

Technical Technical Note



ColorQuest® XE
ColorQuest® XT
UltraScan® PRO
UltraScan® VIS

How to Measure: Plastic Preforms

- Preform color measurements can be used to verify lot-to-lot consistency, predict final blown bottle color from the preform color and get into target range when switching over a line to a new color.
- Spectral measurements in the 360 - 390nm range on an UltraScan PRO and UltraScan VIS can be used to verify the presence of a UV absorber for food grade bottle cut-outs (can also be done on preforms with caution).
- Haze measurements of bottle cut-outs are used to verify that internal scattering is minimal from lot-to-lot.
- Color measurements of bottle cut-outs are used to verify lot-to-lot consistency and conformance to specification.

Adjustable Preform Holders for ColorQuest and UltraScan

The purpose of a preform holder is to allow consistent placement of the highly curved preform at the measurement port so that a repeatable measurement can be achieved. Two types of HunterLab universal preform holders:

Adjustable Transmission Preform Holder for Clear Preforms for ColorQuest XT, ColorQuest XE, UltraScan VIS and UltraScan PRO



Adjustable Reflectance Preform Holder for Opaque Preforms for ColorQuest XE, UltraScan VIS and UltraScan PRO



Recommendations:

- Standardize normally in the SAV mode (instruments must be ordered with this option) for either RSIN reflectance and TTRAN transmission as appropriate.
- For each measurement, average 3 - 4 readings with rotation between each reading. The averaging of multiple readings with rotation is recommended to minimize measurement variation due to preform replacement between readings, as well as variation in the color uniformity and wall thickness of the preform.

The top-loading **Adjustable Transmission Preform Holder** accepts transparent preforms from a minimum diameter of 10-mm to a maximum diameter of 40-mm. Any preform higher than about 4 inches will stick up through the top of the transmission compartment. If the preform sticks above the transmission compartment, just draw the door close to the preform and take a measurement with the tube sticking out of the top. HunterLab sphere instruments have powerful pulsed xenon lamp sources, and measurements are generally immune to ambient light.

The side-loading **Adjustable Reflectance Preform Holder** accepts translucent and opaque preforms from a minimum diameter of 15-mm to a maximum diameter of 40-mm. The length of the preform must be at least 50-mm.

Plastics preforms come in many shapes and sizes, and vary from transparent to effectively opaque.

A general rule-of-thumb is:

- If your hand can clearly be seen behind a preform, the preform color should be measured in TTRAN transmission.
- If the preform is opaque, translucent or so densely transparent (like a deep green or blue color) such that your hand is not visible, this preform should be measured in RSIN reflectance.

For every rule, there is an exception:

Amber preforms do become transparent when blown to a much thinner wall thickness of a bottle but in the thicker preform state, the amber colorant is so intense and deeply absorbing that you can't see your hand on the other side. This means that there is almost no signal coming through in transmission; the obstacles are the unique, deeply absorption characteristics of this amber colorant (no other color is as deeply absorbing) and two preform wall thicknesses that are many times the thickness of a single bottle cut-out. So, you should measure any color differences on amber preforms in reflectance where they would be more visible.

The alternative solution is to cut the preform down the middle such that only one wall of the amber preform is measured in TTRAN/SAV. Measurements of a single wall preform measured in TTRAN/SAV mode correlate with the bottle cut-outs, and while the signal is significantly reduced, there is still sufficient signal coming through for differentiation and correlate to the corresponding bottle cut-outs.

This requirement is unique to the deeply amber color. Most other colors can be measured as whole preforms.