

# Material Handling: Is Viscosity The Problem?

The food industry processes large quantities of raw materials every day to feed their high volume production operations. Beverage plants require syrups of varying flavors blended to the right consistency. Bakeries utilize jams, icings and other filler materials which must flow easily during application, but still have the stiffness to hold shape afterwards. Prepared foods are coated with batter and seasonings, both of which exhibit uniform flow behavior to meet required concentration and thickness after application.

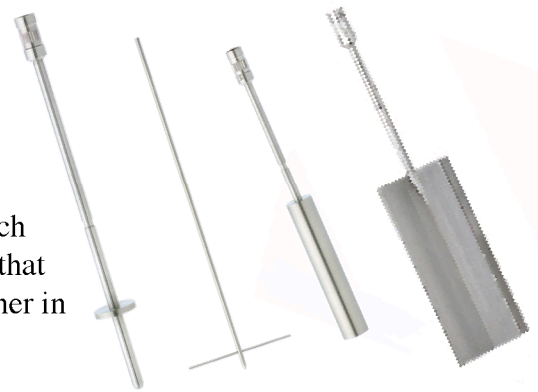


The key measurement made by Quality Control to verify acceptability for the above mentioned behavioral properties is viscosity testing. The standard benchtop rotational viscometer is the instrument of choice. (See Figure 1) The test method must include specification of torque range (LV, RV, HA, HB), spindle, rotational speed, length of time for spindle rotation, and operating temperature for sample. Spindle choices typically found in the food industry are shown in Figure 2. The T-bar and Vane spindles are appropriate for thicker paste-like materials; vane spindles are also used for liquids with suspended particles.

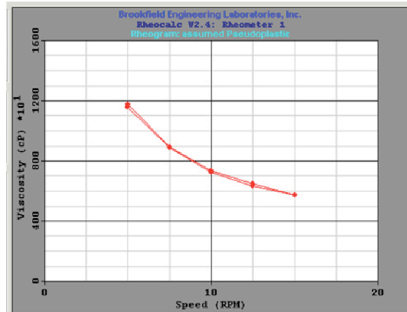
**Figure 1: Standard Benchtop Rotational Viscometer**

The test method typically gives a viscosity value in units of centipoises (abbreviated “cP”), the scientific unit of measurement used in the the Americas. European and Asian countries will report findings in milliPascal seconds (“mPa.s”) which actually have the same equivalency in terms of value. This means that multiple plants around the world are reporting the same data, whether in cP or mPa.s.

Food companies will specify a range within which the viscosity value must fall to pass. This works for most food materials because there is historical experience with this type of information. Some food companies, chocolate



**Figure 2: Standard Spindle Types for Viscosity Testing: Disc, T-bar, Cylindrical and Vane**



**Figure 3: Flow Curve of Viscosity vs. Spindle Speed**

processors for example, will use a more detailed approach, recording viscosity values at different spindle speeds and creating a flow curve. (See Figure 3) This signature curve becomes the yardstick for comparison to future batches and determines acceptability.

Key to successful inspection by QC is the faithful execution of the test method explained above. If any of the parameters are undefined (torque range, spindle, speed, time, temperature), it’s important to nail them down. If the supplier of an ingredient has not clarified how they do the test, talk to them and get the details. When in doubt or not sure, give your instrument manufacturer a call for guidance on how to resolve the unknowns.