

Polymer Chip Drying (Polyethylene Terephthalate)

Background

Polyester polymer chips such as PET are dried prior to injection molding and extrusion processes in order to reduce free moisture content and improve the quality and appearance of the finished product. Careful control of this drying process is an essential prerequisite for product quality (strength/aesthetics).

In the solid form, PET absorbs moisture from the atmosphere until equilibrium is achieved and this hygroscopic behavior can mean that the chips contain as much as 0.6 % water by weight. In order to attain maximum performance it is essential to reduce the water content to 0.003 % (30 ppm) prior to heating as any water present at this stage rapidly hydrolyses the polymer, thereby reducing its molecular weight and damaging its physical properties.

Polymer chip material is processed on a hopper load basis by a flow of heated and dried air from a desiccant dryer. The recognized practice is to expose the chips to a dewpoint below $-40\text{ }^{\circ}\text{C}$ dewpoint for a fixed period of time. Following this process, the chips are down loaded into another hopper supplying a molding machine. A typical manufacturer's factory will have 10 to 50 such drying and molding machines.

Typical Problem Areas

- Air filters blocked
- Return air cooling
- Heater failure
- Ingress of air (ambient)

Measurement Technique

1. On-line Continuous Measurement

The Easidew Hygrometer is used to monitor individual dryers to ensure that the air supply is better than the specified dewpoint temperature limit of $-40\text{ }^{\circ}\text{C}$ dewpoint and so assures that the chip material is processed to a satisfactory degree. Audible and visual alarms can be connected to the Easidew On-line dual alarm system to warn maintenance staff when the dryer begins to deteriorate.

The sensor is positioned before the hopper to measure the dewpoint of the air being passed into the dryer and over the chips.

The Easidew Hygrometer can be used if the air drying system is PLC controlled Transmitter with input capability to accept mA outputs.

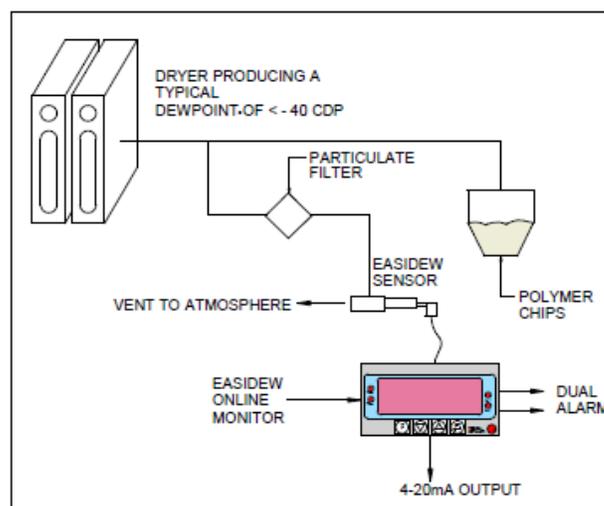


Diagram to illustrate Easidew in use in a polymer chip drying application

Measurement Technique

2. Spot Checking

The HygroPort Portable Hygrometer can be used to check the efficiency of a drier under operational load. Using the HygroPort to perform spot checks at regular intervals offers a cost effective assurance of product quality. With easy operation and fast response to industrial standard dewpoints of less than $-40\text{ }^{\circ}\text{C}$, multiple drying facilities can be monitored within reasonable time frames by maintenance personnel at low costs.

Where particulate contamination (dryer desiccant or polymer dust) is present at the sampling point, in-line filtration is recommended.

Reference Users

Conair, Universal Dynamics, Dry-Air



HygroPort



Easidew

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