

**30+ Years**  
**MANUFACTURING**  
**PRECISION**  
**FEEDTHROUGH**  
**PRODUCTS**



# ABOUT MPF PRODUCTS

## Company

MPF Products is a US-based manufacturer of precision ceramic-to-metal hermetic feedthroughs, connectors, isolators, viewports, and related components — all rated for ultra-high vacuum (UHV) applications. Together with Blue Ridge Optics, we offer specialized engineering expertise and an extensive range of standard designs, as well as custom-built, high-reliability solutions.

## Sealing Technology

We have deployed several different sealing technologies to create hermetic seals between conductive metal components and dielectrics. These strategies are effective from -269°C to 450°C, depending on the materials used.

### • Active Metal

A proprietary getter layer and active braze material fuse ceramics with thin-walled transition metals. High-temperature bonding creates a robust hermetic seal, enabling dependable performance for the most demanding UHV applications.

### • Thick/Thin Film Metalization

Using a proprietary formulation of molybdenum-manganese (Mo-Mn), alumina ceramics are sintered, nickel coated, and joined with a tailored braze alloy. Vacuum furnace firing creates a reliable hermetic seal.

### • Glass-Ceramic

Metal surfaces are bonded using an amorphous glass material with an appropriate coefficient of thermal expansion. During heat treatment, the glass crystallizes to form a strong hermetic seal.

### • Mechanical

MPF's proprietary gasket material enables compressive seal designs suitable for use in UHV environments up to 200°C. This serviceable and relatively flexible "soft seal" technology complements our "hard seal" molecular bonding techniques described above.

MPF is trusted to deliver solutions for global Fortune 500 companies in the Aerospace, Communications, Defense, Electronics, Energy, Industrial, Life Sciences, Medical, Nanotechnology, Nuclear, Photonics, and Semiconductor sectors. We are proud to design and manufacture products for entities such as:

#### MANUFACTURERS:

- 3M
- Agilent Technologies
- Ametek
- Applied Materials
- ASML
- General Electric
- Honeywell
- Horiba
- LAM
- Lockheed Martin
- KLA Tencor
- Raytheon
- Veeco

#### RESEARCH LABS:

##### United States:

- Argonne
- Brookhaven
- Fermi
- Jet Propulsion Lab
- Idaho National
- NASA
- NIST
- Pacific Northwest
- Sandia

##### Asia Pacific:

- Australian Synchrotron
- Pohang Light Source II
- Singapore Synchrotron
- Taiwan Light Source

##### Canada:

- Canadian Light Source
- TRIUMF

##### Europe:

- CERN
- DESY
- Diamond Light Source
- INFN
- ITER

# VIEWPORTS

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All of our designs can be manufactured for fully non-magnetic applications by utilizing titanium or several different grades of stainless steel material.



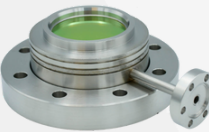
## Standard

Sapphire & Fused Silica viewports including UV, DUV, and EUV Laser Grade optics.



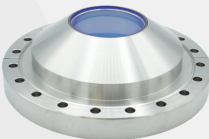
## Laser Applications

Our designs can incorporate various window materials with various anti-reflective (AR) coatings or random anti-reflective (RAR) nano-texture technology for use in ND-YAG, ArF, KrF, XeCl, Diode, F2, and Helium Neon laser applications.



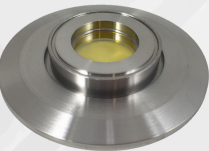
## Differentially Pumped

Designed for extreme high vacuum applications where you need an access port to the window cavity pump-out.



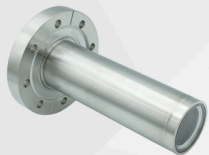
## Over-Pressure

Created to withstand sudden extreme pressure bursts. Tested to withstand high pressure and avoid catastrophic rupture in critical UHV applications.



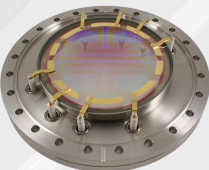
## Extended Range

These ultra-high vacuum (UHV) viewports employ window materials such as Calcium Fluoride, Crystal Quartz, Germanium, Magnesium Fluoride, and Zinc Selenide.



## Re-Entrant & Protruding

Specialized standard and laser grade viewports for UHV and high-pressure applications. Engineered to exact specifications. AR coatings and RAR nano-texture options available.



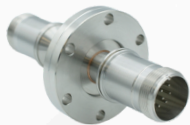
## Custom Designs

MPF can manufacture specialty designs with AR coating, ITO coating, RAR nano-texture, various lens thicknesses, wedged & angled geometries, and a range of view diameters.



# STANDARD CATALOG

Visit us online at [www.mpfpi.com](http://www.mpfpi.com) to review our 2,200+ parts catalog to find ceramic-to-metal feedthroughs, connectors, isolators, viewports, and related components.



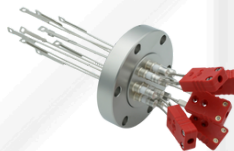
Connectors:  
Mil-C-5015 & Mil-C-26482



Base Plate  
Feedthroughs



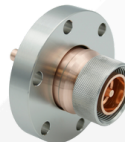
Sub-D Mil-DTL-24308 &  
Micro-D Mil-DTL-83513



Thermocouple:  
C, E, J, K, N, R, S, T



RF Power to 13.56 MHz  
Up to 35 kW



Coaxial: SMA, BNC, MHV,  
SHV, Type N Microdot, SMB,  
True Triax, HN 7/16, N to  
SMA, BNC to Microdot



High Voltage and High  
Current Feedthroughs



Isolators: 5 to 60 kV Non-  
Magnetic, Weld or Braze





# ***SPECIALTY DESIGNS***

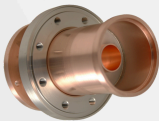
In addition to our standard catalog items, MPF specializes in the design and manufacture of custom ceramic-to-metal assemblies, engineered for the most demanding applications. Our multidisciplinary team of expert engineers, scientists, and technicians brings decades of experience to every project, working closely with your team to translate application requirements into optimized designs that ensure high reliability, precision, and performance.

Every specialty project is supported by a dedicated project manager and backed by our advanced manufacturing capabilities and rigorous quality standards. We leverage our extensive experience, proven best practices, and a collaborative approach to deliver precision-built components that meet exacting specifications, while also withstanding the most challenging operating conditions.

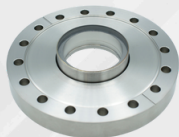
## **CUSTOM ORDER EXAMPLES**



- Low Energy RHIC Electron Cooling (LEReC)
- Computer Aided Detection Beam Position Monitor
- 30 mm Button Antenna



- 4 kW Variable RF Power Coupler
- 300 K RF Window
- For Use With FRIB Quarter-Wave Cavities
- Ceramic to Copper Brazing



- High-Tolerance Viewport
- 20 Kpsi Sapphire Window
- UHV and High-Pressure



- Coaxial Feedthrough for Transmission / Detection
- Based on MPF Standard SMA for Reduced Costs
- Precise Tolerances for Beam Position Monitor
- Custom-Machined Housing



- Broadband Transmission of RF Signals Into Cryogenic UHV Cavity
- 50 Ohm Impedance Matched
- Copper-Alloy Components Sealed to Alumina Ceramic
- UHV Metal-Sealed Flange Mount
- Integrated Liquid Cooling

Visit  
[mpfpi.com](http://mpfpi.com)  
for more  
information  
about custom  
orders!



# TECHNICAL RESOURCES

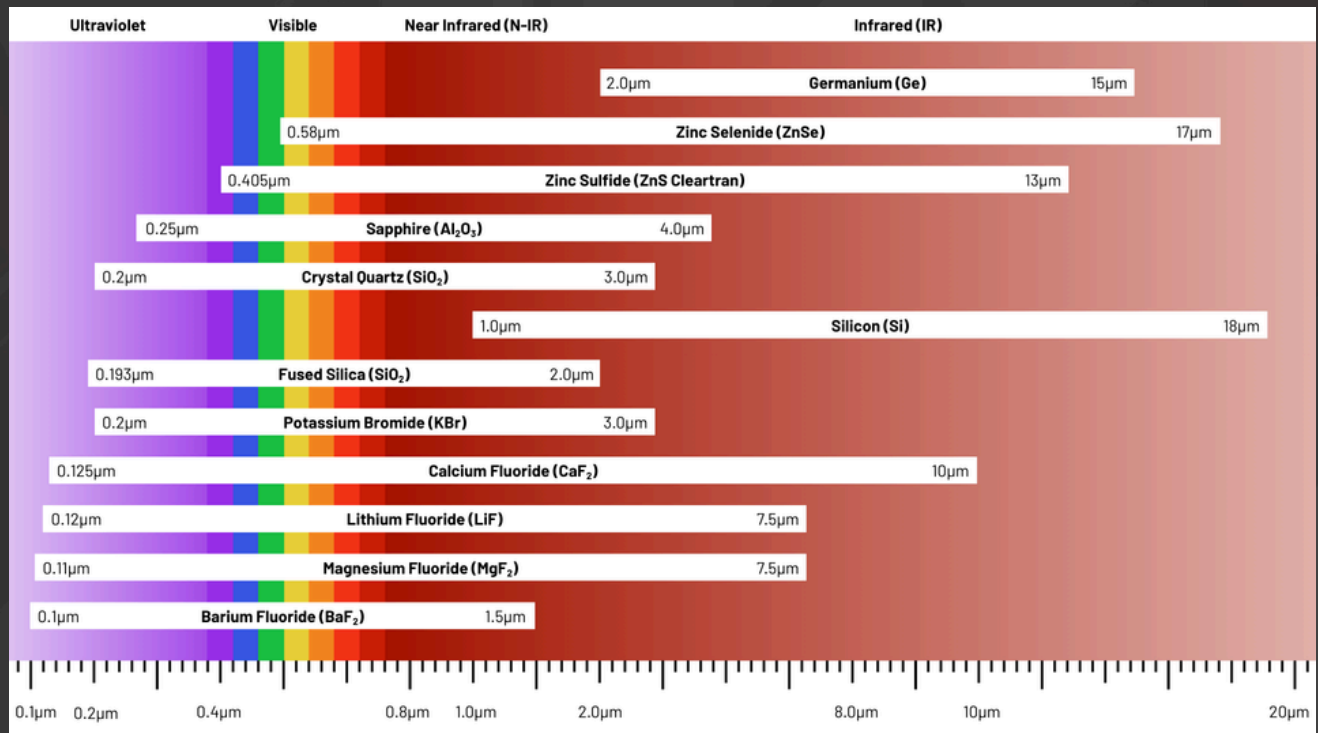
## COAXIAL CONNECTOR DESIGNS

TYPE	VOLTS	AMPS
Microdot	500	2
SMB	375	0.5
SMA	700	1
BNC	500	3
Type N	500	3
BNC to Microdot	500	2
N to SMA	500	1
Triax	500	1
MHV	5,000	3
SHV 5	5,000	5
SHV 10	10,000	5
SHV 20	20,000	15
7/16" DIN	2700 VRMS	NA

## MPF CAPABILITIES & OTHER FACTS:









- 21,000+ ft<sup>2</sup> Manufacturing Facility
- Partial Pressure Vacuum Ovens
- Vacuum Brazing & TIG Welding
- Machining & Turning Centers
- High Pot Test to 40 kV
- Cryogenic Testing to -196°C
- Micro Amp Leakage Current Testing
- Leak Testing to  $1 \times 10^{-9}$  Atm cc/sec (He)
- Pressure Test to 30,000 PSI
- 2,200+ Standard Catalog Items
- Engineering Software: SOLID WORKS
- Company in operation since 1994
- Customer Base: Fortune 500
- Supplier for World-Renowned Research Facilities

## WINDOW MATERIAL TRANSMISSION CHART



# TECHNICAL RESOURCES

## THERMOCOUPLE REFERENCE TABLE

TYPE	MATERIAL	POLARITY	TEMPERATURE RANGE
<b>K</b> 	Chromel Alumel	+ -	-184 to 1260°C
<b>C</b> 	Tungsten 5% Rhenium Tungsten 26% Rhenium	+ -	0 to 2760°C
<b>E</b> 	Chromel Constantan	+ -	-184 to 900°C
<b>J</b> 	Iron Constantan	+ -	0 to 750°C
<b>T</b> 	Copper Constantan	+ -	-184 to 400°C
<b>N</b> 	Nicrosil (NiCrSi) Nisil (NiSiMg)	+ -	-270 to 1300°C
<b>R</b> 	Platinum 13% Rhodium Platinum	+ -	0 to 1540°C
<b>S</b> 	Platinum 10% Rhodium Platinum	+ -	0 to 1540°C

## DIELECTRIC MATERIALS & METALS

### Insulating Materials

- Alumina ( $\text{Al}_2\text{O}_3$ )
- Sapphire ( $\text{Al}_2\text{O}_3$ )
- Fused Silica (Amorphous  $\text{SiO}_2$ )
- Zirconia Toughened Alumina ( $\text{ZrO}_2\text{-Al}_2\text{O}_3$ )
- Zinc Selenide ( $\text{ZnSe}$ )
- Zinc Sulfide ( $\text{ZnS}$ )
- Cleartran
- Calcium Fluoride ( $\text{CaF}_2$ )
- Magnesium Fluoride ( $\text{MgF}_2$ )
- Crystal Quartz ( $\text{SiO}_2$ )

### Conductive Materials

- Titanium
- Stainless Steel (304 / 304L / 316 / 316L / 316LN)
- OFHC Copper CDA 101
- Molybdenum
- Nickel 200
- CuNi (70/30)
- NiFe (52%) / NiFe (42%)
- Kovar (FeNiCo I) / Inconel
- Platinum / Palladium / Gold / Silver
- Chromel / Constantan
- Niobium





INFINITE POSSIBILITIES  
ZERO COMPROMISE

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ENGINEERING LIGHT  
EMPOWERING INNOVATION

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