

CIRCUITEX CONDUCTIVE SHIELDING MATERIAL

HIGHLY CONDUCTIVE TEXTILE TECHNOLOGY FOR SUPERIOR SHIELDING



SHIELDING TECHNOLOGY

Advancements in technology are changing today's infrastructure at unprecedented speed. An increasingly faster-paced market requires faster, smarter materials to compete, construct, and protect.

CIRCUITEX Shielding Technology by NOBLE is specifically engineered to meet the demands of today's, and tomorrow's, technical advancements.

Our mission-critical, Berry compliant products for shielding, conductivity, and dissipation applications are currently used by leaders of industry and trusted by the most discerning product engineers in the military, including U.S. and Allied Special Forces, aerospace, NASA, Lockheed Martin, Northrup Grumman, and Boeing.

PROTECTION AT THE HIGHEST LEVELS

We are NOBLE - the global leader in fiber science. Our smart technologies are developed to power products that solve real problems; protecting, saving, healing, and improving lives. We consider this **The Noble Advantage**.

THE DEMAND FOR A MATERIAL ADVANTAGE

Never before has demand for shielding and protection materials been so urgent. Fortunately, the engineers at NOBLE are ahead of the game. CIRCUITEX Conductive Shielding Material, developed with a proprietary, state-of-the-art polymer science, redefines the approach to building safe, secure data infrastructures.

- Z-Axis Conductivity
- EMI Shielding
- RFI Shielding
- IR Signature
- Data Warehouse Protection
- Electrostatic Discharge
- Flexible Material Taping
- Biometric Monitoring
- Fabric-Over-Foam Solutions
- Thermal Conductivity
- Pressure Sensitive Solutions
- High Frequency Microwaves

TECHNOLOGY THAT CHANGES MARKETS

FABRIC METALLIZATION

Using proprietary technology, CIRCUITEX Conductive Shielding Material permanently bonds pure silver to the surface of polymer substrates, including yarn, fiber, fabric, tape, and foam. For superior design flexibility, the material can be blended with natural or man-made fibers. The result is a highly conductive, durable, flexible, washable material with 360° permanent encapsulation coating.

- Superior performance
- Covalent chemical bond
- Micron-thin coating
- Super lightweight construction
- Textile integrity, polymer properties unchanged (stretch, durability)
- Permanent (lasts for the life of the polymer)
- Inherent antimicrobial construction with conductivity optimization
- Custom formulations protect against galvanic reactions and oxidization



NEXT GENERATION MARKET APPLICATIONS

**EFFECTIVENESS AND EFFICIENCY
IS ALL THAT MATTERS**

CIRCUITEX Conductive Shielding Material is essential.

- Medical equipment
- Municipal infrastructure
- Data warehousing and communications
- Radio frequency interferences:
digital displays, computers, smart phones,
tablets, GPS devices, drones
- 5G security and shielding
- Electromagnetic interference shielding for cable assemblies
- Electrostatic discharge protection
- Lightweight electrical pathways for low voltage
power transmissions
- Vehicle and HVAC control systems



EMI/RFI SHIELDING

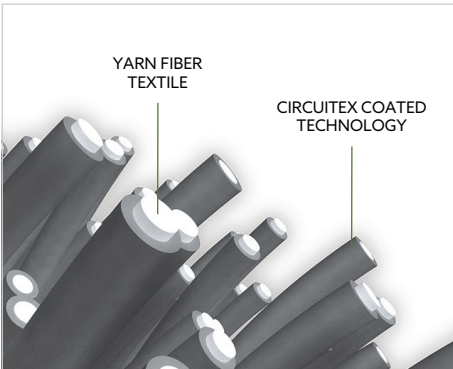
FAILURE IS NOT AN OPTION

CIRCUITEX Conductive Shielding solutions deliver soft surface, lightweight, flexible materials for broad spectrum shielding applications.

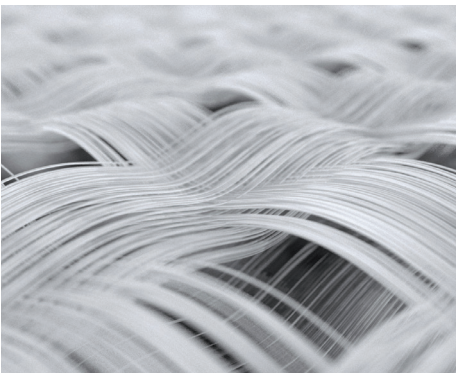


These materials provide unmatched consistency and performance in shielding effectiveness, decibel reduction, Z-axis electrical and thermal conductivity, softness, and flexibility.

NOBLE's products are easy to integrate, can be processed on standard textile manufacturing equipment, perform to exacting specifications, and are utilized in a wide range of commercial and industrial applications.



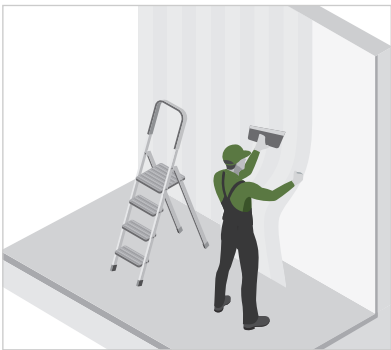
- Cable shielding
- High frequency microwave shielding
- Seam shielding or filling
- EMI/RFI repair kits
- Grounding planes
- EMI/RFI gaskets in fabric over foam
- Static dissipation
- EMI shielding for tents, shelters, and portable structures
- High-altitude electronic shielding
- High-temp shielding
- Data protection bags and pouches
- Missile transportation
- Naval towed array sonar



EMI/RFI SELF-STICK SHIELDING PRODUCTS



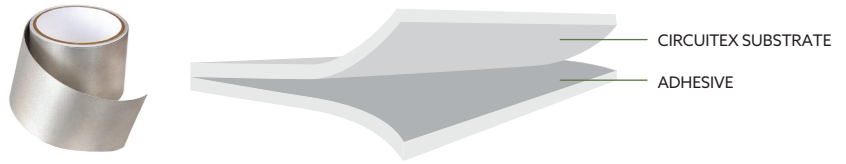
Trust CIRCUITEX Conductive Shielding Material to secure large and small spaces for secrecy, equipment testing, and data segregation.



From airplane hangars and closets to transportation cases and meeting areas, CIRCUITEX protects them all. We serve a wide range of market sectors including telecom, big data, government, information technology, manufacturing, aerospace, automotive, and more.

ANY SPACE IS OUR SPACE

- FR capabilities meet ASTM requirements
- Assembled to fit your specific program requirements
- Available in several configurations to accommodate various performance specifications
- Highly durable, our textile-based products deliver the flexibility and weight savings required to effectively shield portable and deployable structures.



INSTALLS FAST WITH MINIMAL EFFORT

Specifically designed for implementation in environments where time and manpower are at a minimum, CIRCUITEX can be installed quickly and easily by anyone.

- No soldering or other complicated seaming
- Very little to no down time needed for installation
- Install in finished spaces or during construction
- Produced in convenient rolls of various widths



MULTI-SPECTRAL CAMOUFLAGE AND LOW OBSERVABLE TECHNOLOGY



WHEN YOU NEED A STRATEGIC ADVANTAGE

Proven to prevent detection by thermal imaging technology, CIRCUITEX Multi-Spectral Shielding Materials are effective in both the visible light and infrared portions of the EM spectrum. These highly specialized materials improve performance, decrease noise detection, reduce weight, improve comfort, and increase portability in situations where eluding radar, infrared, sonar, and other detection methods is critical.

MULTI-SPECTRAL

- Warfighters and Special Details
- Uniforms and Equipment for Soldiers
- Vehicles

SONAR

- Ships
- Submarines

LOW OBSERVABLE

- Aircraft
- Drones
- Hovercraft



CONSTRUCTION AND DELIVERABLES

ELEMENTAL CAPABILITIES

- Material choices include Silver, Copper, and other conductive options
- Compatible with the addition of carbon, graphene, conductive inks, and other coatings
- Different fabric construction and additional coatings, like polyurethane, acrylics, and a variety of other materials, are available
- Multiple plies can be utilized to tailor shielding performance

CIRCUITEX FABRICS

- Available in a variety of weights (OPSY/gsm) and levels of conductivity (Ω /square) to fit a wide range of technical needs
- Fabric conductivity options can be tailored as needed, and are available as low as 0.006 Ω /square in electrical resistance
- Verified to be effective in shielding from 30MHz through 40GHz and can be adjusted to provide 40 to 100 dB in shielding performance

CIRCUITEX YARNS

- Available in a variety of deniers and levels of resistance
- Highly durable
- Can easily be integrated into standard textile processes
- Yarn conductivity options can be tailored as needed, and are available in levels of electrical resistance of less than 10 Ω /meter

CIRCUITEX PRINTING

- Digital printing on fabric
- Traditional screen, wet printing

CIRCUITEX TAPES AND WALLPAPERS

- Adhesive tapes for use on trim and small areas
- Large-format papers for covering walls of any size



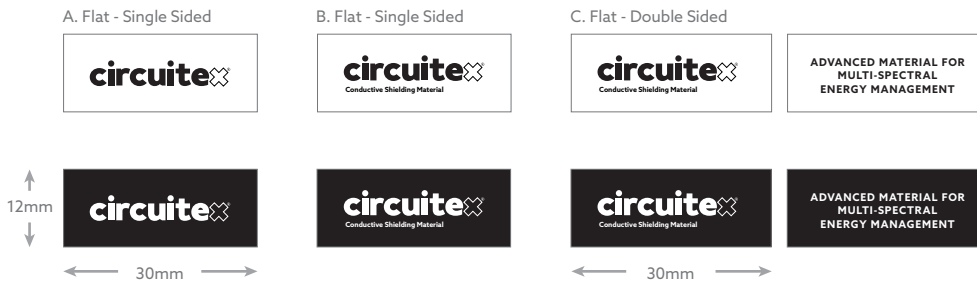
CIRCUITEX BRAND SUPPORT FOR ALL END USE PRODUCTS*



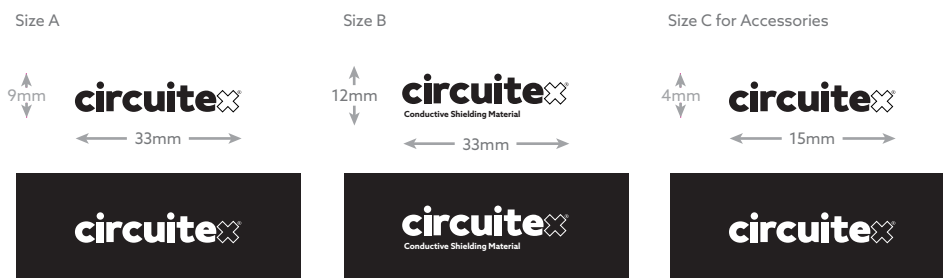
HANGTAGS One universal, multilingual tag for all products in all sizes, printed on 100% recycled paper



PRINTED FABRIC LABELS A universal label: three styles, positive and reverse designs



HEAT TRANSFERS A universal emblem: three styles, positive and reverse designs



* Additional languages for Asia available upon request. Brand support is complimentary on orders that are placed 60 days before in-hand date.

REGULATORY AND AFFILIATIONS



US FOOD & DRUG
ADMINISTRATION
Class 1 & 2 Medical
Device Approvals



EUROPEAN COMMUNITY
CERTIFICATION
Cleared for use in Class 1,
2 and 3 Medical Devices



EU DIRECTIVE
2002/95/EC



EU REGULATION (EC)
No. 1907/2006



BLUESIGN
System Partner

FOR MORE INFORMATION, PLEASE CONTACT:

US WEST COAST

Ian Pund
ipund@noblebiomaterials.com

US EAST COAST

Mark Sardella
msardella@noblebiomaterials.com

US SOUTH

Bennett Fisher
bfisher@noblebiomaterials.com

US MIDWEST

Brian Fee
bfee@noblebiomaterials.com

ASIA

Alison Tsui
atsui@noblebiomaterials.com

EUROPE, INDIA, AND MIDDLE EAST

Steve Milner
smilner@noblebiomaterials.com

REGULATORY

Terry Walmsley
twalmsley@noblebiomaterials.com

MARKETING

Allon Cohne
acohne@noblebiomaterials.com

NOBLE Biomaterials is a global leader in antimicrobial and conductivity solutions for soft-surface applications. The company produces advanced material technologies designed for mission-critical applications in the performance apparel, healthcare, industrial, and emerging wearable technology markets. Its flagship brands, X-STATIC®, IONIC+™, and CIRCUITEX®, are used by world-class licensees to provide odor elimination, infection prevention/management, biometric monitoring, and conductive protection benefits. Our headquarters and manufacturing facilities are located in Scranton, Pennsylvania, and we have a network of offices across Europe, Asia, and South America. Learn more at NobleBiomaterials.com.

NOBLE | THE BIOMATERIAL ADVANTAGE

NOBLE BIOMATERIALS, INC
300 PALM STREET, SCRANTON, PA 18505

+1 (570) 955-1800 • FAX +1 (570) 955-1801
INFO@NOBLEBIOMATERIALS.COM