

# Eccospheres® for Electronic Applications

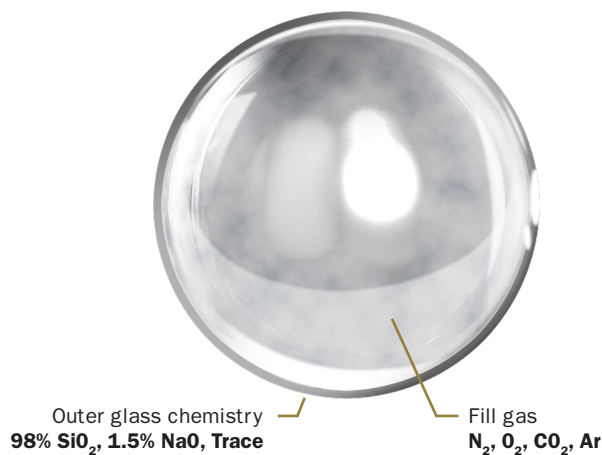
## Eccospheres®

**As electronic equipment becomes increasingly compact with corresponding signal and power density, it is essential dielectric properties are customizable for each industry and application. Common goals for engineers across industries for dielectric materials include:**

- **Engineered product:** Specialized material that can be tailored to each application, unlike naturally occurring dielectric additives such as Ground Calcium Carbonate (GCC), Precipitated Calcium Carbonate (PCC), Kaolin or Talc
- **Chemically stable:** Industry-leading silica purity provides long life stability without leaching or negative resin interactions
- **Reduced loss tangent:** A chemically stable and low-density particle structure that reduces the dielectric constant ( $D_k$ ), which results in a better attenuation properties
- **Customizable material:** A material that can be tailored to control density and strength, surface functionalization, moisture content and particle size
- **Strong processability:** Maximize particle loading while maintaining processability due to high roundness, inert chemistry and low additives
- **Mechanical process survivability:** Engineered to be resilient, and when processed through film and nip rollers can consequently reduce waste.

Trelleborg’s Eccospheres®, which are hollow glass microspheres, solve these requirements for dielectric materials and can be used in an array of applications and markets.

Eccospheres® with a wall thickness at 1µm



Eccospheres® can be custom designed (particle sizes and coatings) to ensure specific resin compatibility or hydrophobicity.

## Benefits:

- 98% amorphous Silica (SiO<sub>2</sub>)
- Controllable moisture content
- Chemically stable
- High strength
- Particle size control
- Low density
- Lower viscosity per unit addition
- No leeching or cross-reactions with resins
- Long material life span with low maintenance

## Dielectric Applications:

- 5G equipment in electrical connectors
- Copper Clad Laminates (CCL)
- Radar transparent coatings
- Low dielectric potting complexes
- Microwave materials
- Antenna materials
- Cable sheathing/cores

Specified Values			Calculated Values		
Grade	Nom. Density (kg/m <sup>3</sup> )	Diameter (μm)	Wall Thickness (μm)	Dielectric Constant <sup>1</sup>	Thermal Conduct (W/mK) <sup>2</sup>
SI100	100	65	0.49	1.22	0.052
SI130	130	65	0.65	1.15	0.061
SI200	130	60	0.93	1.24	0.081
SI250	250	60	1.18	1.29	0.096
SID160z	160	60	0.74	1.19	0.069
SID200z	200	53	0.82	1.24	0.081
SID230z	230	52	0.93	1.27	0.09
SID270z	270	50	1.06	1.32	0.102
SID311z/ FTD311z	311	45	1.11	1.37	0.114
SID350z/ FTD 350z	350	45	1.26	1.41	0.126
SID380z/ FTD380z	380	40	1.22	1.45	0.136

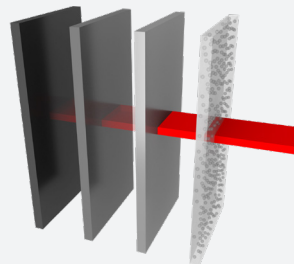
1. Calculated with pure silica Dk of 3.6 and internal gas Dk of 1.0

2. Maxwell model

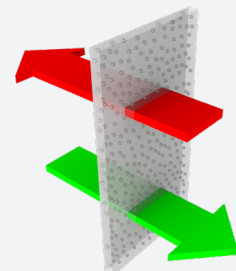
## Illustration of Eccospheres® for use in custom attenuation



Since the 1960's Eccosphere® technology has been used in dual purpose thermal ablators/ signal transparent materials which both protect and maintain communications with ground stations.



Eccosphere® containing coating used as transparent protective layer over adsorbant layers



2 way communication through eccosphere® containing coating

Eccospheres® have a long history in aerospace coatings serving as a multipurpose filler granting light weighting, thermal barrier, and signal transparency properties.

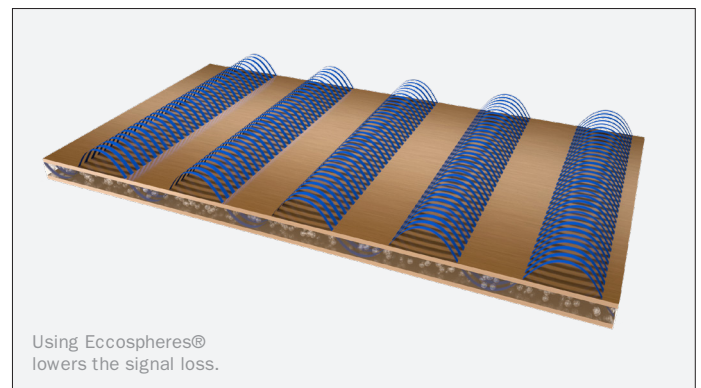
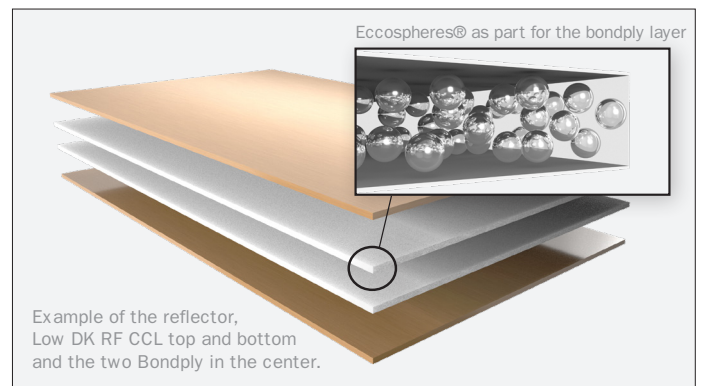
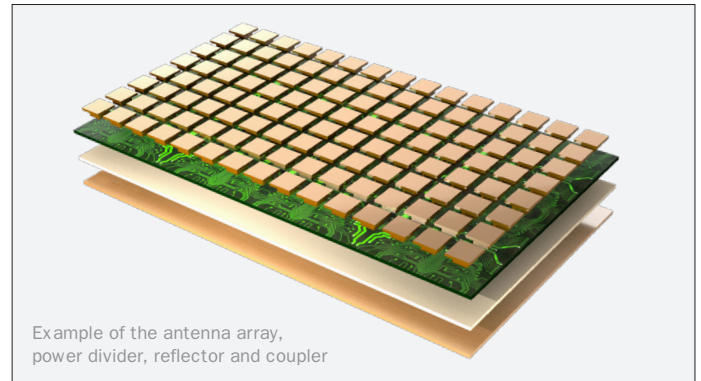
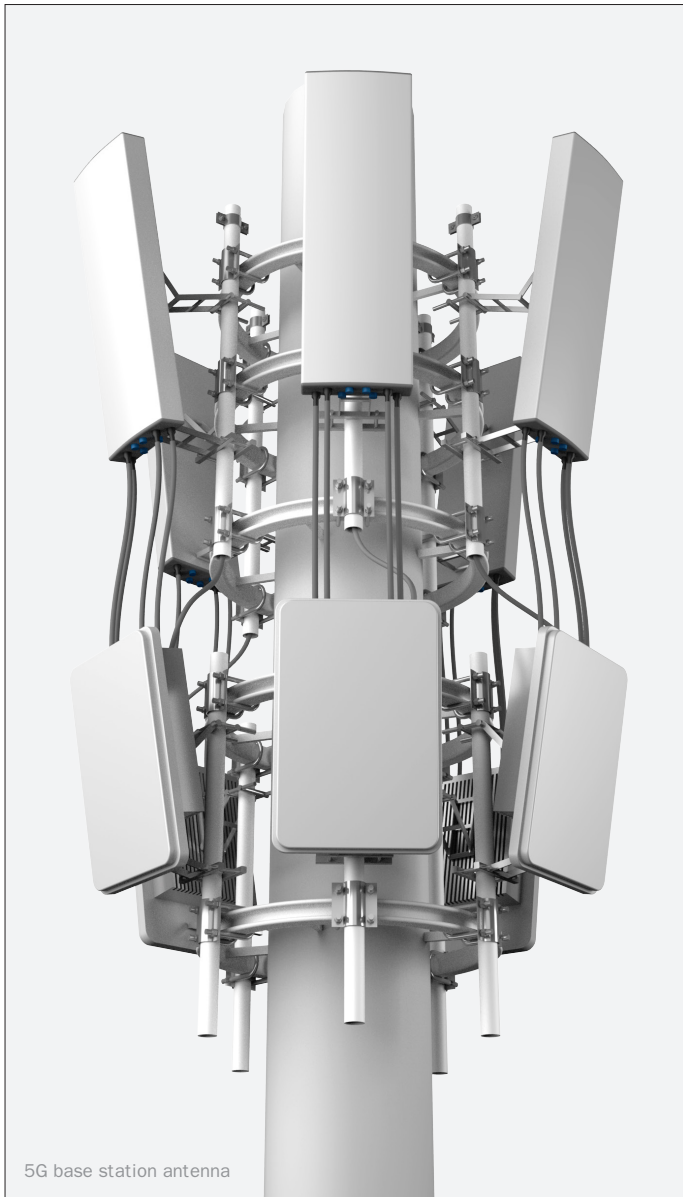
Eccospheres® high purity silica, inert internal gas and density options allow for the custom modulation of attenuation properties to match use.



## Illustration of Eccospheres® for use in 5G antenna base stations

Trelleborg has worked with engineers to design materials that lower dielectric properties and ensure radar signal transparency while also reducing overall system weight by using Eccospheres® within a resin system.

Eccospheres® within a resin enables high frequency communication, increased signal speed, and lower signal loss, due to the customizable low dielectric design and increased signal transparency.



## Contact Us

Trelleborg Applied Technologies delivers innovative and reliable solutions, materials and smart systems that maximizes performance for our customers. Our vast range of specialized, customizable materials ensure peace of mind at every stage of your project. With reliable and efficient project management and manufacturing, we endeavor to take performance to new levels by achieving your goals safely, on time and within scope.



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