



Conductive Pipette Tips

Stat-Tech™ Electrically Conductive Compounds
offer precision performance

Conductive Pipette Tips



Application Description

A conductive pipette tip is a long, thin, cone-like hollow plastic part roughly 2" to 4" long and 3/16" in diameter manufactured from a conductive plastic material. Conductive pipette tips are used in conjunction with robotic pipettors for measuring and dispensing liquids in laboratory and production settings. A pipettor is a device (either manual or robotic) that transfers a specific quantity of liquid from one location to another. In many applications, accurate measurement of finite amounts of liquid is critical.

The liquid is transferred via the pipette tip, which attaches to the pipettor. A vacuum is drawn and the liquid is transferred to the pipette tip and subsequently dispensed into another container. The robotic pipettor picks up a set of pipette tips, transfers an exact amount of liquid from one location to another, ejects the now used pipette tip, and begins the cycle again. In many cases, pipette tips are used only once due to concerns that contamination and/or liquid retention may hinder precise measurement.

In automated systems, pipette tips are often made of conductive polymeric materials that enable the tip to sense the liquid and therefore accurately measure the correct amount of liquid being transferred.

In some applications, conductivity is needed to avoid static discharge that could give a false or inaccurate reading.

Key Requirements & Challenges

Conductive pipette tips must meet demanding performance criteria and therefore require a polymer compound with a unique, and often difficult to achieve, blend of properties.

Physical Performance Requirements:

- Hydrophobic properties for complete liquid dispensing and contamination prevention
- Concentric dimensions and tight tolerances to provide accuracy at minute measures
- High degree of dimensional stability
- Robust chemical resistance
- Excellent conductive properties within the part and from manufacturing run to manufacturing run:
 - To ensure accurate liquid level readings
 - To prevent static discharge

Manufacturability:

- Processing ease
- High flow properties for multi-cavity molds
- Ability to easily fill long, thin wall parts
- Warp resistance
- Low scrap and reject rates
- Fast cycle times

The PolyOne Difference

PolyOne's approach to meeting difficult performance challenges is based on a three-pronged model:

Rigorous and thorough situation analysis: We complete a methodical needs analysis by working closely with our customers to understand the total performance spectrum for the application: from end use, to manufacturability, to cost effectiveness.

In-depth polymer and compounding knowledge: We combine a comprehensive knowledge of polymers with extensive compounding and formulation experience to develop and evaluate compounds that not only meet performance requirements, but also meet other key goals such as manufacturing efficiencies and processing ease.

Close interaction with customers: We communicate closely with our customers to ensure that the program is well aligned and on track. We carefully coordinate sample preparation and delivery to coincide with our customers' machine availability to minimize production interruptions and line downtime.

The PolyOne Solution

PolyOne's Stat-Tech™ Electrically Conductive Compounds can be specifically formulated for pipette tip applications to create a unique combination of electrical conductivity, mechanical properties and processability. Stat-Tech electrically conductive compounds provide consistent conductivity, at any location on the pipette tip, as well as from manufacturing run to manufacturing run. This enables accurate readings, reduces static discharge and drives repeatable part performance. Stat-Tech compounds can be tailored to achieve high flow and easy processing, which facilitate efficient molding and part-to-part consistency.

The performance and processing characteristics of Stat-Tech compounds, combined with our three-pronged approach to understanding and solving difficult challenges, set us apart from other engineering material manufacturers.

PolyOne's Stat-Tech electrically conductive compounds offer:

- **An outstanding balance of conductivity, flow, dimensional stability and toughness** results in high-quality parts and efficient processing.
- **Consistent conductivity** ensures repeatable part performance and minimizes failures related to inconsistent electrical conductivity.
- **High flow and easy processing** facilitate filling of thin wall parts and multiple cavity tools, which enable faster cycle times and lower per-unit part costs.
- **Superior durability** reduces breakage and resultant scrap-related costs.
- **Less tendency to flash** results in improved appearance and less fluid retention in or on the tip, thus driving greater accuracy and less potential for cross-contamination.
- **High strength** produces parts with greater stiffness and warp resistance, again minimizing scrap-related costs.

Stat-Tech compounds can be formulated out of a wide range of base resins, including ABS, LCP, Nylon, PC, PPS and PEEK.

The Net Result...



Customer Value

PolyOne delivers value in the manufacture of conductive pipette tips in several important and quantifiable ways:

Our **rigorous situation analysis, in-depth polymer and compounding knowledge, and close interaction with customers** mean we help you arrive at an optimal solution with speed and accuracy. This reduces your time to market, and lowers your product development and manufacturing costs.

Stat-Tech conductive compounds' excellent balance of properties enables pipette tip manufacturers to **quickly and effectively enter the conductive pipette tip market with a high-quality product**. For existing manufacturers of conductive pipette tips, Stat-Tech compounds offer a quality advantage and competitive edge over competing materials. The property benefits offered by Stat-Tech compounds are quantifiable in terms of reduced cycle times and reduction in manufacturing- and performance-related defects.

The high flow characteristics of Stat-Tech compounds enable them to be run in tooling with more cavities than alternative conductive compounds – some cases, two to four times as many cavities, which has these substantial benefits:

- **Reduces the number of molds and machines required to meet production needs**
- **Reduces the machine time to produce the required parts**
- **Decreases the ramp-up time to full production capability**

The outstanding conductive performance and consistency of Stat-Tech compounds can substantially decrease reject and scrap rates as well as reduce the need for finished part testing and evaluation.

Overall manufacturing efficiencies have been realized in these areas:

- **Multiple Cavity Savings**
- **Cycle Time Savings**
- **Scrap Savings**
- **Up to 30% increase in productivity**
- **Up to 40% reduction in cycle time**
- **Up to 50% decrease in scrap rate**

The net result of manufacturing conductive pipette tips using PolyOne's Stat-Tech electrically conductive compounds is higher-quality pipette tips, lower total costs, improved speed to market, and a significant advantage over competitors.

Contact your PolyOne representative to learn how we can help you meet your performance requirements in other medical products and equipment including high-flow resins for standard pipette tips, high specific gravity compounds for radiation shielding, soft-touch resins for use in grips and handles for medical equipment and tools, and more.

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