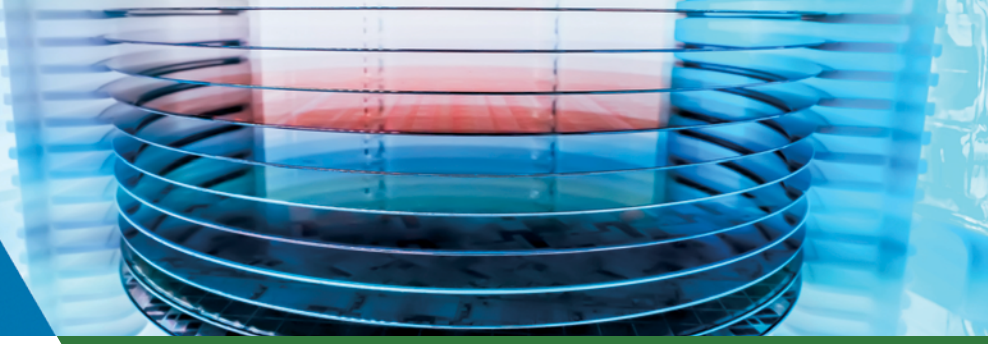


SEALING SOLUTIONS FOR THE SEMICONDUCTOR INDUSTRY

Greene Tweed's MSE® products offer superior performance at cryogenic temperatures as low as -150°C.

Greene Tweed MSE® seals are an effective choice when standard elastomer-based seals don't meet the operating requirements of a harsh environment including extremely low temperatures. MSE® (Metal Spring Energized) seals incorporate plastic jacket materials over varying spring designs. The jacket provides the seal surface and the spring provides sealing force between the jacket and the hardware. Avalon® fluoroplastic jacket materials provide high and low temperature capability and chemical resistance. Spring design and material provide optimized seal force in application. Together they provide a total seal solution.

MSE® Seals

Solid Spring MSE® Seal

MSE® seals set the standard for performance in corrosive and extreme temperature environments.

- The MSE® seal's superior designed dual-lip body offers improved sealing performance in virtually unlimited media service and the widest temperature range
- Virtually unlimited media service with one seal
- Will not contaminate sensitive media
- Cryogenic to 550°F (288°C), providing excellent performance at extreme temperatures
- Operates effectively at pressures from vacuum to 19,000 psi (1,310 bar) and up to 30,000 psi (2,068 bar) with custom designed anti-extrusion ring.*

The Solid Spring MSE® additionally outperforms at low temperatures.

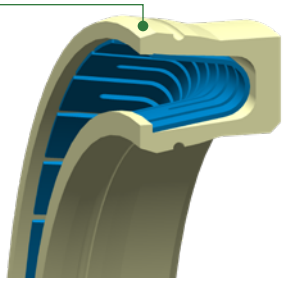
- Helium leak testing showed leak rates of $1.00E^{-11}$ atm cc/sec at -150°C (230 PSI) under test conditions
- Demonstrated better leakage performance than finger springs or coil springs at cryogenic temperatures
- Avalon 56HP Jacket (PTFE) provides the highest level of cleanliness for sealing materials
- GT considering testing at even lower temps (-196°C)

A wide range of industries and applications rely on Greene Tweed's selection of **custom-engineered MSE® sealing solutions.**

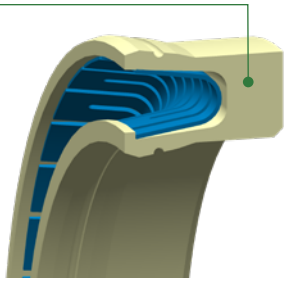
*Please contact your Greene Tweed team for custom design options.

Various MSE® design examples

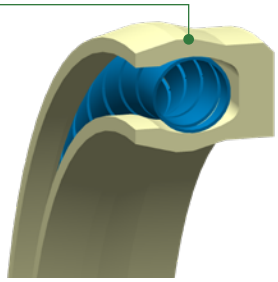
MSE® seal jacket designs vary depending on the primary function.



Sealing Lip
Designed to maintain strong compression force between seal lip and mating substrate



Extended Heel
For higher etch-rate applications requiring extra erosion resistance



Static Sealing
Designed for much higher initial compressive and spring force

To learn more about our MSE seals solutions, download our MSE catalog.

Designed to your needs

No matter how challenging the environment, Greene Tweed experts design the exact solution necessary to meet your operating requirements.

Full Suite of Design Tools

- Solidworks CAD modeling
- FEA (Abaqus, Simulation)
- Rapid prototyping
- Thermal analysis

Concurrent Engineering

- Local Application Engineering
- Improves efficiency of the design process
- Extends customers design resources
- Shortens the product development cycle

Product Testing

- Custom testing services for Compliance, Qualification, Design Verification and Failure analysis
- Full project scope Capabilities, Engineering, System and Fixture design, Testing and Analysis

Materials Testing

- Mechanical testing
- Chemical analysis
- Morphology analysis
- Other testing

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