

## 2.2.10. VISCOSITY - ROTATING VISCOMETER METHOD

Rotating viscometers are used for measuring the viscosity of Newtonian (shear-independent viscosity) or non-Newtonian liquids (shear dependent viscosity or apparent viscosity). Rotating viscometers can be divided in 2 groups, namely *absolute* and *relative* viscometers. In absolute viscometers the flow in the measuring geometry is well defined. The measurements result in absolute viscosity values, which can be compared with any other absolute values. In relative viscometers the flow in the measuring geometry is not defined. The measurements result in relative viscosity values, which cannot be compared with absolute values or other relative values if not determined by the same relative viscometer method.

Different measuring systems are available for given viscosity ranges as well as several rotational speeds.

### **SPINDLE VISCOMETER METHOD**

Spindle viscometers are relative rotating viscometers. The measurements result in relative viscosity values (dependent on the type of viscometer, size of the spindle and speed of its rotation), which cannot be compared with absolute values or other relative values if not determined by the same relative viscometer method. The viscosity is determined by rotating a spindle (for example, cylinder- or disc-shaped) immersed in the sample placed in a beaker.

#### **Spindle selection**

Viscometer DV-E is provided with a set of seven spindles. The right spindle is chosen according to the viscosity of the measured sample (you must apply the trial-and-error method), or the size of the spindle can be prescribed in the test method.

Each spindle has a code which must be set via SELECT knob on the viscometer. Setting the SPEED/SPINDLE switch to the right position will allow the operator to adjust the spindle selection. The SELECT knob can be rotated until the desired spindle number is selected. Once the desired spindle number is shown on the display, set the SPINDLE/SPEED switch to the middle position.

## Speed selection

There are 18 rotational speeds available on the RVDV-E Viscometer (0.3 – 100 rpm). Setting the SPEED/SPINDLE switch in the left will allow the operator to adjust the speed selection. The SELECT knob is rotated until the desired speed is selected. Once the desired speed is shown on the display, set the SPINDLE/SPEED switch to the middle position.

## Method

- Attach the desired spindle to the lower shaft.
- Insert and centre spindle in the test material until the fluid's level is at the immersion groove on the spindle's shaft. With a disc-type spindle, it is sometimes necessary to tilt the spindle slightly while immersing to avoid trapping air bubbles on its surface. (You may find it more convenient to immerse the spindle in this fashion before attaching it to the Viscometer.)
- Set the right code of the used spindle.
- Select a speed of the rotation.
- Set the MOTOR switch in the ON position.
- The spindle must rotate at least five times before a viscosity reading is taken.
- For a maximum accuracy, readings below 10% and above 90 % should be avoided.
- Measure the viscosity and record the viscometer reading.
- Switch the MOTOR ON/OFF switch to turn the motor „OFF“ when changing a spindle or changing samples. Remove spindle before cleaning.

## Results

Conditions of measurement		Brookfield Digital Viscometer RVDV-E Spindle N° Speed of rotation Temperature	
Sample name:			
1 <sup>st</sup> measurement	2 <sup>nd</sup> measurement	3 <sup>th</sup> measurement	Average