PORT PLASTICS

Semiconductor

The Critical Properties for Selecting the Right Material for Your Test Socket Application

The market is filled with choices when it comes to selecting the right material for your Test Socket or related application. Even though the raw materials are known, there are nuances created from the specific type of fill, amount of fill and processing methodology that will yield different physical properties. Selection should be based on the physical properties that are most important for your application. The following will review the four most impactful physical properties that are critical to proper product selection.

TENSILE ELONGATION – Tensile Elongation (ASTM D638) is a measure of the elasticity of the plastic material. Essentially the plastic is fixed and then stretched in both directions at a constant rate until the material yields. The material is then calculated in terms of percent growth from start to completion of the test. The higher the percentage, generally the more elastomeric the product. So you may be asking yourself, what does this have to do with test socket material selection? Todays test socket designs require decreasing hole sizes and pitch sizes. Hole diameter sizes are approaching 0.08mm! These minute features need to be placed in precise locations for the pogo pin to be able to pass thru without interruption. The lower the Tensile Elongation of a product, the less the drill bit moves at the surface before it pierces the plastic and thus the more accurate the hole placement.

THERMAL PROPERTIES – Machining minute features such as micro holes creates frictional heat at the surface of the bit, especially when the drill bit comes thru the bottom of the plastic. If the heat is higher than the plastics ability to resist the heat a burr will result. There are many factors in burr generation but clearly the thermal properties of the material plays a huge role. The good news about ceramic filled thermoplastics is that the ceramic often acts a buffer between the plastic substrate hindering the formation of burrs despite lower temperature raw materials. For basic test socket materials, Heat Deflection Temperature (ASTM D648 @ 264 psi.) provides a good measure for comparison.

COEFFICIENT OF THERMAL EXPANSION – CTE (ASTM E-831) measures the impact of a temperature gradient to the expansion of the material over a given temperature range. The ASTM test method measures the growth of the material from -40°F to 300°F. The significance to test socket applications concern the dimensional stability of the socket after machining and during usage. Since IC chips are often tested over a wide range of temperature, CTE becomes critical as hole placement changes more for materials with higher values.

FLEXURAL MODULUS OF ELASTICITY (ASTM D790) – Flexural Modulus measure the materials ability to resist bending when the test specimen is secured on a span and a load is applied to the center. The test measures the pressure required to flex the specimen 5% and is recorded in psi. The higher the psi value, the stiffer the material. Maybe more than any other physical property, flexural modulus is critical in selecting a material for an application. When machining a significant array pattern of holes with minute pitch sizes its important the remaining plastic maintains its integrity. Flex Modulus is a good measure of the materials ability to resist the flex under test.

These four physical properties are certainly among the most critical in selecting an optimum material that delivers a stable, functional machinable test socket.

FOR QUESTIONS ON HOW TO MATCH UP A MATERIAL FOR YOUR APPLICATION CONTACT YOUR LOCAL PORT PLASTICS SERVICE CENTER OR VISIT **PORTPLASTICS/BACKENDTEST**

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