Material	ρ (Ω•m) at 20 °C Resistivity	σ (S/m) at 20 °C Conductivity
Silver	1.59×10^{-8}	6.30×10^{7}
Copper	1.68×10^{-8}	5.96×10^{7}
Annealed copper	1.72×10^{-8}	5.80×10^{7}
Gold	2.44×10^{-8}	4.10×10^{7}
Aluminum	2.82×10^{-8}	3.5×10^{7}
Calcium	3.36×10^{-8}	2.98×10^{7}
Tungsten	5.60×10^{-8}	1.79×10^{7}
Zinc	5.90×10^{-8}	1.69×10^{7}
Nickel	6.99×10^{-8}	1.43×10^{7}
Lithium	9.28×10^{-8}	1.08×10^{7}
Iron	1.0×10^{-7}	1.00×10^{7}
Platinum	1.06×10^{-7}	9.43×10^{6}
Tin	1.09×10^{-7}	9.17×10^{6}
Carbon steel	(10^{10})	1.43×10^{-7}
Lead	2.2×10^{-7}	4.55×10^{6}
Titanium	4.20×10^{-7}	2.38×10^{6}
Grain oriented electrical steel	4.60×10^{-7}	2.17×10^{6}
Manganin	4.82×10^{-7}	2.07×10^{6}
Constantan	4.9×10^{-7}	2.04×10^{6}
Stainless steel	6.9×10^{-7}	1.45×10^{6}
Mercury	9.8×10^{-7}	1.02×10^{6}
Nichrome	1.10×10^{-6}	9.09×10^{5}
GaAs	5×10^{-7} to 10×10^{-3}	5×10^{-8} to 10^{3}
Carbon (amorphous)	5×10^{-4} to 8×10^{-4}	1.25 to 2×10^{3}
Carbon (graphite)	2.5×10^{-6} to 5.0×10^{-6} //basal plane 3.0×10^{-3} ☐basal plane	2 to 3×10^{5} //basal plane 3.3×10^{2} ☐basal plane

Material	ρ (Ω•m) at 20 °C Resistivity	σ (S/m) at 20 °C Conductivity
Carbon (diamond)	1×10^{12}	$\sim10^{-13}$
Germanium	4.6×10^{-1}	2.17
Sea water	2×10^{-1}	4.8
Drinking water	2×10^{1} to 2×10^{3}	5×10^{-4} to 5×10^{-2}
Silicon	6.40×10^{2}	1.56×10^{-3}
Wood (damp)	1×10^{3} to 4	10^{-4} to 10^{-3}
Deionized water	1.8×10^{5}	5.5×10^{-6}
Glass	10×10^{10} to 10×10^{14}	10^{-11} to 10^{-15}
Hard rubber	1×10^{13}	10^{-14}
Wood (oven dry)	1×10^{14} to 16	10^{-16} to 10^{-14}
Sulfur	1×10^{15}	10^{-16}
Air	1.3×10^{16} to 3.3×10^{16}	3×10^{-15} to 8×10^{-15}
Paraffin wax	1×10^{17}	10^{-18}
Fused quartz	7.5×10^{17}	1.3×10^{-18}
PET	10×10^{20}	10^{-21}
Teflon	10×10^{22} to 10×10^{24}	10^{-25} to 10^{-23}

ProTech Materials

Consistent High Quality
Volume Capability
Special materials
Build to print
Expertise in Metallurgy, Ceramics and Sputtering
Engineering and Design
Cost advantage

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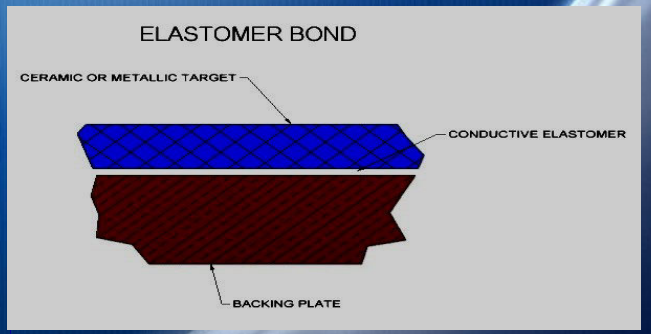
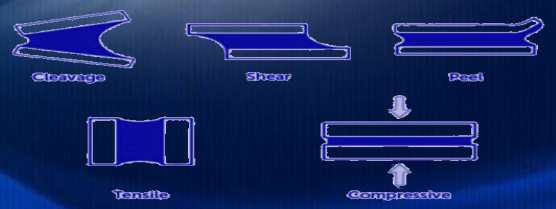
ProTech Materials

Your Connection to the World of Materials

Elastomer Bonding



Types of Joint Stress



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Elastomer Bonding

Protech Materials has been manufacturer and supplier of high quality, low cost materials since 1997. Located near San Francisco we have our corporate headquarters and main manufacturing facility that gives us ready access to markets all around the world.

With our background and expertise in materials science we are well positioned to offer customers total solutions to most every materials requirements they have.

Among the many capabilities and offering we have are basically all materials for PVD, Sputtering, and Evaporation coating of substrates used in todays many applications of Vacuum coating.

To bond these materials to Backing plates we offer both Solder and Elastomer bonding:

- ProTech has developed several types of Elastomer materials and application techniques to handle many electrical and thermal requirements.
- Elastomer is seen to be a viable alternative to other bonding systems and this acceptance has been building and expanding.

Our HQ in Hayward CA and partners are completely setup and equipped to supply high quality precision parts, manufactured to exacting customer specifications. Years of experience with the metallurgy of these materials enable us to also offer assistance and guidance to our customers to help ensure the success of all applications.

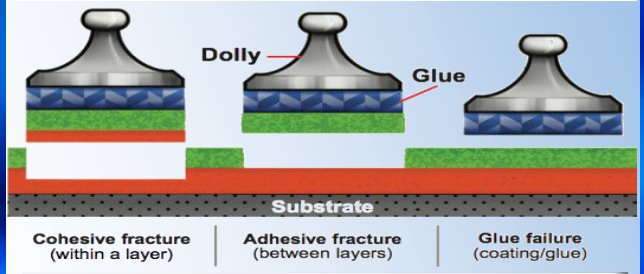
Elastomer Bonding Features

- Elastomer Bond material is cost competitive with any other bonding system.
- Elastomer bonds are electrically conductive.
- Elastomer Bond material maximum continuous operating temperature is above many other bonding systems. – 250 degrees C
- Elastomer Bond results in a stress free assembly i application.
- Elastomer bonding systems have a NASA 'A' rating for use in high vacuum applications.
- Elastomer Bond material can be handled and dispensed with great precision resulting in being able to assure bond reproducibility.
- Uniformity and distribution of an Elastomer bond can be easily controlled using our techniques.
- Elastomer Bond material has be demonstrated to being able to create a reliable joint between most any combination of materials.
- Elastomer Bond material can be managed and in an environmentally friendly way.
- Assemblies, when finished in initial use, can be re-bonded with new components
- Elastomer Bonds are ductile and can handle bonding dissimilar materials.
- Elastomer Bond can handle bonding large surface areas of dissimilar materials.
- Elastomer Bond is well suited for bonding of fragile materials.
- Elastomer Bonding material has been demonstrated to have no affect in application of resulting assembly.

Elastomer Bonding Benefits

- Lower overall Cost to customer
- Faster turnaround process to solder bonds
- Bonding process is reliable and reproducible
- Little to no effect in process chamber parameters
- User have ability to deposit with higher applied power
- Great flexibility in combinations of materials that can be joined
- Can be used with any sized target system
- Can be used for both Rotary and Planar assemblies

Mechanical Properties	Value
Typical pull strength (bond)	160 PSI
Bulk density (base material)	1.02 g/cm3
Tensile Strength (base material)	750 PSI
Thermal Properties	**Value**
Thermal Conductivity (base Material)	.27 W/m-K
Max continuous operating Temp (Bond)	250 degree C
Vacuum Ratting	**Value**
Outgassing	NASA A Rating
Electrical Properties	**Value**
Volume resistivity (base material)	3E+14 ohm-cm
Typical resistance (bond)	Conductive



ProTech Materials Quality

- ISO 9001:2015 Certified
- Analytical techniques to ensure purity and composition accuracy:
  - ICP
  - LECO
  - GDMS
  - Titration
- Microscopic analysis to achieve good uniformity in target grain size and microstructure to ensure good film uniformity
- 4 point probe to monitor electrical properties of targets
- Ultrasonic scan to detect bonding and material defects for both planar and rotary targets
- Various metrology tools to ensure dimensional accuracy
- Well established and competitive supply chain
- Business continuity plan in place