

Aerospace & Defense

Technology Solutions



About Systems Protection

Federal-Mogul Systems Protection (FMSP) is the world's foremost supplier of protective sleeving and shielding solutions for wires, hoses, and mechanical assemblies. Major industries served include automotive, aerospace and defense, as well as a host of industrial segments. With sales, manufacturing, and innovation centers located in the Americas, Europe and Asia, FMSP delivers the broadest, most innovative product portfolio to both original equipment and tier suppliers. FMSP is the proud manufacturer of Bentley-Harris® protection products.

About Federal-Mogul

Headquartered in Southfield, Michigan, Federal-Mogul Corporation is a leading global supplier of powertrain and safety technologies, serving the world's foremost original equipment manufacturers of automotive, light commercial, heavy-duty, agricultural, marine, rail, off-road and industrial vehicles, as well as the worldwide aftermarket. With locations in 35 countries, the company's leading technology and innovation, lean manufacturing expertise, as well as marketing and distribution deliver world-class products, brands and services.

Our Mission

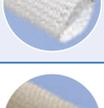
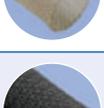
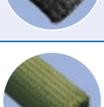
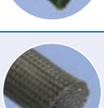
To be recognized by our customers, on a worldwide basis, as the pre-eminent supplier of protection products, by providing excellent product value, outstanding customer service and innovative product solutions.



Powerful Solutions for Superior Aircraft Protection

ABRASION & BUNDLING



| Product | Description | Temperature | Flammability | Halogen Free | Design and Construction | Available Sizes |
|---|---|--|-------------------------------|--------------|---|---|
|  ROUNDIT® PPS | A lightweight, solution that provides abrasion protection in areas within close proximity to fluid lines or in space applications where low outgassing is required. | -60°C to +175°C (-76°F to +347°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Polyphenylene Sulfide (PPS) | 5 to 38 mm (3/16" to 1-1/2") |
|  ROUNDIT® 2000 NX | A flexible solution that provides excellent abrasion and cut-through resistance; oil and water repellent. Qualified to ASD EN6049-006 and BMS 13-81 Type 1. | -60°C to +200°C (-76°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nomex® and PPS | 5 to 40 mm (3/16" to 1-1/2") |
|  ROUNDIT® 2000 NX PTR/VTR | Designed with a pink tracer to identify fuel lines or a violet tracer to identify fiber optics, as well as an ivory tracer to indicate maximum operating diameter; oil and water repellent. Qualified to ASD EN6049-006. | -60°C to +200°C (-76°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nomex® and PPS | 5 to 40 mm (3/16" to 1-1/2") |
|  ROUNDIT® 2000 NX Red / Orange | Designed to identify wire harnesses connected with test equipment taken on-board airplanes (Orange) or with weapon systems (Red); oil and water repellent. Qualified to ASD EN6049-006. | -60°C to +200°C (-76°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nomex® and PPS | 5 to 40 mm (3/16" to 1-1/2") |
|  ROUNDIT® 2000 NX GRIP | Designed with a sewn loop textile attachment method which, in conjunction with an adhesive hook, enables attachment of the wire harness directly to the aircraft structure thus reducing the space needed between the wire harness and the structure. | -60°C to +200°C (-76°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nomex® and PPS | 5 to 40 mm 3/16" to 1-1/2" |
|  Expando® HR Plus | Fray-resistant and flame retardant solution used for abrasion protection over a range of temperature environments. | -70°C to +150°C (-94°F to +302°F) | • FAR Part 25 § 853 • VW-1 | | Design: Tubular Construction: Halar®(E-CTFE) fluoropolymer | 3 to 64 mm (1/8" to 2-1/2") |
|  Expando® 686 DM | Optimal solution for use where a combination of abrasion protection and lightweight properties are required. | -70°C to +200°C (-94°F to +392°F) | • FAR Part 25 § 853 • VW-1 | ✓ | Design: Tubular Construction: PEEK & PPS | 3 to 64 mm (1/8" to 2-1/2") |
|  Expando® PPS | Designed for mechanical protection in high temperature areas. Often used for its outstanding properties in extreme environments. | -70°C to +200°C (-94°F to +392°F) | • FAR Part 25 § 853 • VW-1 | ✓ | Design: Tubular Construction: PPS | 3 to 45 mm (1/8" to 1-3/4") |
|  Expando® HTNS-L/HO | Low flammability and resists damage from most chemicals. Features an open-braid construction, making the product highly flexible and resistant to trapping water, heat and humidity. Qualified to EN6049-003. | -60°C to +240°C (-76°F to +464°F) | • FAR Part 25 § 853 • VW-1 | ✓ | Design: Tubular Construction: Nomex® | 2 to 30 mm (1/16" to 1-3/16") |
|  Expando® PEEK | Designed for mechanical protection in temperature extremes and hostile conditions. | -70°C to +260°C (-94°F to +500°F) | • FAR Part 25 § 853 | ✓ | Design: Tubular Construction: PEEK | 3 to 64 mm (1/8" to 2-1/2") |
|  Expando® PFA | Self-extinguishing when used to encase typical non-flammable wires or cables, has low flammability and resists damage from most chemicals. | -70°C to +260°C (-94°F to +500°F) | • FAR Part 25 § 853 | | Design: Tubular Construction: PFA | 3 to 32 mm (1/8" to 1-1/4") |
|  Silicone Tapes | Provide good fluid resistance and are ideal for sealing, connecting and finishing cut ends. Also available with fiberglass reinforcement for increased mechanical strength. | -60°C to +250°C (-76°F to +482°F) | | | Design: Flat Construction: Silicone | Maximum elongation ranges from 200% to 500%. Multiple widths and thicknesses available. |
|  Lacing Tapes | Flat braided textiles that feature outstanding chemical and thermal stability, are fray resistant and have a high breaking strength. TG series conforms to CID-A-A-52083 Finish D. | -55°C to +1100°C (-67°F to +2012°F) | | | Design: Flat Rectangular Construction: Available in Teflon-coated fiberglass, Nomex® or ceramic fibers | |

ELECTRICAL INSULATION



| Product | Description | Temperature | Flammability | Halogen Free | Design and Construction | Available Sizes |
|---|---|--------------------------------------|---------------------|--------------|---|-------------------------------------|
|  Ben-Har® 1151 FR-B | A rugged, flame-retardant solution that provides both electrical insulation and abrasion resistance. Difficult to ignite and self-extinguishes promptly. Grade B qualified to DMS 2109. | -70°C to +200°C (-94°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Tubular Construction: Silicone Rubber Coated Fiberglass Sleeving | 14 AWG through 3" (Grade B only) |
|  ROUNDIT® 2000 NX HT | A high temperature version of ROUNDIT® 2000 NX. Includes a wide ivory tracer on the outer side for identification purposes; oil and water repellent. Qualified to ASD EN6049-007. | -60°C to +260°C (-76°F to +500°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nomex® and Polyetheretherketone (PEEK) | 5 to 40 mm (3/16" to 1-1/2") |

Powerful Solutions for Superior Aircraft Protection

THERMAL MANAGEMENT

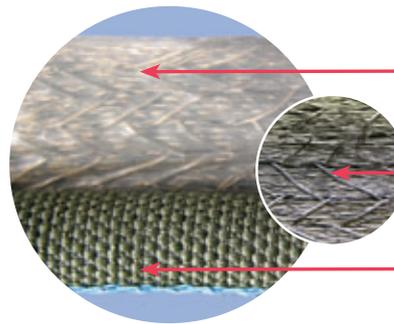
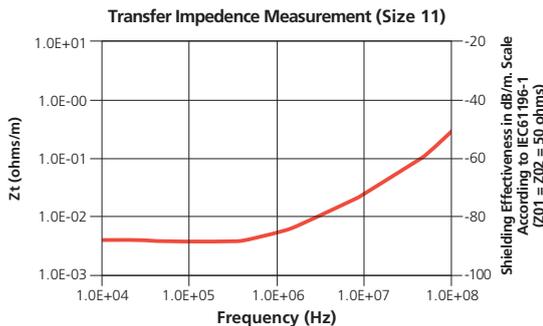


| Product | Description | Temperature | Flammability | Halogen Free | Design and Construction | Available Sizes |
|---|---|---|--|--------------|---|---|
|  Aerospace FyreJacket® | Protects components in extreme temperatures. Silicone rubber coating has excellent shedding properties; meets AS 1072. | -54°C to +260°C (-65°F to +500°F) | Withstands 15 min at +1100°C (+2012°F) when installed on AS 1055 hose assembly | ✓ | Design: Tubular. Also available in tape form (FyreTape®) Construction: Silicone outer layer and fiberglass inner layer | 5 to 100 mm (1/4" to 4") |
|  ROUNDIT® Therm-A | Three layer design provides thermal/fire protection and excellent cut-through and abrasion resistance; oil and water repellent. | -60°C to +260°C (-76°F to +500°C) | Withstands 5 min at +1100°C (+2012°F) according to ISO 2685 | ✓ | Design: Wrappable Construction: ROUNDIT® 2000 NX HT, silica and Panox® | 10 to 32 mm (3/8" to 1-1/4") |
|  ROUNDIT® Therm-B | Two layer design provides increased thermal/fire protection and excellent cut-through and abrasion resistance; oil and water repellent. | -60°C to +260°C (-76°F to +500°C) | Withstands 15 min at +1100°C (+2012°F) according to ISO 2685 | ✓ | Design: Wrappable Construction: ROUNDIT® 2000 NX HT and FyreTape® | 10 to 32 mm (3/8" to 1-1/4") |
|  Therm-L-Wrap™ 66 | Self-wrappable sleeve with an adhesive closure; offers excellent radiant heat protection and excellent EMI shielding performance | -60°C to +200°C (-76°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Aluminum outer layer and fiberglass inner layer | 10 to 25 mm (3/8" to 1") |
|  Therm-L-Gard™ | Custom multilayer heat shielding system also shown to provide good EMI shielding performance | Based on construction; customized testing can be conducted to actual application specific heat environment. | • FAR Part 25 § 853 | ✓ | Design: Application specific Construction: Fiberglass fabric with aluminum laminate | Custom parts may be slit to width and length or die cut into complex geometric shapes |

ELECTROMAGNETIC SHIELDING



| Product | Description | Temperature | Flammability | Halogen Free | Design and Construction | Available Sizes |
|--|---|-----------------------------------|---------------------|--------------------|--|-----------------------------|
|  ROUNDIT® 2000 NX EMI | Provides mechanical/abrasion protection with outer layer and EMI shielding with inner layer; oil and water repellent. | -55°C to +200°C (-65°F to +392°F) | • FAR Part 25 § 853 | ✓ (Type A only) | Design: Wrappable Construction: Nickel-plated copper C27 according to ASTM B-355 combined with Nomex® multifilaments and PPS monofilaments; PTFE layer optional | 6 to 38 mm (1/4" to 1-1/2") |

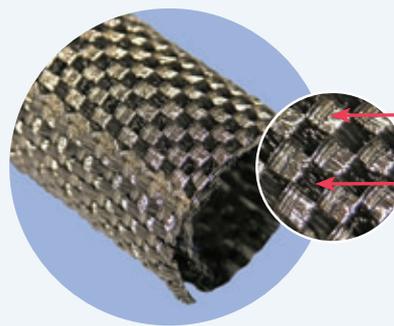
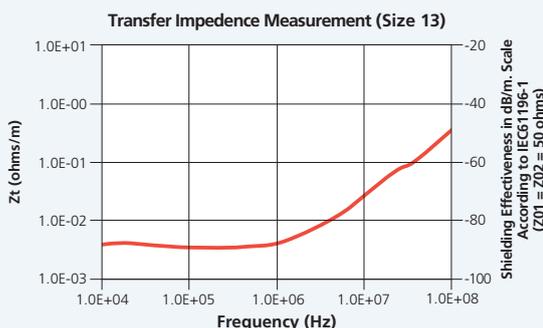


Optional PTFE inner layer provides protection of component from the metal

Braided nickel-plated copper wire provides EMI insulation

Nomex® & PPS construction with oil and water repellent treatment

| | | | | | | |
|--|--|-----------------------------------|---------------------|---|---|------------------------------|
|  ROUNDIT® EMI FMJ | Self-wrapping metal solution with 95% optical coverage; flexible and easy to install providing very high performance EMI shielding | -65°C to +200°C (-85°F to +392°F) | • FAR Part 25 § 853 | ✓ | Design: Wrappable Construction: Nickel-plated copper C4 according to ASTM B-355 combined with PPS monofilament | 8 to 38 mm (5/16" to 1-1/2") |
|--|--|-----------------------------------|---------------------|---|---|------------------------------|



Nickel-plated copper strands are woven to provide high conductivity and ensure EMI shielding with a 95% optical coverage

PPS monofilaments ensure aerospace-grade temperature and a highly flexible assembly



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