Does D445 require use of a full length capillary tube?

Labs are sometimes under the mistaken impression that modern, automated viscometers that use shorter capillary tubes are out of compliance with ASTM D445/ASTM D446. This is not the case. In section 6.1.2, ASTM D445 specifies that "automated apparatus may be used as long as they mimic the physical conditions, operations or processes of the manual apparatus". Automated kinematic viscometers that use shorter viscometer tubes, such as the CANNON® CAV® 4.2, miniAV® and miniAV®-X, meet or exceed all accuracy and precision specifications for ASTM D445. The CANNON® Ubbelohde-style viscometer tubes used in these automated viscometers are, in fact, versions of the tubes listed in ASTM D445 Addendum, Table A1.1, with slight modifications to accommodate automated sample loading.

With the issue of ASTM D445/ASTM D446 compliance settled, there are many advantages to instruments that use shorter viscometer tubes. Longer tubes, including the Atlantic-style tube used in many older-style automated viscometers, require larger overall bath dimensions and may consume up to 35% more lab space than modern counterparts that employ shorter tubes. In addition to increased bath space, full length viscometer tubes require more solvent to clean their larger surface area. There is as much as a two-fold difference in the solvent requirement for automated viscometers using Atlantic-style tubes versus those using the CANNON® Ubbelohde-style tubes. As a result, automated viscometers with smaller tubes offer significant opportunity for cost savings associated with solvent purchase and disposal costs.

In addition to cost savings, automated viscometers using the shorter Ubbelohde-style viscometer tubes provide the advantage of temperature-independent calibration associated with use of a suspended-level viscometer tube. Although both the non-suspended level Atlantic-style and the suspended level Ubbelohde-style tube follow the same linear calibration equation, the Atlantic-style tube requires separate calibration coefficients at each test temperature. Temperature-independent calibration associated with the CANNON® Ubbelohde-style tube permits calibration measurements at a single temperature and avoids the time and expense associated with having to calibrate at each test temperature as is the case with automated viscometers using Atlantic-style tubes.

CANNON® has been involved with the technical development and review of ASTM D445 since the inception of the method in the 1930's. As a company, CANNON is considered one of the world's foremost experts in precision kinematic viscosity measurement. CANNON's President, Pat Maggi, is the current Vice Chairman of ASTM D02.07 and Chairman of ASTM D02.07, Section A which oversees ASTM D445. CANNON stands behind all of its viscosity products and is happy to accurately answer your questions regarding method compliance. Don't doubt the accuracy of the information you're receiving from your supplier, contact CANNON® at service@cannoninstrument.com.