides the customer the benefits of a nickel-copper fabric—better shielding over the lower frequency range of 20 to 300 MHz—and will reduce the hazards and performance loss associated with nickel fracturing.

The acrylic based C70 and C12 coatings that are used on our Nickel-Copper claddings have joined Schlegel EMI's original patented C2 conversion coating on our gasket products. In addition to abrasion resistance, the coatings offer enhanced galvanic compatibility of the fabric to the metal flange with which it comes in contact.

Independent tests prove that the materials used in Schlegel EMI gaskets provide increased durability and longevity over other materials and products. Galvanic compatibility and corrosion testing is designed to evaluate the compatibility of EMI gasket materials against different metal types. Using test method SAE ARP 1481 that uses environmental conditions based on MIL-STD 202F, as listed in chart number 1, Schlegel EMI's original Silver-C2 fabric passes tests 1, 2 and 3, which shows the material is compatible in both indoor and outdoor environments, and in varying conditions.[7] Now, our Nickel-Copper and Silver-Monel claddings even exceed the performance characteristic standard set by the original Silver-C2 product.

[7] For information on galvanic compatibility and corrosion testing with other SCHLEGEL fabrics, please contact your local SCHLEGEL representative.

Galvanic corrosion will occur under the following three conditions:

1. Two metals or materials that are electrochemically dissimilar are utilized in a structure, such as a plated fabric gasket and a metal enclosure.
2. A conductive path exists between the electrochemically dissimilar metals or materials.
3. A medium or pathway is present for ionic conduction between the electrochemically dissimilar materials.

If we can prevent any of the above conditions from occurring, then we can prevent galvanic corrosion from affecting our EMI gasket joint. However, it is not possible to

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entirely eliminate the three conditions listed above.

We must have a conductive path between our gaskets and the mounting flanges in order to make a joint that will prevent EMI leakage. A pathway or medium through which ions can flow is typically present with the addition of water to the gasketed EMI joint. Water can reach a joint through the flow of moist or humid air. Salt water reaching the joint will increase the ability of ions flowing between the two metal surfaces. Of the three conditions, holding the electrochemical difference between the two metal surfaces is the easiest to control. By selecting a metal or metallized plastic enclosure whose potential difference is minimal when compared to the EMI gasket, the rate of galvanic corrosion can be tremendously reduced. For most commercial equipment a rule of thumb followed is to hold the electrochemical potential between the gasket and the enclosure metals to 0.5 volts. In harsh environments the rule of thumb is 0.25 volts potential difference.

The chart below summarizes the SAE-ARP1481 test program which varies temperature, humidity and time to simulate the exposure to a controlled indoor, warehouse and outdoor environment. If a gasket passes test number 1, then test number 2 is carried out on a new test sample. Test number 3 would follow upon passing the conditions of test 2. The test samples were comprised of Schlegel EMI Silver-C2 clad gaskets and standard foam formulations. The gaskets were placed between a variety of metal substrates to form a test module. Metal substrates consisted of Tin-plated Steel, Zinc Chromated Steel, Alodine Aluminum, Chromated Aluminum, and Nickel with Gold-plated Brass as a control module. The results show the Schlegel EMI Silver-C2 gasket is compatible with environments up to and including an uncontrolled outside environment. Graphs detailing the performance of the gaskets against each metal, as a function of shielding effectiveness over frequency, are available upon request.

CHART NO. 1

Test	Environmental Test Description	Compatibility Class
1	50% to 80% RH @ 26^0C for 24 hours	Compatible only in a controlled general indoor environment
2	95% RH @ 40^0C for 96 hours	Compatible in an uncontrolled warehouse type environment
3	90% to 98% RH @ 65^0C and 80% to 95% RH @ 25^0C for 48 hours	Compatible in an uncontrolled outside environment with some rain, varying humidity and temperature

Battelle Memorial Institute conducted extensive on-site accelerated aging tests on Schlegel EMI gaskets using the institute's multiple flowing gas method.[8] These tests revealed that Schlegel EMI gaskets have a life span in excess of 30 years when exposed to normal atmospheric conditions. In industries such as telecommunications, the longevity of a gasket over a 20-year life span is vital.

[8] Flowing gas analysis tests at Battelle Memorial Institute employed three different gases — H_2S, CL_2, NO_2. This test is based on IEC 68-2-60.

Compression Load Deflection

Schlegel EMI shielding gaskets deliver the mechanical properties essential in today's intricate electronic enclosures. Schlegel EMI's highly conductive fabric-clad foam products offer significant mechanical advantages over competitive materials, such as beryllium copper, conductive elastomers, wire mesh, and stamped metal fittings.

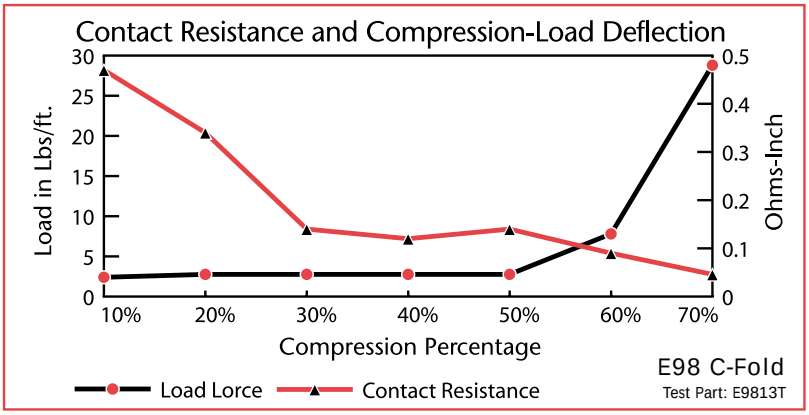
Schlegel EMI's highly conductive fabric over open-cell urethane foam gaskets offer the lowest compression force available due to their open-cell structure and flexible, highly conductive fabric. In addition, the contact resistance with the mating surface is minimally affected by the compression variations that maintain the original shielding effectiveness.

Compression, which yields a high conductivity level between gasket and flanges, is the vital factor in shielding effectiveness. Poor conductivity between the opposing flanges

through the gasket results in lower shielding effectiveness. A complete lack of contact along any part of the joint results in a thin gap capable of acting as a slot antenna.

Schlegel EMI understands that the first steps toward ensuring conductivity is to make sure flange faces are smooth, clean and treated as necessary to provide highly conductive surfaces. These surfaces must be masked prior to painting. It is essential that shielding gasket material is continuously well-bonded to the appropriate flange. The compressibility of the conductive gasket is intended to compensate for any flange irregularity.

All gaskets have a minimum contact resistance needed in order to work effectively. The designer can lower the contact resistance of many gaskets by increasing the gasket's compression. Most gaskets work effectively between 30 percent and 70 percent compression of their free-standing thickness. Hence, within the recommended minimum contact, pressure between the two facing low spots is enough to ensure adequate conductivity between the gasket and flanges.



Gasket compression, however, should not have to be so high that it induces unnatural compression set, which can lead to gasket contact failure and possible electromagnetic leakage. Flange separation requirements are essential to control gasket compression to the range recommended by the gasket manufacturer. Included in that design is the need to make sure the flanges are sufficiently rigid so as not to bow significantly between flange fasteners. In some cases, additional fasteners may be needed to prevent bowing in the case structure. Compression set is an important characteristic for joints that may be cycled, such as doors or access panels. If a gasket is prone to take a compression set, then the shielding performance will decrease with each cycle of the door panel. The gasket will require higher compression forces to achieve the shielding levels equivalent to a new gasket. In most applications, this is not possible, and a long-lasting EMI solution is needed.

If the case or the flange is plastic with a conductive coating, the addition of an EMI gasket should not pose too many problems. The designer, however, must consider the abrasion that many gaskets will impart on a conductive surface. Metal gaskets, in general, tend to be more abrasive on the coated surface. This will reduce the shielding effectiveness of the gasketed joint over time and could pose future problems for the manufacturer.

Schlegel EMI's protective coatings over the highly conductive fabric also provides abrasion resistance and allows integral wiping actions. The manufacturing process employed by Schlegel EMI creates a fusion of core and fabric, making this type of material available in various, customized shapes. Leaf seal gasket designs, such as C-Folds for example, provide an even lower compression rate.

In addition, the contact resistance with an uneven mating surface is consistent, and is minimally affected by the compression variations that maintain shielding effectiveness across an RF joint.

And since the materials used in Schlegel EMI gaskets are lightweight compared to other shielding materials, the overall weight of the end unit is reduced—a highly demanded product feature for electronic units of the 21st century. Fewer latch fasteners necessary in production also reduce the cost of materials and assembly. Additional mechanical advantages of Schlegel EMI gaskets include ease of attachment and the absence of loose wires during assembly.

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Safety and Recycling

In addition to superior conductivity and galvanic compatibility, the materials used in Schlegel EMI products meet or exceed the leading safety and recycling requirements specified by the industry.

Underwriters Laboratories and its widely recognized component program, evaluates components and materials used in products certified to UL flammability standards, including EMI gaskets, insulating materials and plastic housings for assemblies. And, unlike some foam gasket products, Schlegel EMI's complete gaskets are tested intact with their cladding and are recognized UL 94 V-O components.

Schlegel EMI gaskets meet UL 94 V-O testing requirements for gaskets down to 1.00mm in thickness, and down to 0.61mm in thickness for gaskets rated UL 94 HB, in specific claddings. Copies of the current UL "yellow" card data can be found at the Underwriters Laboratory website, www.ul.com **(Reference File No. E109346)** or from your local Schlegel EMI representative. Schlegel EMI is continually evaluating and improving its materials to expand the company's UL-recognized components.

Another important issue is the recyclability of obsolete electronic units. Now a requirement for products made or shipped into the European Union, recyclability limits the use of some materials in EMI applications. Schlegel EMI's silver, silver-monel and nickel-copper-plated products are very easy to recycle, and they are not required to have any specific handling or restricted-use limitations in accordance with current or pending environmental regulations. In addition, Schlegel EMI offers a foam core that is UL 94-VO rated and is Bromine Free to meet the new EU directives being implemented in 2004 and will become mandatory in 2006.

Schlegel EMI's Commitment to Service and Quality

Whether products are at the design stage or in the testing lab, Schlegel EMI provides customers with expert design assistance—including on-site design consultation, if necessary—and material recommendations for cost-effective solutions from prototype to final inspection and delivery.

The company's state-of-the-art design capabilities and manufacturing procedures work in tandem with the designer in identifying critical component parameters up-front to meet the exacting standards that demanding customers require.

As of April, 2003, Schlegel EMI and Fairpoint Industrial, Ltd. have established a new company, Schlegel Far East, Ltd., to extend the availability of the Schlegel EMI product line of EMI shielding products to the Far East.

The new company, which is located in Hong Kong, completes Schlegel EMI's global support and manufacturing network and fits in with its strategy of making products easily accessible to the Asian market. The company recently opened a new state-of-the-art manufacturing facility in Dongguan City, Guangdong Province, China.

The new facility brings us closer to Schlegel EMI's customer base and allows us to deliver Schlegel EMI's high-quality EMI shielding products to companies in Asia at competitive prices within 24 hours.

Schlegel EMI's manufacturing facility has made-to-order capabilities for the company's signature fabric-over-foam EMI shielding products as well as production and finishing capabilities for standard gasket designs and custom I/O designs. The facility also has engineering support on site.

Through its worldwide network of direct technical sales support, distributors and manufacturing facilities (see the front of this catalog for reference), as well as knowledgeable customer service representatives, Schlegel EMI provides fast, reliable service by delivering expert solutions quickly. From the maker of carriage trimmings of yesteryear to advanced EMI shielding for today's electronics, Schlegel EMI's commitment to quality and service has always been top priorities.

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SCHLEGEL EMI's Worldwide Locations

SCHLEGEL Rochester, NY is the company's worldwide headquarters. It has a sophisticated research and development facility and manufactures products for all four Schlegel divisions using 3 core technologies; textile products, extruded plastic products, and urethane foam products.

SCHLEGEL Graham, Texas plant manufactures pile weatherstripping for Schlegel's building products division.

SCHLEGEL Pty., Ltd. based in Sydney, Australia, produces pile, plastic and flexible brush weatherstripping for the building industry.

SCHLEGEL BvBa based in Gistel, Belgium, produces specialty textiles, cleaning brushes to remove toner from copiers and static eliminators.

SCHLEGEL GmbH based in Hamburg, Germany, manufactures and distributes sealing products for the building and automotive industries.

SCHLEGEL SRL based in Milan, Italy, operates a sales and distribution facility.

SCHLEGEL Taliana, S.A. is based in Barcelona, Spain, manufactures and distributes pile weatherstripping products for the building industry.

SCHLEGEL Engineering KK based in Tokyo, Japan, manufactures knitted wire carrier products for automotive applications and sells weatherstripping products.

SCHLEGEL Pty. based in Singapore, operates engineering sales and logistical support.

SCHLEGEL Far East based in Hong Kong, handles the fabrication and converting of EMI Shielding gaskets to include the application of double sided tape and cut to length operations.

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Glossary

C2 — A patented protective coating that offers a unique silver-to-silver metal combination to make the highly conductive fabric galvanically compatible with a wide range of metal contact surfaces.

C12 — An exclusive coating that uses insulating polyethylene on the back and a conductive protective layer on the front.

C70 — An exclusive coating that consists of a layer of copper topped by a layer of nickel, plated to a polyester rip-stop fabric and sealed with an acrylic-based C70 coating.

C-Fold™ — Low closure force gasket profiles employed primarily for cabinet door applications. Commonly referred to as “leaf seals.”

Clip attachment — An integral part formed into the gasket, which becomes the primary attachment mechanism to a flange.

Compression — The force or pressure applied to a gasket when fixed between two mating surfaces.

Compression load deflection — The amount of force necessary to compress a gasket between two mating surfaces.

Contact resistance — The electrical measurement made across or between the contact surfaces of a conductive gasket at a predetermined, fixed interval. Typically tested to LP 3001.

Cut-to-length — Cutting a product to a specific length by various methods, such as rotary blade, guillotine, or die cut.

Die cut — Cutting a complex pattern into a product using a steel rule die in a punch press. EMI I/O panel gaskets are a common application of the die-cut process.

Dynamic seal — Seals that function under a varying height from maximum to minimum limits, where loading forces will vary inversely proportional to height. An example is a seal used on the door of an enclosure.

Flammability — Term used by Underwriters Laboratories, Inc. in their UL recognition program to indicate the potential of a component to ignite or burn.

Gap size — The distance between the inner edges of two mating surfaces (e.g., the distance between door’s and cabinet’s edges).

Kiss cut — A process that cuts adhesive-backed products down to short lengths, while providing for easy removal of the release liner from the adhesive-backed pieces. Mailing or address labels are common examples of this process.

Knife edge — A commonly used term, describing a gasket or flange design that features a contoured surface, ideally employed in reduced insertion force applications.

Laser finishing — Cutting a complex pattern into a product using an X-Y plotter equipped with a laser beam. A CAD drawing is downloaded to the plotter and then “printed” with a laser beam, which cuts out the shape. Typically used for I/O gasket prototypes and short-run production.

Low closure force — The low pressure required to deflect a gasket from a free height to the maximum recommended compression height (minimum gap).

M80 — A Monel-plated non-woven polyester based laminate cladding which utilizes an advanced plating process and offers enhanced galvanic compatibility and performance.

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Mounting flange — The surface to which the gasket will be attached.

Notching — The manufacturing process of cutting a “v” or “u” shape out of a profile, typically cut with a die.

Pressure-sensitive adhesive (PSA) — A medium-firm, acrylic-based adhesive system, which features very high initial adhesion. Firm application pressure helps develop adhesive contact and improve bond strength. Properly installed, the PSA’s bond strength will increase as a function of time and temperature.

Self-mounting — Gaskets and I/O shielding gaskets that don’t require adhesive methods, such as PSA for attachment.

Shear — Shear gaskets function in applications where loading force is applied to a gasket parallel to the mounting/attachment surface with a uni or bi-directional wiping action.

Shielding effectiveness — The ratio of the signal received (from a transmitter) without the shield to the signal received inside the shield; also the insertion loss when the shield is placed between the transmitting antenna and the receiving antenna. (IEEE 299-1991) Typically tested to MIL-G 83528B.

Sliding — Contact motion in a single or bi-directional wiping action.

Static seal — Seals that function at a fixed height, where the loading force is constant.

T-slot — The T-shaped channel, which is molded or extruded into an enclosure to accept a corresponding T-slot mechanical attachment method gasket.

VersaClad — A family of products which utilizes an advanced plating process in which multiple metal substrates, in various thicknesses, can be laid down onto fabric or film. The process can lay down pure metals and multiple metals as well as alloys such as Monel.

VC100 — The first in the VersaClad family that consists of Silver and Monel plated to a woven nylon ripstop fabric. It is an ideal solution for PC and desktop computer applications.

Volume resistivity — The correlation of volume conductivity, measured in siemens per centimeter, which is a steady-state parameter. (IEEE 402-1974w) Typically tested to LP 3007.

Wide Release Liner™ — For products on which PSA is applied, this liner is wider than the adhesive strip, allowing for the gasket’s easy removal from the PSA. Standard liner is the same width as the adhesive.

Wiping — See sliding.

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