



Oakland Instrument Corporation  
7417 Bush Lake Road  
Minneapolis, MN 55439 USA  
Tel & Fax (952) 835-4935  
E-mail: info@oaklandinstrument.com

## TECHNICAL BULLETIN

May 20, 2011: For Immediate Release

### **Calibration Standards for Model RT-6000 Opacity Meter**

#### *Theory of Operation*

Our RT-6000 Opacity Meter is a relative opacity meter, or a comparator-style meter. It was originally introduced for the measurement of opacity of extruded plastic film and plastic sheet, but it does perform well for the measurement of opacity in certain other product applications. It operates on the principal of measuring light absorption by the film sample, compared to a scale of 0% absorption (calibrated with the light source on and no film sample in place) and 100% absorption (calibrated with the light source off and no film sample in place). The light source is line-voltage powered, and produces full-spectrum visible light, which is not filtered; the light passes through the sample with the light source on one side and the light detection sensor on the other side of the sample. It is not a reflective-type system, nor does it use black/white reflectance plates for calibration.

The RT-6000 Opacity Meter is designed to operate as a Quality Control device and as a Comparator, because it is a relative measurement device. It is not designed to be used as a Laboratory research device, because it is not an absolute measurement device. This means that the RT-6000 does not follow an international standard (such as ISO, ASTM or TAPPI), nor is a standard calibration sample available from NIST to calibrate it.

According to Neil Sticha, Oakland Sales Manager, "We only have issues in the marketplace with this product if the customer is expecting to read "haze" (very low opacity), "light blocking" (very high opacity), or "absolute opacity" (rather than comparative) data to better than 1% opacity. The RT-6000 is not designed for these applications".

#### *Suitable Applications*

"The RT-6000 is an effective system for opacity quality control for plastic films and sheets with mid-range opacities (not light blocking, and not for clarity or haze testing). For bagmaking, for instance, it is the most common system in use."

If an opacity meter technology is not appropriate, then the customer may need to look at an optical viewing technique, or a density measurement device. Examples where this may apply is for films or sheets that include a filler, or that have air voids within the material. For these examples, the customer would need to ascertain whether the RT-6000 Opacity Meter has the capability and repeatability or differentiation to work for the application.

However, as a cost-effective, easy-to-use, comparator for day-to-day quality control testing, the RT-6000 Opacity Meter has no equal in the marketplace. The RT-6000 is ideal for QC testing of plastic films, the bag market is an excellent example, to control the correct amount of colorant added to the resin.

### *Preparing Calibration Standards*

Calibration standards are prepared from your actual production samples, a measurement standard is then created for the device, and production is monitored against that standard.

### *Protecting Against Line Voltage Fluctuation*

The RT-6000 is affected by line voltage changes on the electrical circuit on which it runs. If this is a problem at your plant, we recommend the following solutions to improve the performance of the RT-6000: addition of an isolation transformer, and a Variac. Adding an isolation transformer, however, will provide dampening (primarily) as you are still running an AC Source to the light bulb. A better method is to add a Variac and adjust the output voltage (input voltage to the RT-6000) before you run your tests. We set up and calibrate the instruments here at Oakland at 117 VAC 60 Hz (for our 115V versions) so we know they are all calibrated when they leave the factory. A Variac with a digital voltmeter on the output is relatively inexpensive.

### *Correlation to Alternative Opacity Measurement Techniques*

Opacity in different plastics is wavelength dependent. Other techniques for measuring film opacity, including densitometers, use filtered light sources which focus on certain parts of the spectrum. The optical density of plastics typically ranges from 0.3 to 2.9.

The RT-6000 can be correlated to other opacity measurement devices, both relative and absolute-measurement types. However, a separate correlation curve must be prepared for each color class (for example, white) of film or sheet product. Please contact the Oakland Instrument factory for additional details and support regarding correlation questions.