ISO 9001:2008 CERTIFIED

BROOKFIELD AMETEK®

R/S Rheometer

Process Viscometer

Texture Analyzers

Viscometer

Krebs Unit (KU)

Viscometer

Powder Flow Testers

Gel Timer

ISO 9001:2008 CERTIFIED
BROOKFIELD AMETEK

with offices in: Boston • Chicago • London • Stuttgart • Guangzhou
Tel: 800.628.8139 or 508.946.6200 Fax: 508.946.6262 www.brookfieldengineering.com

Date: August 15, 2012

Dear Customer,

Brookfield has been providing solutions to Viscosity and Rheology for over 75 years all over the world through their distribution network. During the past four decades, Brookfield has expanded its product range offering:

- Lab Viscometers
- Process Viscometers
- Rheometers
- Texture Analyzer
- Powder flow Tester

India is the priority country for Brookfield's vision to serve customers with High-tech products, quality application and after sales service support. At the onset of 2012, Our President Mr. David Brookfield visited India to officially inaugurate Brookfield Advanced Application Lab, the first in ASEAN countries. During his visit he had personal interaction with customers to understand various aspects in the area of Quality Control, Research, Applications, expected service levels and distribution channels across the nation.

Brookfield Advanced Application Lab provides services to optimize use of the system, method development, sample analysis, training course, and hands on instruments that include Powder Flow Tester, Rheometers, Texture Analyzer and Viscometers. The lab will significantly help customers make decision for purchase after reviewing practical results of their own samples and further train their experts on the systems, develop new methods and improve existing SOPs.

Brookfield distributors in India, Amkette Analytics Ltd. & M J Exports Pvt. Ltd., managed by Mehta & Parekh Family have been serving customers in India for over three decades. Enthusiasm and bond between our primary distributors, dealer network and customers across India emphasized the need to create advanced network of distribution for supporting the demands and challenges that are put forth by customers for research and quality improvement to current International standards.

BRK Instruments India LLP is an effort of all hands joined together as a single resource to support Brookfield product range in India. Authorized distributors and dealers appointed nationwide will ensure prompt sales support. BRK Instruments India LLP with a team of experienced members will provide technical and after sales service support followed and practiced by Brookfield in USA and across the world.

We once again thank you for your support and trust in Brookfield range of products for over 75 years and sincerely wish you extend the same level of trust and co-operation to our Joint effort through BRK Instruments India LLP.

Sincerely,

Joe Moi
Vice President, International Operations,
Brookfield Engineering Labs Inc., Middleboro USA.

Brookfield Engineering Laboratories, Inc. • 11 Commerce Boulevard • Middleboro, MA 02346 USA
SPECIALISTS IN THE MEASUREMENT AND CONTROL OF VISCOSITY SINCE 1934

Why measure viscosity?

The ability to gather data on a material's viscosity behavior gives manufacturers an important "product dimension." Knowledge of a material's rheological characteristics is valuable in predicting its pourability, its performance in a dipping or coating operation, or the ease with which it may be handled, processed, or used. The interrelation between rheology and other product dimensions often makes the measurement of viscosity the most sensitive or convenient way of detecting changes in color, density, stability, solids content, and molecular weight.

Price

Choices for Instrumentation

This chart shows the Brookfield family of Laboratory Viscometers and Rheometers at a glance. This will help to give you a general idea of what is available before making a decision. The horizontal axis indicates performance capability and features while the vertical axis addresses price level.

Need to measure viscosity in-line? Brookfield also offers a complete line of process viscometers. (p78)

Dial Reading
- Torque

DV-E
- Calculates Viscosity
- Torque

DV-I M Cone/Plate
- Small Sample Size
- Defined Shear Rate

DV-I M
- Optional Temp Probe
- Calculates Viscosity
- Torque

DV2T Cone/Plate
- Small Sample Size
- Defined Shear Rate

DV2T
- Touch Screen Interface
- Temp Probe
- Data / User Security
- PC Control
- Calculates Viscosity
- Torque

DV3T Cone/Plate
- Small Sample Size
- Defined Shear Rate

DV3T
- Touch Screen Interface
- Real Time Graphing
- Temp Probe
- Data / User Security
- PC Control
- Calculates Viscosity
- Torque
- Yield Stress

CAP 2000+ Cone/Plate
- Broad Shear Rate Range
- Peltier Plate Temp Control
- RS 232 (PC control)

RST Cone/Plate
- Peltier Plate

RST Coaxial Cylinder
- Controlled Stress & Rate
- Yield Stress
- Stand Alone Programmable
- Temp Probe
- RS232 (PC control)
- Calculates Viscosity
- Torque

PVS Rheometer
- Pressurized Sample Chamber
- Controlled Rate
- Temp Probe
- RS232/USB
- Calculates Viscosity
- Torque

Performance

SPECIAL PURPOSE INSTRUMENTS

BF 35 Fann Viscometer
- Measures viscosity of oil drilling and fracturing fluids

KU-3 Viscometer
- KREBS Viscosity
- Required for Paint and Coatings

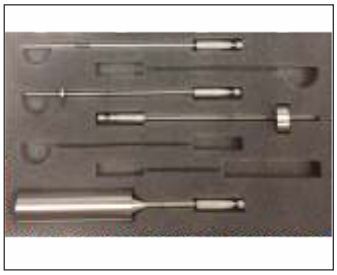
CAP 1000+ Cone/Plate
- Single Shear Rate
- Required for Paints and Coatings

R/S Soft Solids Tester
- Yield Stress
- Creep
- Recovery

Falling Ball Viscometer
- Viscosity
- Used for QC & Academic Institutions

Brookfield also offers several special purpose instruments which are used to perform a specific type of test or are used to evaluate certain types of materials.

LV Spindle Set



RV/HA/HB Spindle Set

EZ-Lock Spindle Coupling System

Torque Range

LV	= 673.7 dyne•cm
RV	= 7,187 dyne•cm
HA	= 14,374 dyne•cm
HB	= 57,496 dyne•cm
5xHB	= 287,480 dyne•cm
1N•m	= 10^7 dyne•cm

Need additional assistance? Our website, www.brookfieldengineering.com, contains additional information on the measurement selection process as well as detailed application notes.

Selection: Viscometer & Essential Accessory

(depending on application)

Dear Customer,

Brookfield Viscometers are world standard for over 75 years. It is very important to spend few minutes to understand, select the right model based on application and industry standard.

Generally there is industry or supplier/vendor specifications that you need to duplicate. We suggest that you check and confirm in your industry to find out which Brookfield Viscometer they are using so that your data can be correlated.

The most commonly used instruments are LV/RV/HA/HB Viscometer. We suggest our most successful DV2 series which is now available with ***Touch Screen*** feature. It has the most advanced facility of computer connectivity, software, USB connection and many more...

Accessories: UL Adapter (for ultra low viscosity) to measure viscosity as low as 1cps, Small Sample Adapter (for limited sample volume), Helipath Stand (for non-flowing substances like paste & cream), Thermosel (for testing sample at high temp.), Viscosity Standards (for performance check) and most important of all Water-Refrigerated-Circulating Bath (for maintaining temp @ 25°C) **are essential & required to get the optimum use of the Viscometer.**

Brookfield offers other specialized instruments: Cone & Plate Viscometer, CAP Viscometer, Krebs Unit Viscometer and Falling Ball Viscometer.

Our technical team will guide you with the right selection of Viscometer and accessory for your application.

Software
(for advanced data processing)

Water-Refrigerated-Circulating Bath
(to maintain temp. @ 25°C)

Small Sample Adapter
(to measure small volume samples)

Helipath Stand
(to measure viscosity of cream & paste)

UL Adapter
(to measure viscosity as low as 1 cps)

Wells Cone & Plate
(to measure viscosity of sample volume as low as 2 ml)

Viscosity Standards
(for performance check & IQ/OQ/PQ)

Thermosel
(to maintain high temp. upto 300°C)

Analog (Dial)

DV-E Digital

DV-I Prime

KU-2 (Krebs Unit)

CAP Series

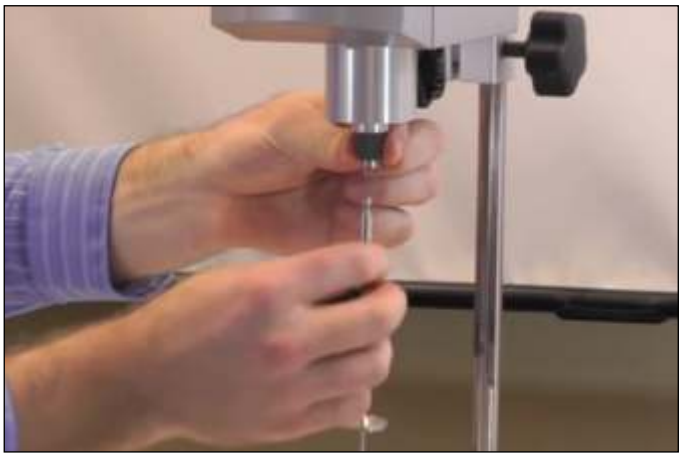
Falling Ball

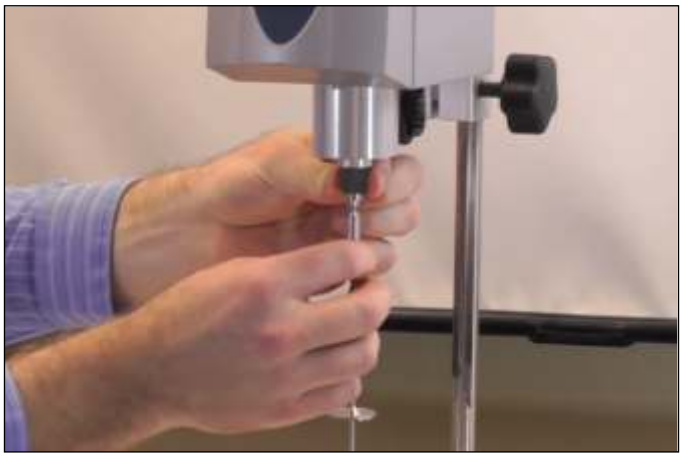
Other series DV-I, DV-E or Analog (Dial) options with reduced features are available to fit low budget.

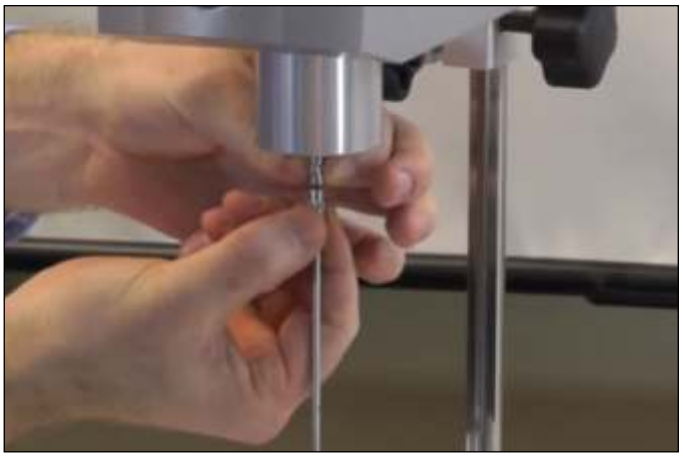
Viscometer by itself without accessories may not give required results within the specification.

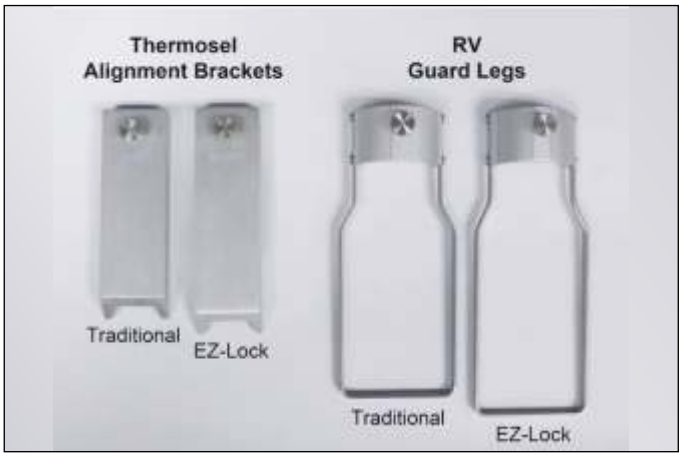
EZ-LOCK

- DV2T & DV3T Viscometers with EZ lock system
- Possible to convert old viscometers into EZ lock.









Upgrade Viscosity Measurement & Control Manual to Automatic

In-line viscometer can help to keep process control and product quality in check

FAST-101/MXTS™ Viscosity Controller

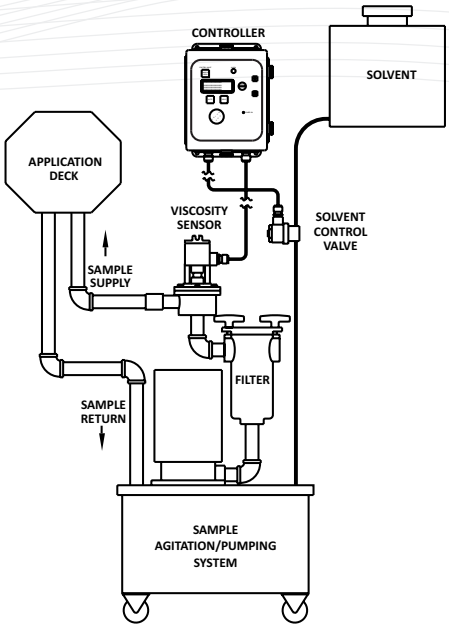
The compact FAST-101/MXTS is the world's most innovative means of viscosity control

FMXTS

The FAST-101/MXTS is a versatile instrument that is excellent for customers who are looking for viscosity control (i.e. maintaining the viscosity of the product) in their process more than the measurement of an exact number (for example, 23.5 cP). It is easy to install, cleans-in-place, and has no moving parts, so maintenance is minimal.

- Rugged 316 stainless steel construction
- Continuous, reliable output 4-20 mA, RS232 or Rs485
- Saves you money while increasing your production
- Optional configurations food grade and explosion-proof designs (Nema 4, Nema 7, ATEX or Sanitary Configurations)
- Pay back with few months

Typical Installation

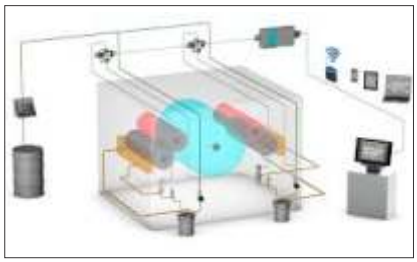


Viscosity Control for

- *Automotive Painting*
- *Coating*
- *Ceramic Slurry*
- *Capsule*
- *Varnish*
- *Food*
- *Fuel, Oil*
- *Starch*
- *Chocolate*

Is a complete package for control and correction for all viscosity applications. The FAST 101 will be the perfect assistant and will maintain your inks, varnishes or coating viscosity to their optimal condition.

The FAST 101 is installed between the pump and the application deck. The actual viscosity is detected in real time and displayed on the Touch Screen Monitor, providing a continuous measurement and corrections to the smallest of changes in inks, varnishes or coatings etc.



FAST-101™ Controllers

FAST-310SY Process Viscosity Controller

- The FAST-310SY is designed for use with the Brookfield FAST-101 system to control viscosity and temperature, interlock with other process devices, and accurately control fluid viscosity in a variety of industrial applications.
- The FAST-310SY is a precise, programmable controller with timed dosing intervals. Its intuitive screen layout allows for quick selection of setup and menu items. At a glance, set point and alarm status are displayed as are viscosity in cP, mPa•s, cSt or cup-seconds, current pH value and temperature in °C or °F.

ADDITIONAL FEATURES INCLUDE:

- Touch Screen Convenience
- Viscosity and pH data trending
- pH and pump interlock
- Multi-level password protection
- Viscosity high/low alarms
- Control of viscosity set point
- Ethernet output

FAST-400SY Process Viscosity Controller

- The FAST-400SY is designed for use with the Brookfield FAST-101 system to monitor viscosity, display temperature, interlock with other process devices, and accurately control fluid viscosity in a variety of industrial applications.
- The FAST-400SY is a precise, 8-station programmable controller with individual station timed dosing intervals. Its intuitive main screen layout allows for quick individual station selection of setup and menu items.

PVS Rheometer

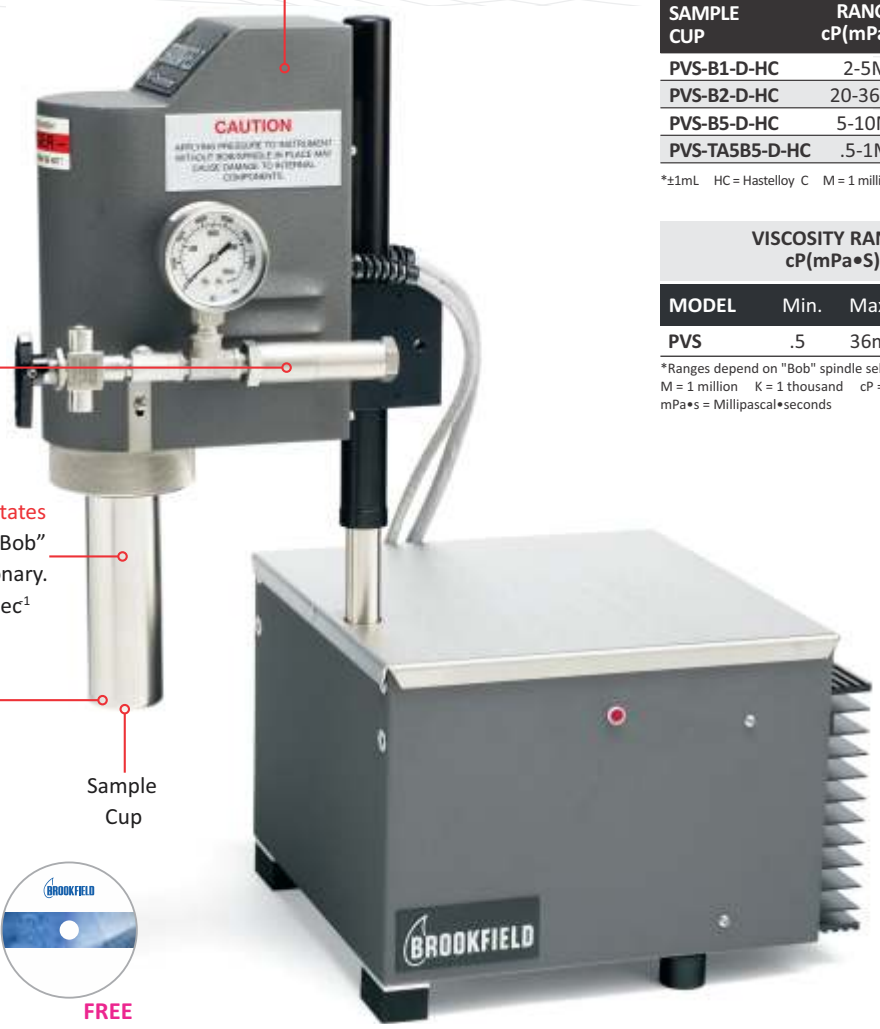
Allows quick and easy viscosity measurements under pressure where sample boil-off is a problem

1'x1'x2' footprint
for site to site mobility

Includes RheoVision Software
for sophisticated rheological analysis

Hastelloy C cup and bobs
for operation in severe field enviornments

Robust Drive Capable of Speeds Up to 1000 RPM



High Pressure (1000 psi) Safety Release Valve

Outside Cylinder Rotates While Inside "Bob" Remains Stationary. Shear Rates to 1700 sec^{1}

RTD on the Inner Cylinder Ensures Accurate Sample Temperature Measurement

Sample Cup

PVS Rheometer Ranges

BOB/STATOR SAMPLE CUP	VISCOSITY RANGE cP(mPa•S)	SHEAR RATE (sec^{-1})	SAMPLE VOLUME (mL)*
PVS-B1-D-HC	2-5M	1.7N	23
PVS-B2-D-HC	20-36M	0.38N	40
PVS-B5-D-HC	5-10M	0.85N	30
PVS-TA5B5-D-HC	.5-1M	0.85N	175

*±1mL HC = Hastelloy C M = 1 million N = RPM mL = Milliliter

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
PVS	.5	36m	.05-1K	10K

*Ranges depend on "Bob" spindle selected.
M = 1 million K = 1 thousand cP = Centipoise
mPa•s = Millipascal•seconds

for Fracturing fluids/Drilling muds

FREE
RheoVision Software

BF 35 Fann Viscometer™

measures viscosity of oil drilling and fracturing fluids at atmospheric pressure in both field and laboratory settings

Features and Benefits

- Easy speed changes with convenient control knob
- Conventional oilfield rotor, bob and torsion spring maintain rheology history and reproducibility between instruments and laboratories
- Sample Cup
- Adjustable table height to accommodate a variety of beaker/containment sizes
- Shear Stress Values Displayed on easy-to-read lighted magnified dial
- Maintains a constant shear rate under varying input power and drilling fluid conditions. Provides drilling fluid engineers with an accurate and

Specifications	
Motor Speeds:	8 fixed (3, 6, 30, 60, 100, 200, 300, 600)
Speed Accuracy:	0.001 (rpm)
Readout:	Direct dial with light
Heat Cup:	Stainless steel, 150 Watt, 190°F (88°C) maximum recommended temperature
Geometry:	True Couette Coaxial Cylinder
Power:	97-250 VAC, 50/60 Hz (12 volt operation requires special cable)
Carrying Case	Included

What is powder flow analysis?

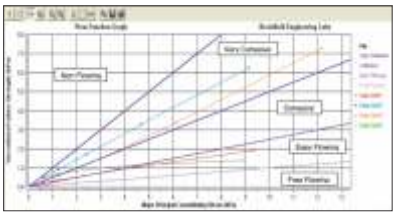
for powder applications

Particulate materials constitute a large group of solids that can range in size from sub micron particles to large rocks and minerals. Brookfield's Powder Flow Tester measures the flow behavior of bulk solid materials that have a top particle size of 2mm. At least 90% of the sample should consist of particles less than 1mm in diameter. In many instances, powders with larger particles can still be characterized effectively by sieving the material at 1mm and testing the fines (the fines control the flow properties of a material with a wide size range). The generic term used by Brookfield to name these materials is "powder", therefore the name of our instrument is "Powder Flow Tester".

Unlike liquids which, under the influence of gravity, tend to have a horizontal surface, powders exhibit a structure, due to internal friction and cohesion, which allows them to form piles with angles relative to the surface on which they are placed. At ambient conditions, powders do not change flow behavior when subjected to variable shear rates, whereas most liquids do. However, pressure controls the strength of a powder (i.e., increases the resistance to flow) whereas a liquid will show limited change in rheology under pressure. In other words, the consequence of subjecting a powder to a compressive force is that the powder will flow less easily; the relationship between the compressive stress applied to consolidate the powder and the strength it obtains is the measurement of the powder flowability, or its "Flow Function".

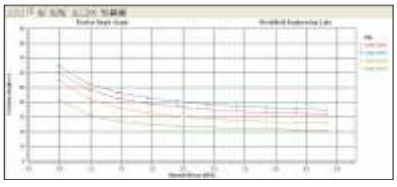
There is a need throughout industry to characterize powder flow properties and flow behavior. The Brookfield Model PFT Powder Flow Tester is a precision instrument of robust design that satisfies this need and more.

Customer Test Report **Standard Flow Function Test**



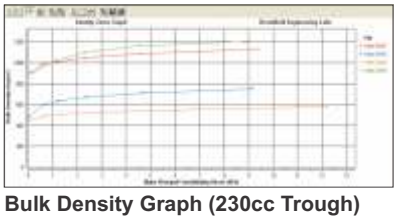
This flow function graph illustrates the flowability of the samples over different consolidating stresses.

Flow Function Graph (230cc Trough)



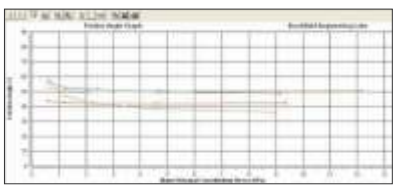
This graph illustrates the angles of wall friction for each powder over different consolidating stresses..

Wall Friction Angle Graph (230cc Trough)



This bulk density graph illustrates the density of the samples over different consolidating stresses.

Bulk Density Graph (230cc Trough)



This graph illustrates the angles of internal friction at different levels of normal stress.

Internal Friction Angle Graph (230cc Trough)

What are the industrial issues with powders?

The classic problem with powders is their failure to discharge reliably from bins, hoppers, silos, etc., and poor or unpredictable flow in feeders, dosing machines, packing machines, etc. This causes unwanted interruptions in the production process, leading at times to complete plant shutdown in order to correct the flow restrictions and stoppages. It also leads to variations in pack weight, mixture, performance and sensory properties of powder products.

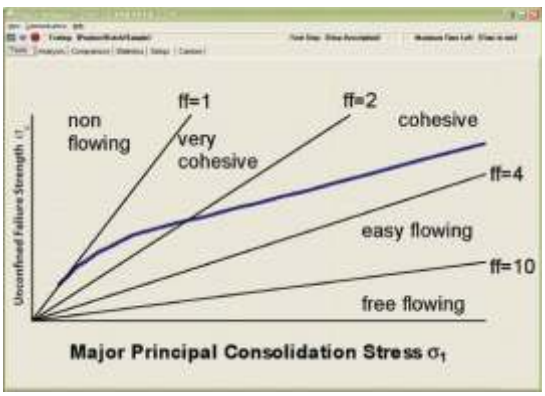
Quality Control Departments are constantly dealing with raw materials in powder form, which come from multiple suppliers. The variability in particle size and distribution, moisture content, and basic ingredients requires a battery of incoming inspection tests, none of which assure that proper flow will take place when loaded into the plant equipment. The Brookfield Powder Flow Tester is a single-solution instrument which can resolve this uncertainty.

R&D Departments are constantly adjusting formulations of powder products to satisfy customer demand for improved properties: better coating action for paints, enhanced taste for spices, rapid dissolving of chemicals when put into solution. New formulations do not necessarily have the same flow properties, thereby leading to production problems when the process is scaled up to high volume. The Brookfield Powder Flow Tester can predict those problems so they can be prevented.

How can flow problems with powders be eliminated?

There is a proven scientific method, called the "Flow Function test", which can analyze powders for flow behavior. ASTM D6128 describes this procedure for compressing and shearing powder samples in a defined annular shear cell, using a well-defined methodology established years ago.

The resulting data produces a "Flow Function", much like what is obtained for liquids when testing with a viscometer to create a "flow curve".



Flow Function for powder sample shows "non-flowing" to "very cohesive" behavior at low consolidation stresses and "cohesive" behavior at higher consolidation stresses.

Analysis of the "Flow Function" leads to calculation of the critical outlet dimensions of feeders, hoppers, etc., through which the powder will flow. Comparing the "Flow Function", or these critical dimensions, allows powders to be benchmarked, ranked and compared against one another for flowability. The dimensions can also be used to determine whether a particular powder will flow through an existing plant or process, or to determine what the geometry should be if purchasing new solids handling equipment.

PFT™ Powder Flow Tester *Powder measurement made easy*

Quick & Easy Analysis of Powder Flow behavior using proven scientific method AST D6128, USP 1174 method

Developed in association with The Wolfson Centre for Bulk Solids Handling Technology at the University of Greenwich, England.

The PFT Powder Flow Tester brings quick and easy analysis of powder flow behavior in industrial processing equipment. Evaluate powder discharge from storage containers. Use as QC check for incoming materials. Rapidly characterize new formulations for flowability and adjust composition to match flow behavior of established products.

Choice of Test Options:
- Flow Function
- Time Consolidated Test with Flow Function
- Wall Friction
- Bulk Density

Choice of Flow Function Tests:
- Demo (8 minutes)
- Standard (38 minutes)
- Time Consolidation (user-defined)

Real Time Clock Displays:
- Test Step
- Remaining Time to Completion

Shearing Algorithm Captures:
- Peak Stress Value
- Subsequent Stable Stress Value

Data Output:
- Flow Index for Powder Flowability
- Arching Dimension (Index)
- Rat-hole Diameter
- Hopper Half Angle
- Gravity Chute Angle (Wall Friction Angle)
- Bulk Density Curve

Compact design with small footprint
Tester fits conveniently on workbench
- Depth: 15inches / 38cm
- Width: 14inches / 36cm
- Height: 27inches / 69cm

Close-up View of Vane Lid used for Flow Function Test.

Close-up View of Wall Friction Lid for wall friction test and density test

Outer and Inner Catch Trays with Scraper Tool for Sample Preparation in Trough

PFT Powder Flow Tester Specifications

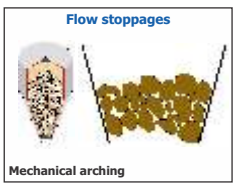
Load for Vertical Axis Compression:		7 kg — Accuracy ±0.6% FSR
Axial Speeds:		0.1mm/second up to 5mm/second
Distance:		Accuracy ±0.3mm
Torque:		±7.0 N•m — Accuracy ±1.2% FSR
Trough Rotational Speeds:		
		1 revolution/hour (RPH) up to 5 RPH
Temperature Sensing:		-20°C to 120°C*
Humidity Sensing:		10% to 95% RH ±5%†
Dimensions (wxdxh):	(cm)	36.2 x 39.7 x 67.6
	(in)	141/4 x 155/8 x 265/8
Weight:		34 kg (75 lb)

* Requires Part No. DVP-94Y † Requires Part No. PFT-607Y

Computer Specifications for Powder Flow Pro Software

2GHz processor with 512 MB of RAM and 30 MB hard drive space available
1024x768 video resolution with 128 MB of graphics memory
Windows XP or Vista with one USB or RS-232 port

Typical Powder Flow Problems



Small Volume Vane Lid / Small Volume Holder 38cc
.795-13.252 kPa

Standard Volume Vane Lid / Standard Volume Holder 230cc
.289-4.819 kPa

Applications

R&D, Incoming Materials Inspection, New Product Formulation, Quality Control, Process Plant Design

- **Adhesives**
- **Cosmetics**
- **Chemicals**
- **Construction:**
  - Cement
  - Fly Ash
  - Gypsum
  - Hydrated Lime
- **Detergents**
- **Equipment Manufacturing:**
  - Silos
  - Bins
  - Feeders
  - Hoppers
- **Food:**
  - Beverages
  - Biscuits
  - Cereal
  - Chocolate
  - Cocoa/Milk Powder
  - Cookies
  - Crackers
  - Flavorings
  - Flour
  - Seasonings
  - Spices
- **Energy:**
  - Biomass
  - Coal
  - Fluxes
- **Gunpowder/ Ammunition**
- **Healthcare Products:**
  - Tablets
  - Minerals
- **Personal Care Products:**
  - Talcom Powder
  - Pharmaceuticals
  - Starch

Properties Measured

Flow function
relation between consolidation stress and powder strength
Angle of internal friction
Angle of wall friction
Bulk density
Arching dimension
Rat-hole diameter
Normalized flow function

CT3 Food Texture Analyzer

compression and tension testing for rapid QC analysis

CT3 with Fixture Base Table and Cylindrical Probe in compression mode

Why Measure Texture?

Consumer products succeed in the marketplace in part because their "textural characteristics" are pleasing to customers. This is certainly true with food products but it also applies to cosmetics, pharmaceuticals, packaging, industrial materials and even adhesive type materials.

Properties Measured

Adhesiveness	Yield Point	Breaking Point	Chewiness	Elasticity
Cohesiveness	Consistency	Fracture Force	Gel Strength	Gumminess
Hardness	Ripenes	Spreadability		

Application areas:

Food process industries	Confectionaries	Bakery products
Food ingredients	Meat process	Fisheries
Agriculture research	Dairy industries	Ready to eat products
Post harvest products	Food testing labs	

Model	Load Range / Resolution*
CT3-1000	0-1000g/0.10g
CT3-1500	0-1500g/0.20g
CT3-4500	0-4500g/0.50g
CT3-10kg	0-10000g/1.0g
CT3-25kg	0-25000g/2.0g
CT3-50kg	0-50000g/5.0g

g = grams kg = kilograms
*Accuracy = ±0.5% Full Scale Range (FSR)

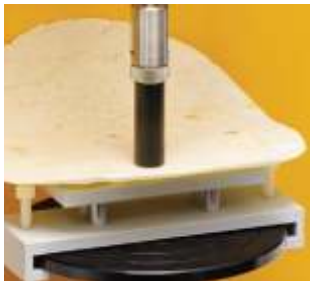
All CT3 Model Specifications	
Speed:	
Range	0.01 - 0.1mm/s (increments 0.01mm/s)
	0.1 - 10mm/s (increments 0.1mm/s)
Accuracy	±0.1% of setspeed
Position:	
Range	0 - 101.6mm
Resolution	0.1mm*
Accuracy	0.1mm

mm = milimeter s = seconds
*Resolution 0.01mm when used with TexturePro CT Software

Food Applications

TA-KF
Kieffer Dough and Gluten Estensibility Fixture quantifies maximum force and distance needed to break sample. Fixture Base Table required.

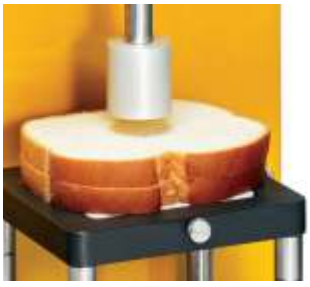
TA-JTPB
Small scale version of Three Point Bend Fixture is used with TA7 blade from general probe kit. Rotary Base Table required.



TA-JPA
Junior Punch Fixture is for punching through flat samples; 12.7mm max. diameter probe. Hole in fixture is 14mm. Rotary Base Table required.

TA-CTP
Compression Top Plate for applying uniform compression forces on samples up to 4x6 inches (10x15cm) Fixture Base Table required.

TA-WSP
Wire Shear Plate cuts through the sample. Good for products with significant stickiness like cheese and butter. Fixture Base Table required.



TA-AACC36
AACC spec probe for measuring bread firmness and performing texture profile analysis (TPA). Fixture Base Table required.

TA-TGA
Grips for tensile testing of thin film seal adhesive and seal strength on pharmaceutical packaging.

TA-10
GMIA & GME probe and spec Bloom bottle TA-GBB-2 sold in package of twelve bottles. Rotary Base Table required.

CT3 Pharmaceutical Texture Analyzer

*21CFR PART 11 compliance software

Model	Load Range / Resolution*
CT3-1000	0-1000g/0.10g
CT3-1500	0-1500g/0.20g
CT3-4500	0-4500g/0.50g
CT3-10kg	0-10000g/1.0g
CT3-25kg	0-25000g/2.0g
CT3-50kg	0-50000g/5.0g

g = grams kg = kilograms
*Accuracy = ±0.5% Full Scale Range (FSR)

All CT3 Model Specifications	
Speed:	
Range	0.01 - 0.1mm/s (increments 0.01mm/s)
	0.1 - 10mm/s (increments 0.1mm/s)
Accuracy	±0.1% of setspeed
Position:	
Range	0 - 101.6mm
Resolution	0.1mm*
Accuracy	0.1mm

mm = milimeter s = seconds
*Resolution 0.01mm when used with TexturePro CT Software

Solid Dosage

- Tablet hardness / crush strength
- Breakability for Scored tablets
- Fast dissolving tablets - permeability
- Soft gel capsule hardness / rupture / burst strength
- Hard gelatine capsule tensile test
- Bilayer tablet - bond strength
- Suppositories hardness
- Tablet Coating Strength
- Lozenges - chewability
- Gummies - hardness


Capsule brittleness


Bilayer ablet shear jig


Tablet breakability

Gelatin

- **Soft gelatin "Bloom test"**

for determination of Bloom Strength as a means of monitoring the effect of quality, concentration & process methods on gelatin


Soft gel hardness


Bloom test

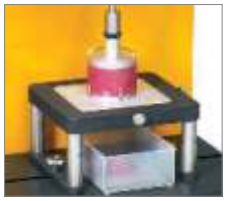

Capsules puncture

Topicals

Spreadability, Firmness, Tackiness, Flow Behavior, Gel Strength, Adhesiveness

- Creams
- Gels
- Ointments


Tooth paste extrusion


Dual extrusion cell


Lotion stickiness

Advanced Applications

- Muco adhesion / Bio Adhesion
- Metered Dose Inhaler
- Transdermal Patch Consistency
- Fast dissolving films
- Aerosols
- Nasal Spray Test
- Pre-filled Syringes
- Raft Strength
- Pellet Hardness
- Gallen Gum adhesiveness
- Chewable gummies
- Powder Compaction force


MDI - Actuation test


Pellet crush


Muco - adhesion

Cosmetics

- Lipstick bend test as per ASTM method
- Hardness of Face pack
- Creams / gels hardness, spread value
- Eye pencil break test
- Deodorant Spray and Shot weight test
- Peel strength for facial mask
- Hair & Care products


Spreadability


Spray force test


Hair combability

Packaging

- Rubber - Cap Penetration. as per industry method.
- Injection - Gliding / break loose / withdrawal force
- Blister pack consistency
- Film tensile, rupture, elongation
- Peel Test (90°, 180°)
- Tube extrusion test


Tube extrusion test


Tensile jig


Blister packaging

RST Touch series Rheometers *Enhancing viscosity measurements to next level*

For Viscosity & Rheology (World's most economical & best Rotational Rheometer)

Touch Screen Rheometers for Controlled Rate/Stress Measurement

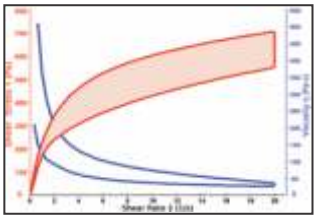
Pharmaceuticals, Adhesives, Dairy Products, Chocolate, Gypsum, Slurries, Minerals, Biomass, Paints etc.

The R/S Plus Rheometer is available in three configurations: Model **RST-CC** (Coaxial Cylinder) Model **RST-CPS** (cone/plate or plate/plate) and Model **RST-SST** (soft solids tester/vane) for a variety of sample types.

The rotational motor developed for this rheometer utilizes a high dynamic precision drive system without gearing or mechanical force transducers. The torque is therefore controlled without deflection. A 400,000 line optical encoder carefully measures spindle position during rotation. This combination of motor drive and optical encoder enables the RST to be controlled via Controlled Shear Stress (CSS) or Controlled Shear Rate (CSR). With its wide torque range capability (0.05 to 100 mN•m), the RST Plus Rheometer can handle most applications usually limited to the high-end research Rheometers.

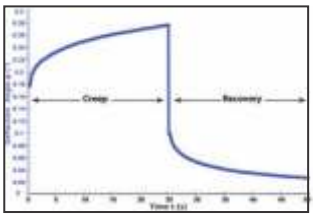
Controlled Shear Rate provides important information on flow behavior showing how viscosity changes with spindle speed and time. Data analysis using RHEO3000 software allows for plotting of flow curves, quality control min/max limits, math models, data averaging and many more analysis functions.

Thixotropic

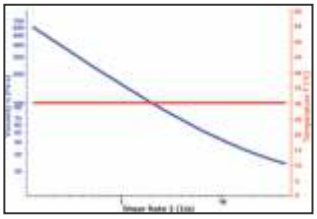


Thixotropy Analysis:
up/down shear rate ramp produces curves for shear stress vs. shear rate (red color) and viscosity vs. shear rate (blue color). Thixotropy calculation is the area between the red curves, approximately 2,000 Pa•s.

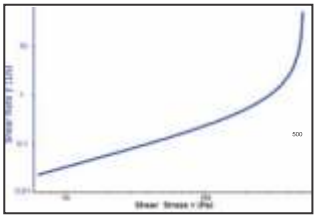
Viscoelastic Behavior



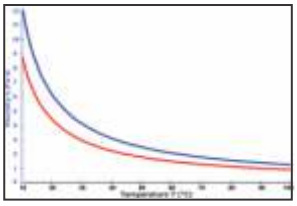
Creep /Recovery Behavior:
material flow under constant stress is measured by detecting angular rotation of spindle; when constant stress is removed, recovery is measured by backward rotation of spindle.



Viscosity Flow Curve :
viscosity vs. shear rategraph shows pseudoplastic behavior while temperature remains constant at 30°C.



Yield Stress Determination
shear stress ramp from 0 to 1,000 Pa over 2 minutes shows yield stress values at 500 Pa.



Viscosity vs. Temperature:
viscosity is measured at constant shear rate while temperature increases from 10°C to 100°C for two test samples.

- Shear Rate / Shear Stress measurements
- Stability

Making measurements using Controlled Shear Stress allows the operator to make direct yield stress measurements and determine creep properties and the presence of elastic behavior. Of special note is the enhanced encoder which provides detailed measurement data on relaxation and recovery behavior after the stress is removed.

Dual Operation Modes (CSS and CSR):

The key to meaningful rheological data and the conclusions drawn from it is to select test parameters that reproduce the conditions experienced by the sample in the real world. Capable of operating with either stress or rate as the control parameter, the dual capability of the R/S Rheometer provides the very best of both worlds. Controlled shear stress/shear rate operation makes it easy to study material behavior — from initial yield to flow curve response.

RST Spindle Ranges

SPINDLE	VISCOSITY cP RANGE	SHEAR RATE	MAX. SHEAR STRESS	SAMPLE VOLUME
COAXIAL	**Pa•s**	**sec^{-1}**	**Pa**	**mL**
CCT-DG	0.00005-4.07K	0.043-5.64K	177	15.7
CCT-40	0.0003-27.6K	0.0215-2.79K	594	68.5
CCT-25	0.002-177K	0.013-1.67K	2.28K	16.8
CCT-14	0.012-1M	0.013-1.68K	13K	3.4
CCT-8	0.065-5.41M	0.013-1.672K	69.6K	1.0
CONE				
RCT-25-1	0.005-407K	0.06-7.8K	24.4K	0.1
RCT-25-2	0.01-814K	0.03-3.9K	24.4K	0.2
RCT-50-1	0.0006-50.9K	0.06-7.8K	3.05K	1.0
RCT-50-2	0.0012-101K	0.03-3.9K	3.05K	2.0
RCT-75-1*	0.0002-15K	0.06-7.8K	905	2.5
RCT-75-2*	0.0004-30K	0.03-3.9K	905	5.0
PLATE				
RPT-25	0.03-2.49M	0.013-1.7K	32.6K	0.5
RPT-50	0.002-155K	0.027-3.4K	4.07K	2.0
RPT-75*	0.0004-30.7K	0.04-5.1K	1.2K	4.5

*For use with water bath version only 1 Pa•s = 1,000 cP K = 1 thousand M = 1 million
Notes: Values based on minimum speed of 1 RPM and maximum speed of 1000 RPM

RST Vane Spindles

SPINDLE	LENGTH (mm)	DIAMETER (mm)	STRESS
VANE	**mm**	**mm**	**Pa**
VT-10-5	10	5	330-210K
VT-20-10	20	10	41-27K
VT-20-20	20	20	9-5.9K
VT-30-15	30	15	12-8K
VT-40-20	40	20	5.2-3.4K
VT-40-40	40	40	1.2-740
VT-50-25	50	25	2.7-1.7K
VT-60-8	60	8	24-15K
VT-60-15	60	15	7-4.3K
VT-60-30	60	30	1.6-1K
VT-80-40	80	40	0.7-420
VT-80-70	80	70	0.2-120

Values based on minimum speed of 1 RPM and maximum speed of 1000 RPM
K = 1 thousand

RST Technocal Specifications (all models)	
Maximum Torque:	100 mNm
Torque Resolution:	0.15 µNm
Speed:	0.01 to 1300 rpm
Data Output:	USB, RS232
Display Units:	cP, Pa•s, Dynes/cm^2, Pa, °C, °F

Applications suitable for

- **Suspensions**
- **Liquids**
- **Slurries**
- **Gels**
- **Cream**
- **Pastes**
- **Inks**
- **Oils**
- **Topical Semisolids**
- **Minerals**
- **Eye drops**
- **Chemicals**
- **Coatings, Paints**
- **Food Industry**








RST-CPS Touch™ Rheometer

Cone/Plate & Plate/Plate Systems for small samples and wide shear rate ranges

Features and Benefits

- Controlled shear stress/shear rate operation makes it easy to study material behavior from initial yield to flow curve response
- User-friendly Touch Screen and graphical display for stand-alone operation
- Quick Connect Coupling System for easy spindle attachment
- Very Small Sample Size permits rapid test set up and clean up
- Spindle Barcode for auto spindle recognition
- 21 CFR Part II Compliance
- Automatic or Manual Gap Setting for quick and easy gap setting
- Rapid Temperature Control of plate with Peltier option for quick profiling of viscosity vs. temperature

	VISCOSITY RANGE* (Pa•s)		SPEEDS
MODEL	Min.	Max.	RPM
RST-CPS Cone/Plate	0.0006	814K	0.01 - 1.3K
R/S-CPS Cone/Plate	0.002	2.49M	0.01 - 1.3K

K = 1 thousand M = 1 million 1 Pa•s = 1000 cP (centipoise)

Cone/Plate Temperature Control Options

MODEL	Description	Temperature
RST-CPS-FH	Bath	-20° to 200°C
RST-CPS-PA	Peltier Air	0° to 180°C*

† Higher temperatures available on request.
* 75mm plates cannot be used with Peltier systems.
* Subject to Ambient temperature being @ 20°C

Choice of cone spindles and plate spindles accommodates all sample types. Plate spindles are used for highly-filled or very viscous samples.

The optional Thermal Barrier reduces the effects of heat transfer to the environment. Two part chamber provides thermal isolation of the measurement zone.

The optional KE cooling device is required to cool viscometer bearings when testing with temperatures above 70°C.

RST-CC Touch™ Rheometer

Coaxial Cylinder DIN Geometries for single point QC or full rheological profiling

Features and Benefits

- Spindle Barcode for auto spindle recognition
- Controlled shear stress/shear rate operation makes it easy to study material behavior from initial yield to flow curve response
- Optional Rheo3000 Software allows for PC control and data acquisition/analysis of multiple test files
- Quick Connect Coupling for easy bob (spindle) attachment
- Rugged Design permits use on production floor
- Small sample size facilitates rapid temperature control during testing
- Temperature Control from -20°C to 180°C
  Choice of
  - Direct immersion in bath
  - External circulation using the FTKY3 Water Jacket
- 21 CFR Part II Compliance

	VISCOSITY RANGE* (Pa•S)		SPEEDS
MODEL	Min.	Max.	RPM
RST-CC Coaxial Cylinder	.00005	5.41 M	0.01 - 1.3K

K = 1 thousand M = million 1 Pa•s = 1000 cP (centipoise)

OptionalCone/ Plate Accessory provides extended range capability for shear rate and viscosity

Water Jacket

Chambers

Coaxial Cylinder Spindles

Double Gap Coaxial Cylinder for very low viscosity materials

Choice of several vane spindle options for a wide measurement range.

DV3T™ Viscometer *with EZ lock quick spindle connect*

the all-in-one tool for measuring viscosity and yield stress

Features and Benefits

- 7-inch Full Color Touch Screen Display
  - New User Interface
  - Enhanced Controls
  - Real Time Graphing
  - Supports Multiple Languages
- Displayed Info:
  - Viscosity (cP or mPa•s)
  - Temperature (°C or °F)
  - Shear Rate/Stress
  - % Torque
  - Speed/Spindle
  - Step Program Status
  - Math Model Calculations
- Built-in math models for data analysis in stand-alone mode. E.g. Casson, Bingham, Power Law, Thix Index
- Enhanced Security
  - Customizable User Access- Date and Time Stamp File
  - Password Access
  - Portable Log-in Settings
- Built-In Options
  - Math Modeling
  - Temperature Control
  - Yield Tests
  - Programmable QC Limits/Alarms
- Analyze characteristics such as yield stress, flow curves (mixing, pumping, spraying), leveling and recovery
- USB PC Interface provides optional computer control and automatic data collection capability
- Convenient Bubble Level

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
DV3TLV	1†	6M	.01-250	2.6K
DV3TRV	100††	40M	.01-250	2.6K
DV3THA	200††	80M	.01-250	2.6K
DV3THB	800††	320M	.01-250	2.6K
DV3T5xHB	4K	1.6B	.01-250	2.6K

† 1 cP achieved with UL Adapter accessory. 15 cP on LV with standard spindles.
†† Minimum viscosity is achieved with optional RV/HA/HB-1 spindle.
B = 1 Billion M = 1 million K = 1 thousand cP = Centipoise
mPa•s = Millipascal•seconds

- Integrated Temperature Control with connection to Brookfield TC series Baths and AP controller or Brookfield Thermosel System.
- Stand-alone programming or download custom test programs with PG Flash Software.
- Built-in RTD Temperature Probe
- Accuracy: ±1.0% of range
  - Displayed with test data
- Repeatability: ±0.2%

DV2T™ Viscometer *with EZ lock quick spindle connect*

Our most versatile, continuous sensing viscometer has a new look!

Features and Benefits

- 5-inch Full Color Touch Screen Display
  - New User Interface
  - Enhanced Controls
  - Supports Multiple
  - Languages
  - Real Time Trend Indicator
- Displayed Info:
  - Viscosity (cP or mPa•s)
  - Temperature (°C or °F)
  - Shear Rate/Stress
  - % Torque
  - Speed/Spindle
  - Step Program Status
- Enhanced Security
  - Customizable User Access
  - Date and Time Stamp File
  - Password Access
  - Portable Log-in Settings
- Built-in Options
  - Timed Tests
  - Data Averaging
  - Programmable QC Limits/Alarms
  - Test Based User Instructions
  - Customizable Speed/Spindle Lists
  - On Screen Data Comparison
- Auto Range Showing
  - Maximum viscosity measured with Spindle/Speed combination
- USB PC Interface provides optional computer control and automatic data gathering capability
- Convenient Bubble Level
- Download custom test programs with PG Flash Software (included with instrument)
- Accuracy: ±1.0% of range - Displayed with test data
- Repeatability: ±0.2%
- Built-in RTD Temperature Probe

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
DV2TLV	1†	6M	.1-200	200
DV2TRV	100††	40M	.1-200	200
DV2THA	200††	80M	.1-200	200
DV2THB	800††	320M	.1-200	200

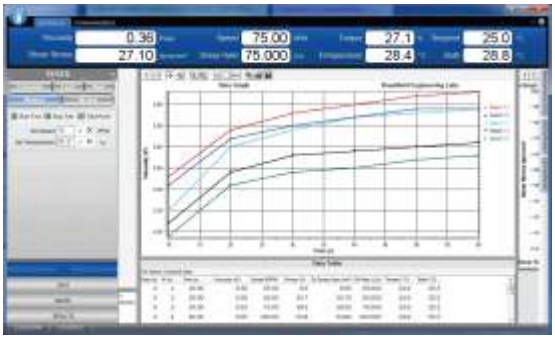
† 1 cP achieved with UL Adapter accessory. 15 cP on LV with standard spindles.
†† Minimum viscosity is achieved with optional RV/HA/HB-1 spindle.
M = 1 million cP = Centipoise mPa•s = Millipascal•seconds

DV2T EXTRA™ Viscometer

The "EXTRA" combines all the versatile viscosity testing capabilities of a DV2T with time and money-saving features such as a **durable ball bearing suspension system, EZ-Lock Spindle Coupling, Quick Action Lab Stand** and FREE Rheocalc T Software.

RheocalcT Software

Get total control of your instrument and test parameters



Automatically control the instrument and collect data with RheocalcT running on a dedicated PC with USB interface. RheocalcT can analyze data, generate multiple plot overlays, print tabular data, run math models and perform other time-saving routines. Up to five comparison data sets can be plotted and saved. Other features include:

- Wizards to guide you through the creation of common tests
- Secure 21CFR features including multiple logins, access levels, digital signatures, and data storage in a password-protected database
- Looping functions for repetitive tasks
- Averaging of collected data by individual step or whole test
- Math models: Bingham, Casson, Power Law, Herschel-Bulkley
- Export data to Excel® file format
- Create data reports in PDF format

DV-I™ Viscometer

The only viscometer in its class to offer continuous sensing and data display!

Free RTD Temperature Probe DVP-94Y
- Instrument must be configured upon purchase.

Features and Benefits

- User Configuration Display :
  - User Choice of most important parameter is displayed in larger font size
  - Choice of static or scrolling display mode
- Display Info :
  - Viscosity (cP, P, mPa•s, Pa•s)
  - % Torque
  - Speed/Spindle
  - Temperature (°C or °F)

  if optional RTD Temperature Probe is installed
- Choice of Multiple Languages

  English, French, German, Portuguese, Russian, Spanish
- USB PC interface for use with optional Wingather SQ Software
- 18 speeds provide great range capability
- Direct Access

  to time measurement function (time to torque, time to temperature, time to stop)
- Accuracy ±1.0% of range • Repeatability ±0.2%

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
DV1 MLV	1*	2M	.3-100	18
DV1 MRV	100	13M	.3-100	18
DV1 MHA	200	26M	.3-100	18
Dv1 MHB	800	104M	.3-100	18

* Minimum ranges can be extended to as low as 1 cP with the use of Brookfield Accessories
** Standard torque range values
M = 1 million cP = Centipoise mPa•s = Millipascal•seconds

- Temperature off-set capability to ±5°C
- Automatic Range Calculation
  - Full Scale Range (FSR) at 100%
  - Maximum Viscosity measured with Spindle/Speed Combination
- Simplified User Interface

  for more direct access to features
- Printing to Dymo® Printer Capability

DV-E Viscometer

our lowest cost digital viscometer

Features and Benefits

- New User Interface
  - Keypad control
  - Sharp viewing screen for close up or distance viewing
- New User Interface

  Direct reading of viscosity
- Displayed Info:
  - Viscosity (cP, P, mPa•s or Pa•s)
  - % Torque - Speed/Spindle
- Easy-to-Use:
- Range:

  Push for determining full scale range (FSR) viscosity
- 18 Speeds for complete range capability
- Bubble Level Conveniently located for easy adjustment
- Accuracy: ±1.0% of range

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
DVELV	1†	2M	.3-100	18
DVERV	100††	13M	.3-100	18
DVEHA	200††	26M	.3-100	18
DVEHB	800††	104M	.3-100	18

† 1 cP achieved with UL Adapter accessory. 15 cP on LV with standard spindles.
†† Minimum viscosity is achieved with optional RV/HA/HB-1 spindle.
M = 1 million cP = Centipoise mPa•s = Millipascal•seconds

Dial Reading Viscometer

our original...over 75 years!

Features and Benefits

- The Worldwide Standard Viscometer
- Easy–to–Select Speeds
- Electronic Drive means quiet, reliable operation
- Analog display
  - Shows % Torque
  - Use Factor Finder to convert reading to centipoise
- Simple-to-use, easy setup
- 2–Year Limited Warranty
- Available in explosion proof U.L. Class 1, Group D locations (w/o Electronic Drive)
- Accuracy: ±1.0% of range
- Repeatability: ±0.2%

	VISCOSITY RANGE cP(mPa•S)		SPEEDS	
MODEL	Min.	Max.	RPM	Number of increments
LVT	1†	2M	.3-60	8
RVT	100††	8M	.5-100	10
HAT	200††	16M	.5-100	10
HBT	800††	64M	.5-100	10

† 1 cP achieved with UL Adapter accessory. 15 cP on LV with standard spindles.
†† Minimum viscosity is achieved with optional RV/HA/HB-1 spindle.
M = 1 million cP = Centipoise mPa•s = Millipascal•seconds

Wells/Brookfield Cone & Plate

for Small Samples

Features and Benefits

- Determine absolute viscosity of small samples (0.5 – 2.0 mL)
- Available in these models
  - DV3T Rheometer
  - DV2T Viscometer
  - DV-I Prime Viscometer
- Accuracy: ±1.0% of range
- Temperature range 1°C to 100°C
- Repeatability: ±0.2%
- Electronic Gap Adjustment™
  - Simplified setup
  - Accurate
  - Easy-to-use
- RTD Temp. Sensor in Sample Cup (Optional) provides direct measurement of sample temp.
- Control Sample Temperature using a Brookfield circulating water bath
- Rapid temp. control due to small sample size
- Temperature Range: - 1°C to 100°C
- Precise shear rates for determining a material's flow curve behavior

Viscosity Range* cP(mPa•s)

MODEL	Cone Spindle: CPA-40Z Sample Volume: .5mL Shear Rate (sec⁻¹): 7.5N	Cone Spindle: CPA-41Z Sample Volume: 2.0mL Shear Rate (sec⁻¹): 2.0N	Cone Spindle: CPA-42Z Sample Volume: 1.0mL Shear Rate (sec⁻¹): 3.84N	Cone Spindle: CPA-51Z Sample Volume: .5mL Shear Rate (sec⁻¹): 3.84N	Cone Spindle: CPA-52Z Sample Volume: .5mL Shear Rate (sec⁻¹): 2.0N	SPEEDS RPM	SPEEDS Number of Increments
DV3TLVCP	.1 - 3K	.5 - 11K	.2 - 6K	2 - 48K	3 - 92K	.01 - 250	2.6K
DV2TLVCP	.2 - 3K	.6 - 11K	.3 - 6K	2 - 48K	4 - 92K	0.1 - 200	200
DV3TRVCP	1 - 32K	5 - 122K	2 - 64K	20 - 512K	39 - 983K	.01 - 250	2.6K
DV2TRVCP	1.6 - 32K	6 - 122K	3 - 64K	25 - 512K	49 - 983K	0.1 - 200	200
DV3THACP	2.6 - 65K	10 - 245K	5 - 128K	41 - 1M	78 - 2M	.01 - 250	2.6K
DV2THACP	3 - 65K	12 - 245K	6 - 128K	51 - 1M	98 - 2M	0.1 - 200	200
DV3THBCP	10.5 - 261K	39 - 982K	20 - 512K	163 - 4M	314 - 7.8M	.01 - 250	2.6K
DV2THBCP	13 - 261K	49 - 982K	25.6 - 512K	204 - 4M	393 - 7.8M	0.1 - 200	200

M = 1 million K = 1 thousand cP = Centipoise mPa•s = Millipascal•seconds mL = Milliliter N = RPM e.g. Spindle CPA-40Z 7.50 x 10 (rpm) = 75.0 sec⁻¹

* Dependant upon cone selected.

CAP1000+™ & CAP2000+™

Perfect for Paints & Coatings Meets Industry Standards:
ASTM D4287, ISO 2884, BS 3900 High Shear Rate Cone & Plate (10,000 sec^{-1})

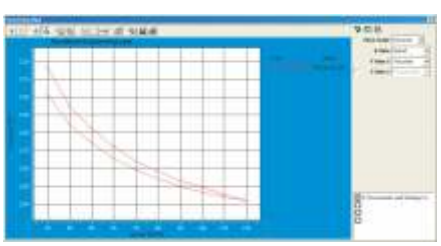
Cone & Plate Viscometers

Features and Benefits

- Keypad for direct input of test parameters
- Cone Spindle is easily removed for cleaning
- Easy-to-use Control Handle for accurate, automatic cone positioning
- Designed to handle repetitive testing in production environments with easy setup and cleaning
- 4-Line display allows simultaneous viewing of all test parameters
- Choice of instruments:
  CAP1000+ (single speed)
  CAP2000+ (variable speed)
- Automatic cone / gap positioning
- Small sample size less than 1mL
- Built-in Peltier Plate for temperature control of sample:
  L Series: 5°C — 75°C
  H Series: 50°C — 235°C

MODEL	VISCOSITY RANGE Poise Min.	VISCOSITY RANGE Poise Max.	SPEEDS RPM	SPEEDS Number of increments
CAP 1000+	0.2	15K	900/750	2
CAP 2000+	0.2	15K	5-1k	995

* Dependant on cone selected.
M = 1 million K = 1 thousand cP = Centipoise
1 poise = 100 cP



KU-3™ Viscometer

Brookfield stormer viscometer for Paints, Coatings and Inks

Features and Benefits

- ASTM D562 Compatible (industry specification)
- New Magnetic Spindle Coupling
- New User Interface
- Easy to use: no weights, simplifies an established test procedure
- LED Display Info:
  - Krebs Units
  - Gram Units (Weight)
  - Centipoise*
  - Select Krebs or Grams or Centipoise
- Lock-In Test Results with Hold Key
- Accuracy: ±1.0% of range
- Repeatability: ±0.5%
- Standard Krebs Spindle
- Measurement range: 40 to 141 KU, 32 to 1099 gm, and 27 to 5274 cP*
- Adapter provided for Pint & 1/2 Pint cans Accommodates quart cans

Applications

Paint
Coatings
Adhesives
Inks
Pastes

Unit	Measurement Range
KU (Krebs Units)	40 - 141
gm	32 - 1099
cP	27 - 5274*

**Centipoise values based on the conversion from Krebs Units as defined in the ASTM D562.*

Falling Ball Viscometer

...Newtonian measurements made simple and easy!

Features and Benefits

- The Brookfield Falling Ball Viscometer uses the simple — but precise — Höppler principle to measure the viscosity of Newtonian liquids by measuring the time required for a ball to fall under gravity through a sample-filled tube.
- Set of six balls to test a wide variety of samples
- Connection to circulating bath for temperature control of sample
- Temperature probe
- Pivot bearing allows for quick and easy tube rotation for repeat test
- Model KF40 (shown) variable angle allows for greater viscosity range
- Model KF30 (also available) fixed angle complies with DIN 53015
- Viscosity Range: 0.5 to 70,000 mPa•s (cP)
- Accuracy: 0.5% to 2.0% (depending on ball used)

SPECIFICATIONS	
Viscosity Range:	0.5 mPa•s (cP) to 70,000 mPa•s (cP)
Accuracy:	0.5% - 2.0% depending on choice of ball
Ball set Material of Construction:	
	Balls 1 and 2: Boron Silicate Glass
	Balls 3 and 4: Nickel-iron
	Balls 5 and 6: Steel
Ball Diameter:	11.0 mm to 15.81 mm
Fall Time of Ball in Measurement: 30 to 300 seconds**	
Length of Measurement Zone in the Tube: 100 mm	
Operating Temperature Range: -60°C to +150°C	
Sample Tube Volume: 40mL	
Viscometer Dimensions: 180 x 220 x 330 mm	

**Falling times greater than 300 seconds allow measurement of liquids above 70,000 mPa•s (cP)

Applications

Beverages
Coatings
Cosmetics
Detergents
Food
Paint
Petroleum Products
Pharmaceuticals
Polymers
Soap

Enhanced UL Adapter™

for ultra low viscosity as low as 1 cP

Features and Benefits

- Reduces measuring range to as low as 1 cP, depending on viscometer used
- Simple attachment to a standard Brookfield Viscometer or DV3T Rheometer
- Small sample size: 16 mL
- Cylindrical geometry provides defined shear rates for detailed product analysis
- Removable cap of low density polyethylene can be considered disposable for one-time use if required
- Stainless steel parts are easily cleaned

Small Sample Adapter™

for rheological evaluation where sample volume is limited

Complete system shows the DV2T Viscometer and Small Sample Adapter with Circulating Water Bath for temperature control.

Standard Sample Chamber with embedded temp. probe provides direct temperature measurement of

Disposable Sample Chamber (Requires SSA-DCU Water Jacket)

Designed to provide an alternative for those customers having limited sample sizes (2 to 16ml)

Features and Benefits

- Cylindrical geometry provides calculable shear rates.
- Optional RTD Temperature Sensor embedded in Sample Chamber provides accurate monitoring of sample temperature during viscosity measurement.
- Simple attachment to any standard Brookfield Viscometer or DV3T Rheometer
- Complete with choice of 1 sample chamber and spindle, water jacket, attachment hardware and storage case.

Small Sample Adapter Viscosity Ranges cP(mPa•s)

MODEL	Spindle: SC4-18 Sample Chamber:* SC4-13R(P) Sample Volume: 6.7mL Shear Rate (sec-1): 1.32N	Spindle: SC4-31 Sample Chamber:* SC4-13R(P) Sample Volume: 8.0mL Shear Rate (sec-1): .34N	Spindle: SC4-34 Sample Chamber:* SC4-13R(P) Sample Volume: 8.4mL Shear Rate (sec-1): .28N	Spindle: SC4-16 Sample Chamber:* SC4-8R(P) Sample Volume: 4.2mL Shear Rate (sec-1): .29N	Spindle: SC4-25Z (316 s/s only) Sample Chamber:* SC4-13R(P) Sample Volume: 16.1mL Shear Rate: (sec-1): .22N	Spindle: SC4-21 Sample Chamber:* SC4-13R(P) Sample Volume: 1.1mL Shear Rate (sec-1): .93N	Spindle: SC4-27(D) Sample Chamber:* SC4-13R(P) Sample Volume: 10.4mL Shear Rate (sec-1): .34N	Spindle: SC4-15 Sample Chamber:* SC4-7R(P) Sample Volume: 3.8mL Shear Rate (sec-1): .48N	Spindle: SC4-28 Sample Chamber:* SC4-13R(P) Sample Volume: 11.6mL Shear Rate (sec-1): .28N	Spindle: SC4-29 Sample Chamber:* SC4-13R(P) Sample Volume: 13.5mL Shear Rate (sec-1): .23N	Spindle: SC4-14 Sample Chamber:* SC4-6R(P) Sample Volume: 2.1mL Shear Rate (sec-1): .40N
DV3TLV	1.2-30K	12-300K	24-600K	48-1.2M	192-4.8M	Not applicable for historical reasons. However, it is possible					
DV2TLV	1.5-30K	15-300K	30-600K	60-1.2M	240-4.8M	to use the above spindles with any of these instruments.					
DV1MLV	3-10K	30-100K	60-200K	120-400K	800-1.6M	Digital Viscometers/Rheometers will automatically calculate					
LVDVE	3-10K	30-100K	60-200K	120-400K	800-1.6M	viscosity. Please contact Brookfield or an authorized dealer					
LVT	5-10K	50-100K	100-200K	200-400K	800-1.6M	if you require information on viscosity range.					
DV3TRV						20-500K	100-2.5M	200-5M	200-5M	400-10M	500-12.5M
DV2TRV						25-500K	125-2.5M	250-5M	250-5M	500-10M	625-12.5M
DV1MRV						50-170K	250-830K	500-1.7M	500-1.7M	1K-3.3M	1.25K-4.2M
RVDVE		Not applicable for historical reasons.				50-170K	250-830K	500-1.7M	500-1.7M	1K-3.3M	1.25K-4.2M
RVT		However, it is possible to use the above				50-100K	250-500K	500-1M	500-1M	1K-2M	1.25K-2.5M
DV3THA		spindles with any of these instruments.				40-1M	200-5M	400-10M	400-10M	800-20M	1K-25M
DV2THA		Digital Viscometers/Rheometers will				50-1M	250-5M	500-10M	500-10M	1K-20M	1.25K-25M
DV1MHA		automatically calculate viscosity. Please				100-300K	500-1.7M	1K-3.3M	1K-3.3M	2K-6.7M	2.5K-8.3M
HADVE		contact Brookfield or an authorized dealer if				100-300K	500-1.7M	1K-3.3M	1K-3.3M	2K-6.7M	2.5K-8.3M
HAT		you require information on viscosity range.				100-200K	500-1M	1K-2M	1K-2M	2K-4M	2.5K-5M
DV3THB						160-4M	800-20M	1.6K-40M	1.6K-40M	3.2K-80M	4K-100M
DV2THB						200-4M	1K-20M	2K-40M	2K-40M	4K-80M	5K-100M
DV1MHB						400-1.3M	2K-6.7M	4K-13.3M	4K-13.3M	8K-26.7M	10K-33.3M
HBDVE						400-1.3M	2K-6.7M	4K-13.3M	4K-13.3M	8K-26.7M	10K-33.3M
HBT						400-800K	2K-4M	4K-8M	4K-8M	8K-16M	10K-20M

M = 1 million K = 1 thousand N = RPM e.g. Spindle SC4-18 1.32 x 10 (rpm) = 13.2 sec-1 cP = Centipoise mPa•s = Millipascal•seconds

N/A = Not applicable for historical reasons. However, it is possible to use any spindle/chamber combination with any torque range. Digital viscometers/rheometers will automatically calculate viscosity.

* Examples

SC4-13R Sample Chamber

SC4-13RPY Sample Chamber with RTD temperature probe and cable to viscometer/rheometer

SC4-27 Stainless Steel Spindle

† Disposable chamber available in 13R size and requires SC4-45YD water jacket

SC4-13RP Sample Chamber with RTD temperature probe

SC4-13RD-100 Disposable Sample Chamber available in packages of 100

SC4-27D Disposable Spindle

Note: Hastelloy C available for some spindles/chambers - call for details

Helipath Stand™

designed for measurement of non-flowing substances

Features and Benefits

- For viscosity/consistency measurement of gels, pastes, creams, putty, gelatin and other non-flowing substances.
- A Brookfield Viscometer or Rheometer is mounted on the Helipath drive motor and a T-bar spindle is attached to the viscometer using a special coupling. The drive motor slowly lowers or raises the viscometer so that the T-bar spindle creates a helical path through the test sample thus eliminating the problem of "channeling".
- Compatible with standard Brookfield Viscometers and DV3T Rheometers
- Simple to set up and clean
- Provides a solution for hard-to-measure materials
- Complete with drive motor, 6 T-bar spindles with coupling, case, lab stand, rod and base

Thermosel™

for Elevated Temperature Testing

Features and Benefits

- Compatible with standard Brookfield Viscometers and DV3T Rheometers
  Note: requires optional cable DVP-141
- Provides control of sampletemperature up to +300°C
- EZ-Lock Option - Thermosel is now available with special EZ-Lock spindle coupling for use on standard Brookfield Viscometers/Rheometers already equipped with the EZ-Lock feature
- Temperature Ramping between set points is possible if used with RheocalcT (DV3T & DV2T) Software
  Note: Requires optional cable HT-106
- Thermo Container (Heating Chamber)
- Computer Controlled when used with DV2T or DV3T and RheocalcT Software (HT-106 cable required)
- Programmable Temperature Controller offers single set point or up to 10 programmable set points.

Applications

- Hot Melts
- Asphalt
- Wax
- Polymers

Vane Spindles

for Foods, Cosmetics, Sealants...

...for use with paste-like materials, gels and fluids where suspended solids migrate away from the measurement surface of standard spindles.

Features and Benefits

- Minimal disruption of sample during spindle immersion
- Keeps particles in suspension during testing cycle
- Viscosity data includes complete flow curve analysis when software is used
- Provides information on yield behavior at low rotational speeds
- Follows industry recommendations on length/diameter ratios for vane spindles
- 3-piece spindle set for versatile range capability
- Optional V-74 and V-75 spindles for even greater range capability and immersion into small size sample containers

Circulating Temperature Baths

NEW series of temperature bath systems combine state-of-the-art controller displays with high performance circulating baths to give you the ultimate control over your sample measurements.

All controllers are swivel-mounted so that user can adjust position for optimum viewing angle

NEW series of temperature bath systems combine state-of-the-art controller displays with high performance circulating baths to give you the ultimate control over your sample measurements.

Choosing the right model is easy:

- Choose the **controller** by considering factor such as the need for PC control using Rheocalc with DV2T or DV3T, ease of use, pump speed, and foreign language choices (AP series controller only).

- Determine the type of circulating **bath** needed by considering temperature range, cooling requirements, reservoir capacity, flow speeds and built-in drains (Model TC-550 and TC-650). Consult the chart on the reverse side for specifications.

Model	Temp. Low Range	Temp. High Range	Temp. Stability†	Reservoir Capacity
TC-650AP	**-20°C**	**+200°C**	**0.01°C**	**7.0 ltrs.**
TC-650SD	-20°C	+170°C	0.04°C	7.0 ltrs.
TC-650MX	-20°C	+135°C	0.07°C	7.0 ltrs.
TC-550AP	-20°C	+200°C	0.01°C	7.0 ltrs.
TC-550SD	-20°C	+170°C	0.04°C	7.0 ltrs.
TC-550MX	-20°C	+135°C	0.07°C	7.0 ltrs.
TC-250AP*	-20°C	+150°C	0.01°C	10.0 ltrs.
TC-250SD*	-20°C	+150°C	0.04°C	10.0 ltrs.
TC-250MX*	-20°C	+135°c	0.07°c	10.0 ltrs.
TC-150AD*	-20°C	+150°C	0.01°C	6.0 ltrs.
TC-150SD*	-20°C	+150°C	0.04°C	6.0 ltrs.
TC-150MX*	-20°C	+135°C	0.07°C	6.0 ltrs.
TC-351	-20°C	N/A	N/A	N/A

*For use at lower temperatures, use the built-in tap water cooling, or use model TC-351 Cooler for control to -20°C.
**Tap water connection required.
N/A - Not Applicable
†Temperature stability may vary depending on bath volume, surface area, insulation and type of fluid.
Note: 1. Specify voltage and frequency when ordering.

AP Series Controller

- Color touch-screen interface
- Standalone programmable or PC control with RheocalcT software
- Variable-speed pump
- Max. temperature up to 200°C
- Built-in help menu

SD Series Controller

- Best value
- Programmable with PC control using RheocalcT software
- Quick scroll to set temperature in standalone mode
- 2-speed pump
- Maximum temperature up to 170°C

MX Series Controller

- Economical
- Large character display
- Single-speed pump
- Maximum temperature up to 135°

Circulating Water Bath Refrigerated

TC-550

TC-650

Viscosity Standards

Brookfield Viscosity Standards provide a convenient, reliable way to verify the calibration of your Brookfield Laboratory Viscometer/Rheometer. Brookfield Viscosity Standards are Newtonian, and they are available as either silicone or oil. Silicone fluids are less temperature sensitive than oil fluids.

Note: Brookfield recommends that all fluids be replaced annually

(Note: Special standards available on request for specific viscosity or specific temp.)

Special Order Silicone Fluids

For our customers needing a nonstandard viscosity or temperature range, our silicone fluids can be modified to meet most requirements.

Viscosity Blends Calibrated at 25°C (77°F)

- Minimum: 5 cP (mPa•s)
- Maximum: 60,000 cP (mPa•s)
- Blends will be within ±2% of requested value

Temperature Calibrations

- Minimum: 10°C (50°F)
- Maximum: 80°C (176°F)
- Minimum temperature increment: 2°C

Ex. Viscosity blend available for 10000 cP at 50°C is for ₹ 0000.00

Viscosity blend available for 50000 cP at 25°C is for ₹ 0000.00

(Note: Special Oil Viscosity Standards available on request for CAP, R/S, C/P, KU Viscometers / Rheometers)

Silicone Viscosity Standards

These fluids are most commonly used to verify calibration of Brookfield Viscometers/Rheometers.

- Accuracy: ±1% of viscosity value
- Excellent temperature stability
- Recommended for use with Brookfield and most other rotational viscometers
- Most economical
- Special viscosity values and temperature calibrations available upon request

General Purpose Silicone Fluids

Part No.	Nominal Viscosity cP (mPa•s)	Temp °C
5 cps	5	25°C
10 cps	10	25°C
50 cps	50	25°C
100 cps	100	25°C
500 cps	500	25°C
1000 cps	1,000	25°C
5000 cps	5,000	25°C
12500 cps	12,500	25°C
30000 cps	30,000	25°C
60000 cps	60,000	25°C
100000 cps	100,000	25°C

High Temperature Silicone Fluids

Part No.	Nominal Viscosity cP (mPa•s)	Temp °C	Temp °F
HT30000	30,000	25.0°C	77°F
	9,000	93.3°C	200°F
	4,500	149.0°C	300°F
HT60000	60,000	25.0°C	77°F
	18,000	93.3°C	200°F
	9,000	149.0°C	300°F
HT100000	100,000	25.0°C	77°F
	30,000	93.3°C	200°F
	15,000	149.0°C	300°F

Oil Viscosity Standards

These fluids are used for specific instruments using cone/plate or Krebs spindle geometry. Also, certain industries may require use of oil standards.

- Accuracy: ±1% of viscosity value
- Appropriate for use at shear rates greater than 500 sec-1
- Recommended for use with cone/plate Viscometers at viscosities above 5,000 cP
- Recommended for Brookfield CAP series and KU-2 Viscometers and R/S Rheometers
- Brookfield oil viscosity standards are hydrocarbon based, either mineral oil or polybutenes

CAP Viscometer Oil Fluids

HIGH TORQUE CAP			
Low Temp 25°C		High Temp 60°C	
Part #	Viscosity cP (mPa•s)	Part #	Viscosity cP (mPa•s)
CAP1L	89	CAP1H	89
CAP2L	177	CAP2H	177
CAP3L	354	CAP3H	354
CAP4L	708	CAP4H	708
CAP5L	1,417	CAP5H	1,417
CAP6L	3,542	CAP6H	3,542
CAP7L	1,328	CAP7H	1,328
CAP8L	5,313	CAP8H	5,313
CAP9L	21,250	CAP9H	21,250
CAP10L	236	CAP10H	236

CAP Viscometer Oil Fluids

HIGH TORQUE CAP			
Low Temp 25°C		High Temp 60°C	
Part #	Viscosity cP (mPa•s)	Part #	Viscosity cP (mPa•s)
CAP0L	57	CAP0H	57
CAP1L	89	CAP1H	89
CAP2L	177	CAP2H	177
CAP3L	354	CAP3H	354
CAP4L	708	CAP4H	708
CAP5L	1,417	CAP5H	1,417
CAP1L	89	CAP1H	89
CAP3L	354	CAP3H	354
CAP5L	1,417	CAP5H	1,417
CAP2L	177	CAP2H	177

Kerbs Viscometer Oil Fluids

Cone Spindle	Nominal Viscosity Kerbs Units	Temp °C
KU61	61	25.0°C
KU61	73	25.0°C
KU61	87	25.0°C
KU61	99	25.0°C
KU61	106	25.0°C

RST Rheometer Oil Fluids

Spindle	Part No.	Nominal Viscosity Kerbs Units	Temp °C
RCT25-1	B73000	73,000	25.0 °C
RCT25-2	B200000	200,000	25.0 °C
RCT50-1	B21000	21,000	25.0 °C
RCT50-2	B41000	41,000	25.0 °C
RCT75-1	B10200	10,200	25.0 °C
RCT75-2	B21000	21,000	25.0 °C

Chocolate Applications

recommended viscometer choices

D V2THA Viscometer
or DV3THA Rheometer
Ball Bearing Suspension
TC-150 Water Bath
S mall Sample Adapter
SC4-27 Spindle
SC4-13RPY Sample Chamber
w/RTD probe

Measuring chocolate viscosity is important to the confectioner in order to help optimize chocolate flow properties in a melted condition for various mixing and coating applications.

Features and Benefits

- Determines Casson yield and Plastic Viscosity
- Conforms to NCA and Bureau of the Technical Committee Office Internationale du Cacao et du Chocolat.
- Control of melting temperatures assuring reproducible comparisons
- Easy to clean, easy to operate

Paints, Coatings & Ink Applications

recommended viscometer choices

KU-3
Viscometer

CAP 2000+
Viscometer

Brookfield has viscometers that have been designed specifically for use in Paint and Coating applications. Whether your requirement is to measure in Krebs units with the KU-2, simulate flow behavior at high shear with the CAP, measure new formulations with DV2T.

Features and Benefits

- Easy to clean, easy to operate
- Instant results, no calculations means fewer errors
- Ensure coating quality
- Long term reliable performance
- Economically priced

Asphalt Applications

recommended viscometer choices

DV2TRV Viscometer
or DV3TRV Rheometer
Thermosel
SC4-27 Spindle
Programmable Controller

Specific test methods for measuring the viscosity of highway asphalt "binders" at mixing and compacting temperatures using Brookfield's Thermosel System have been defined by SHRP, the Strategic Highway Research Program, sponsored by the US Government..

Features and Benefits

- Adheres to ASTM Spec D4402
- Ensures asphalt pumpability
- Provides variable temperature and shear rate capability for complete viscosity profiles

Personal Care Products Applications

recommended instrument choices

RST-CPS Touch Rheometer

CT3 Texture Analyzer w/Extrusion cell

Shampoos and lotions need to flow easily yet retain sufficient thickness. Viscosity analysis and temperature profiling are important QC tools to use. The R/S-CPS Rheometer is important for comprehensive data analysis.

Viscosity Features and Benefits

- Small sample volume & rapid temperature control

Texture Features and Benefits

- The CT3 Texture Analyzer can extrude the semi-solid gel of cream or ointment in a controlled manner, revealing the yield stress and flow characteristics of the product.

Pharmaceutical Applications

recommended instrument choices

RST-CPS Touch Rheometer

CT3 Texture Analyzer w/Syringe Test Fixture

Viscosity Features and Benefits

- Most ointments need to be sufficiently thick when standing to prevent them from oozing away from the intended area of use. They also need to flow easily when applied (known as shear thinning behavior). The R/S-CPS Rheometer measures high viscosity at near zero shear rate to determine yield stress values.

Texture Features and Benefits

- The hardness of a tablet, the dissolution of a tablet or the strength of a gel capsule will have an effect on drug release rate in the body. The CT3 accommodates variable geometries while maximizing the value of data obtained.

Adhesives Applications

recommended viscometer choices

DV2TRV/HB Viscometer, Thermosel, Programmable Controller

DV3THBCP Rheometer

Adhesives can vary significantly in viscosity.
Product viscosity can be modest with easy flow capability to paste-like consistency, requiring high force to apply to a substrate. Choosing the proper test method is critical.

Lab Features and Benefits

- Multiple choices for "best-fit" instrument and spindle
- Guarantees consistent end product from batch-to-batch
- Small sample size (<2mL) for high value products

Process Features and Benefits

- Continuous control of viscosity when applying to substrate
- Ensures economic use of adhesives in continuous operations

ISO 9001:2008 CERTIFIED

BROOKFIELD AMETEK

ON-LINE VISCOMETERS

POWDER FLOW TESTERS

TEXTURE ANALYZERS

VISCOMETERS & RHEOMETERS

Brookfield Advanced Application Laboratory

"The opening of this Advanced Lab will help the Brookfield customers in India with Application Support & Product Demonstration"

"The Lab will serve our customers in West Asia, Africa & the ASEAN nations as a knowledge resource centre for Viscosity, Rheology & Powder Flow Analysis"

What is the objective of the laboratory?

- To establish a long term service and application support commitment to our valued customers.
- The laboratory will be utilised for demonstrating various applications of instruments/equipments, providing training to customers and also helping them with method development and trouble shooting.
- To provide quality solutions in terms of assessing a complete satisfaction before investing into the product.

What is the uniqueness of Brookfield's product in the laboratory?

- Customers will be benefited as they will be able to see the instruments and check its utility before it is installed in their own laboratory.
- As part of customer support, customer's analysis of customer's sample will be done on the instrument available in the laboratory.
- With this facility customers can recruit their lab chemist for advanced level hands-on training on high-end analytical instruments.

For sample trials & demonstrations *Email:* ***application@brkindia.net***

Repairs, Calibration & Certification Service

for long life and optimal performance of your Viscometer, Rheometer and Powder Flow Tester

Brookfield Engineering recommends that you return your instrument to BRK Instruments India LLP on an annual basis for our Calibration and Certification Service.

For Repairs & Calibration *Email:* ***service@brkindia.net***

BRK Instruments India LLP are Authorised Qualified Service Center with Master Viscometers to Repair, Calibrate and Certify all Brookfield Products.

Any Repair, Calibtration & Certifications done without using a Master Viscometer is not In-Line with Brookfield policy

Authorised Distributor / Dealer

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