

## VISCOSITY TESTING DONE CORRECTLY EVERY TIME

Quality Control in the Dairy Industry uses single-point viscosity testing to certify product acceptability before shipping to customers. "Single-point" means that one viscosity value is measured and recorded to establish pass/fail. This test approach applies to virtually every "flowable" product type ranging across milks, creams, yogurts, cheese, and even ice cream.

A typical test procedure for a heavy cream might require an LV-type spindle (see Figure 1) rotating at 12 rpm with requirement for viscosity measurement to fall somewhere between 300 and 500 centipoise. Cottage cheese has a totally different consistency with clumps of curd and requires testing with a spindle called "T-bar" to provide meaningful viscosity data (see Figure 2). The spindle physically travels a corkscrew path down into the yogurt container recording viscosity continuously. Target value might fall between 50,000 and 75,000 centipoise. These tests are quick and easy to perform by trained operators familiar with the instrument and the method.

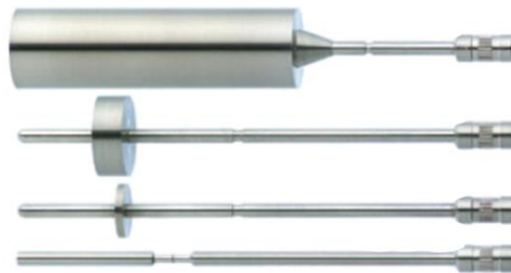


Figure 1: LV Type Spindles Used for Viscosity Testing on Milks and Creams



Figure 2: T-bar Type Spindle for Viscosity Testing on Cottage Cheese

Other considerations that add potential complication to viscosity tests are length of time for spindle rotation, temperature control of sample, and documentation of results. The alert operator carefully notes these requirements, makes sure the needed equipment is working properly, and performs the test method the same way each time. When more than one operator has responsibility for the test, joint training is essential so that all personnel have common knowledge of correct methodology. Group sessions may require each person to demonstrate the procedure, thereby revealing slight differences in approach and leading to meaningful discussion on whether each variance is acceptable.

Evolution of instruments used to measure viscosity has resulted in modern viscometers that can do everything automatically with minimal operator involvement. Of special importance to QC Departments is the requirement that the instrument run unattended in standalone mode with ability to store test data. Viscometers like the instrument in Figure 3 can work either in standalone mode or under control of Personal Computer. The latter situation allows the QC Department to create the viscosity test using software that details the steps defined in the method – choice of spindle, rotational speed used to measure viscosity, temperature control if required, length of time for spindle rotation. In addition, pass/fail limits can be included in the program so that the operator is notified automatically whether product meets the specification. The software program is downloaded into the head of the viscometer and stored as a test which executes with the push of a button. Reports for tests run on a given day might look like the data shown in Figure 4.



Figure 3: Modern Digital Viscometer with Automatic Test Capability



Figure 4: Detailed Test Data Stored in Instrument Memory

Dairy Industry companies have started upgrading their labs to take advantage of these advancements in instrument capability. Automation makes it possible to cope with increased workloads necessitated by increased viscosity testing on each product – i.e. not only the initial QC test, but also shelf-life tests that are repeated at future time intervals after product ships. Payback for initial investment in instrument is within the first year of operation. Elimination of potential operator error in measuring viscosity or recording results is the significant gain because every test is now done correctly without question.

Author: Robert G. McGregor Director, Global Marketing & High End Lab Instrument Sales

Email: [bob.mcgregor@ametek.com](mailto:bob.mcgregor@ametek.com)

AMETEK Brookfield, Instrumentation & Specialty Controls Division

11 Commerce Boulevard | Middleboro, MA 02346 USA | Tel: 800.628.8139 or 508.946.6200 | Fax: 508.946.6200

[www.brookfieldengineering.com](http://www.brookfieldengineering.com)