Thermo Scientific Viscometers

Falling Ball Viscometer, HAAKE Viscotester® and Accessories

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Basic principles in rheology, Selecting a viscometer

Viscometry

Measuring instruments for the determination of the flow behavior of fluids are called viscometers. Viscosity is a material property which is dependent on different parameters such as mechanical stress and strain, time as well as temperature and other ambient conditions.

Flow behavior

In rheology we differentiate between so-called Newtonian and non-Newtonian materials. Newtonian materials are characterized by a viscosity which may depend on temperature but is independent of the shear rate (and shear stress). In contrast, the viscosity of non-Newtonian materials depends on the shear rate. For most non-Newtonian materials the viscosity decreases with increasing shear rate. This behavior is called shear-thinning, or pseudoplastic. A material which viscosity increases at increasing shear rates is called shear-thickening or dilatant.

Materials that do not flow until the applied shear stress surpasses a certain value are said to have a yield-stress.

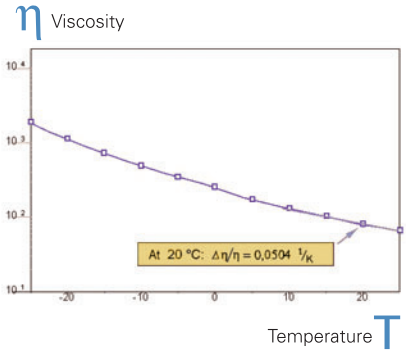
Rotational viscometers

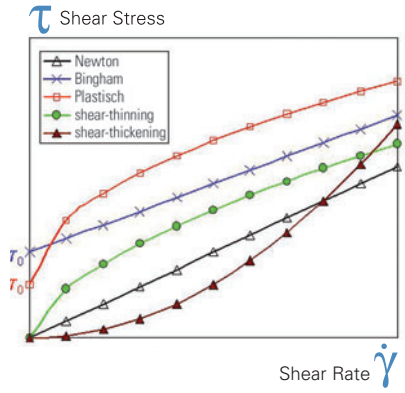
Using a rotational viscometer, the viscosity is calculated from the measured torque and rotational speed as well as the dimensions of the measuring geometry. If the measuring geometry fulfils certain requirements (e.g. small gap), which is the case for coaxial cylinder, plate/plate and cone/plate measuring geometries (DIN 53018, DIN 53019...), the absolute value of the viscosity can be calculated.

If the dimensions of the measuring geometry are not well defined, only a relative value for the viscosity can be determined. In this case, the measured viscosity value not only depends on the ambient conditions, but also on the test method, i.e. the measuring geometry.

Falling ball viscometers

The falling ball viscometer is a conventional and highly accurate instrument for the determination of the absolute value of the viscosity of a Newtonian material. The viscosity can be calculated from the falling time of the ball, the density of the ball as well as the diameter of the tube and the ball.





Overview of Thermo Scientific HAAKE Viscometers

	HAAKE Viscotester 1 plus & 2 plus	HAAKE Viscotester 6 plus & 7 plus	HAAKE Falling Ball Viscometer type C	HAAKE Viscotester 550
Description	Page 3	Pages 4/5	Page 6	Pages 7-10
Measurement	relative	relative	absolute*	absolute**
Standards		ISO 2555	DIN 53015, ISO 12058	DIN 53018 / 53019, ISO 3219
Viscosity	HAAKE Viscotester 1 plus: low HAAKE Viscotester 2 plus: medium	L-Version: low to medium R-Version: medium to high	low to high	low to high
Specials	battery-powered hand-held instrument, digital display	2 years warranty	measurements on gases	temperature-controlled, application-oriented packages

*For Newtonian substances

**Using absolute measuring geometries

Thermo Scientific
HAAKE Viscotester 1 plus & 2 plus

Application
These small, battery-operated rotational viscometers are suitable for quick and reliable tests and comparative measurements for quality control applications. The hand-held instruments can also be operated on a stand.

User friendliness
The operation of the HAAKE Viscotester 1 plus & 2 plus is especially easy due to the one-button operation. The Viscotester is switched on and off by pushing the button once. Pushing the button again selects the rotor type and starts the measurement.

Order information

Order-No.	Description
399-0100	HAAKE Viscotester 1 plus: Basic instrument with batteries instrument holder 2 Measuring cups (A and B) 3 Rotors (No. 3, 4, 5) Delivered in a carrying case
399-0200	HAAKE Viscotester 2 plus: Basic instrument with batteries instrument holder 1 Measuring cup (3) 3 Rotors (No. 1, 2, 3) Delivered in a carrying case
222-1693	Calibration to a measuring accuracy of +/- 1% FSD (HAAKE Viscotester 2 plus)
222-1688	Battery charger incl. 4 AA batteries

Digital display
Contrary to the traditional Viscotester models where the viscosity value is read from an analog dial, the HAAKE Viscotesters 1 plus and 2 plus show the viscosity value on a digital display. Therefore, errors caused by misreading the dial belong to the past. Possible handling errors as well as service information are also shown on the display.

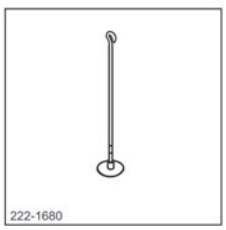
Main features
- Quick, exact and reliable
- One button operation
- LCD display
- No mains supply required

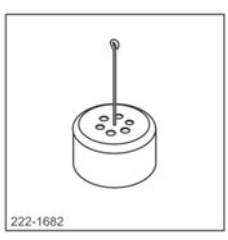
Typical application fields
- Quick viscosity tests, e.g. for process optimization or machine adjustment
- Batch control in production

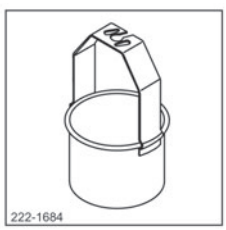
Typical samples
- Printing inks, paints, inks
- Shampoos, creams, lotions
- Oils, greases, pastes
- Sauces, thickeners

Measuring principle
A rotor rotating at a constant speed is immersed in the fluid to be tested; the fluid's resistance to the rotation measures the viscosity of the fluid. The small battery-operated rotational viscometer can be operated independent of a mains supply, so that quick and reliable viscosity measurements can be performed virtually everywhere.

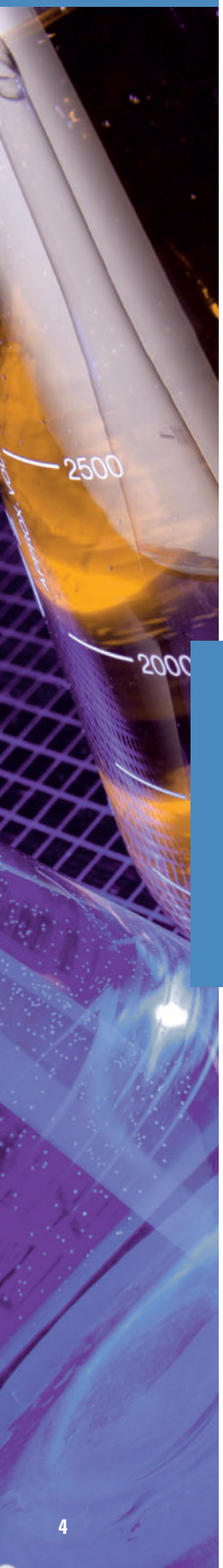
Compatibility
Measuring cups and rotors of the previous models HAAKE VT01 and VT02 can also be used with the plus units.







Technical data	
Viscosity range	1 plus: 1.5 - 330 mPas 2 plus: 0.3 - 4000 dPas
Temperature	up to 150°C
Rotor speed	62,5 rpm
Reproducibility	+/- 1% FSD
Measuring accuracy	standard: +/- 5% FSD optional: +/- 1% FSD (HAAKE Viscotester 2 plus)
Standard display	HAAKE Viscotester 1 plus η in mPas HAAKE Viscotester 2 plus η in dPas
Optional	HAAKE Viscotester 1 plus η in dPas HAAKE Viscotester 2 plus η in mPas



Thermo Scientific HAAKE Viscotester 6 plus & 7 plus

Application

The Thermo Scientific HAAKE Viscotester 6 plus & 7 plus units can be used for tests and comparative measurements for quality control according to recognized standards.

Measuring principle

The HAAKE Viscotester is a classical rotational viscometer that measures the resistance of a test substance against a preset speed. The resulting torque or resistance measures the viscosity of the fluid. The higher the torque, the higher the viscosity. Due to the standardized geometry, the shear rates generated can only be determined precisely for Newtonian substances.

Compatibility

The basic ISO 2555 standard describes the design and the characteristic measuring technique of a viscosity measuring instrument (torque, speed, rotor geometry). If a rotational viscometer meets these requirements – as the HAAKE Viscotester 6 plus & 7 plus do – the results comply with the Brookfield method and are 100 %-compatible as long as comparable viscometer versions are used.

Version "L" or "R"?

L is mainly used for low-viscous substances such as diluted solutions, oils, dispersions and emulsions. Milk-like fluids (2 - 5 mPas) would be an example at the low end of viscosity and motor oil would represent the high end. The measuring range is from 3 - 6 000 000 mPas.

R for medium-viscous substances is the "standard" viscometer for 80 % of all viscosity measurements. It is especially suited for the medium viscosity range extending from sewing machine oil up to PVC plastisols or whipped cream. The measuring range is from 20 - 40 000 000 mPas.

Standards

The HAAKE Viscotester 6 plus & 7 plus meets the following standards:
BS: 6075, 5350
ISO: 2555,1652
ASTM: 115, 789,1076, 1084, 1286, 1417, 1439, 1638, 1824, 2196, 2336, 2364, 2393, 2556, 2669, 2849, 2983, 2994, 3232, 3236, 3716

Common features of HAAKE Viscotester 6 plus & 7 plus

- Ready to go package – unpack, switch on and start measuring viscosity
- Digital display of viscosity, % torque, speed, spindle, upper viscosity limit
- Integrated automatic diagnostic functionality
- Visual and acoustic signals at critical measuring conditions
- Digital calibration of the torque with nationally traceable standards
- 2 years warranty for the most stable measuring instrument in its class

Additional features of the HAAKE Viscotester 7 plus

- Bi-directional RS232 interface
- Thermo Scientific HAAKE RheoWin software (optional) for measurement and data evaluation
- Temperature sensor Pt100 to monitor the sample temperature

Technical data

Ambient conditions:
The instruments can be used at ambient temperatures from +10 °C to +40 °C and a relative humidity of up to 80 %. The power supply should be between 110 - 240V/50-60Hz.

Display:
- η dynamic viscosity in mPas (cP) upper viscosity limit in mPas (cP)
- %τ torque in % of the max. value
- n speed in rpm
- # number of the selected spindle
- T temperature in °C (F) (only HAAKE Viscotester 7 plus)

Rotational speeds:
0.1 / 0.2 / 0.3 / 0.5 / 0.6 / 1 / 1.5 / 2 / 2.5 / 3 / 4 / 5 / 6 / 10 / 12 / 20 / 30 / 50 / 60 / 100 / 200
Accuracy: < +/- 0.5 % of the absolute value

Torque:
The versions L and R differ in the torque range roughly by a factor of 6.
The value displayed is measured with a maximum uncertainty of +/- 1 % in relation to the full scale (100 %).

Viscosity range:
Accuracy: +/- 1 % of full scale, Reproducibility: +/- 0.2 %.
Version L: 3 - 6.000.000 mPas in 84 ranges (21 speeds with 4 spindles)
Version R: 20 - 40.000.000 mPas in 126 ranges (21 speeds with 6 spindles)

Order information
The Thermo Scientific HAAKE Viscotester 6 plus & 7 plus is supplied as a complete measuring unit consisting of the basic instrument with stand, set of spindles with a storage rack in a stable carry case with multilingual documentation.

Order-No.	Description
387-0100	HAAKE Viscotester 6L plus: Basic instrument with stand, spindles L1 to L4, rack, spindle guard in a case
388-0100	HAAKE Viscotester 6R plus: Basic instrument with stand, spindles R2 to R7, rack, spindle guard in a case
389-0100	HAAKE Viscotester 7L plus: Basic instrument with stand, spindles L1 to L4, rack, spindle guard, Pt100 sensor in a case
390-0100	HAAKE Viscotester 7R plus: Basic instrument with stand, spindles R1 to R4, rack, spindle guard, Pt100 sensor in a case

Optional accessories:

Order-No.	Description
	Measuring and evaluation software HAAKE RheoWin; incl. cable
098-5037	HAAKE Viscotester 7L plus
098-5038	HAAKE Viscotester 7R plus
	Helipath stand to penetrate motor driven new test fluid; incl. spindles
222-1380	Helipath stand (230V/50Hz)
222-1386	Helipath stand (115V/60Hz)
222-1379	(UL)-Adapter for low-viscous samples, which extends the measuring range down to lower viscosities; incl. spindle
222-1378	(AKV)-Adapter for small sample volumes
	Necessary accessory:
222-1397	Set of spindles for L-Version of the Viscotester resp.
222-1387	Set of spindles for R-Version of the Viscotester
222-1395	Spindle R1 for the HAAKE Viscotester R-Version
222-1398	Set of spindles for the HAAKE Viscotester L-Version (L1-L4)
222-1396	Set of spindles for the HAAKE Viscotesterm R-Version (R2-R7)

Helipath
- for comparative measurements on high viscous samples such as creams, pastes, gels etc.
- up and down movement of the measuring head allowing the needle spindle to cut into fresh material tracing a helicoidal path through the sample

Adapter
- stainless steel sample chamber, removable
- Flow jacket that allows temperature control of the sample between -10°C and 100°C

UL-adapter for low viscosities
- allows reproducible and accurate measurements of the viscosity from 1.0*mPas for L-models and 6.4 mPas for R-models
  (* Taylor vortices may result in additional errors.)

AKV-adapter for small samples
- sample volume from 8 to 13 ml, depending on the spindle used

Thermo Scientific
HAAKE Falling Ball Viscometer type C

Application

The Thermo Scientific HAAKE Falling Ball Viscometer type C provides a very accurate way of measuring the viscosity of transparent Newtonian liquids and gases. It meets the requirements of the German DIN 53015 as well as ISO 12058 standard and it is accepted as an official reference instrument. Its measuring accuracy when suported with the precise temperature control of a circulator is among the highest available in any type of viscometer.

- Chemical industry (polymer solutions, solvents, inks)
- Pharmaceutical industry (raw materials, glycerine)
- Food industry (gelatin, sugar solutions)
- Mineral oil industry (oils, liquid hydrocarbons)

Measuring principle

The rolling and sliding movements of a ball through the sample liquid are timed in an inclined cylindrical measuring tube. The sample viscosity is correlated to the time needed by a ball to traverse a definite distance. By turning the measuring tube upside down again the return of the ball may also be used for an additional measurement. The test results are given as dynamic viscosity in the internationally standardized, absolute units of milli Pascal seconds (mPas).

Technical data

- Viscosity range: 0.5 - 10^5 mPas (cP)
- Temperature range: -20°C to +120°C
- Reproducibility: < 0.5 %
- Comparability: < 1 %
- Material: Falling tube, balls 1, 2 and G, borosilicate glass; balls 3, 4, 5 and 6, Nickel iron alloy

Viscosity η 20°C (mPas)		Ball
10^5	Tar	6
10^4	Honey	5 6
10^3	Glycerine	5 4
10^2	Lubricating oil	3 4
10^1	Olive oil	3 2
	Spindle oil	3 2
10^0	Water	1 2
10^{-1}	Ether	1 6
10^{-2}	Neon	6

Order information

Order-No.	Description
356-0001	Falling Ball Viscometer type C including 6 balls, instrument case, thermometer -1°C up to 26°C (0.1°C divisons), cleaning tools, calibration sheet, instruction manual
800-0176	Stopwatch, LCD-Display up to 9 h, 59 minutes, 59.99 seconds
800-0009	Ball G for gas measurements
333-0639	Pt100 temperature sensor for falling ball - DC50 circulator

Application

The Thermo Scientific HAAKE Viscotester 550 is specially designed for Quality Control applications. It is a rotational viscometer that measures precisely, quickly and simply the viscosity and flow behaviour of liquid and semisolid test materials. All results like viscosity, shear stress, shear rate, yield point and operating temperature are displayed in the digital LED display.

The HAAKE Viscotester 550 does not mind if a sample is thin like an oil, a paint or a ceramic slurry or as pasty as cremes, salves or a PVC plastisol. One unit covers the whole application range from very thin to very thick. Even more demanding tasks will be fulfilled.

For example, the automatic characterization of the flow behaviour of non-Newtonian fluids or the determination of the yield point using the CD-principle (= Controlled Deformation) can be done. Any one out of a set of 10 predefined routines will be executed with precision and repeatability. Also all predefined routines and the results obtained with them will be documented using a printer.

Specifications	
Speed Range (rpm)	0.5 - 800
Uncertainty	+/- 0.1 %
CD Mode (rpm)	0.0125
Torque Range (Ncm)	
up to 400 rpm	0.01 - 3
up to 800 rpm	0.01 - 2
Uncertainty	+/- 0.5 % fsd
Temp. Range (°C)	-20 - +100 depending on measuring system
Interface	RS232C
Autoswitch Power Supply	230/115 V (50-60 Hz)

Measuring Principle

By its design, the HAAKE Viscotester 550 is a Searle viscometer. A rotational speed is preset and the flow resistance of the sample is measured or in other words the torque required to maintain the set speed is proportional to the viscosity. From the torque required, the set speed and the geometry factors of the applied sensor, all final information on the viscosity, shear stress and the shear rate is calculated. The results are displayed digitally and can be printed simultaneously.

For viscosity measurements a total of 60 different rotational speed steps are available. 50 out of these 60 are factory set, the remaining 10 are userprogammable. The 60 steps cover a wide range reaching from 0.5 rpm to 800 rpm. The resulting torque is measured via a non-contact, low displacement sensor which enables the extended measuring range with perfect signal linearity over the whole range. The operating temperature can be measured by Pt100 probes located either in the sensor used or directly in the test material.

Sensors

The modular design of the HAAKE Viscotester 550 system allows the use of nearly any known sensor. So all applications will be covered. For example:

- Coaxial Cylinder sensors according to DIN 53018 and ISO 3219. Exact temperature control can be provided by use of a circulator.
- Immersion sensors according to DIN 53019 and ISO 3219.
- Cone-and-plate sensors according to ISO 3219 and par al lel plate sensors.
- Relative sensors according to ISO 2555.
- Special immersion sensors for highly filled samples or containing large particles, for the determination of the yield point.

All these sensors guarantee that your results will be absolutely comparable either with in your company or even worldwide with other laboratories.

Motor

A powerful and dynamic motor guarantees high torque and correct rpm values. In case of overload the test is terminated automatically. That means quality by design!

Sensors

Sensor geometries according to DIN, ISO and ASTM as well as customized geometries let your system grow as required. Also, cone-and-plate and parallel plate and coaxial cylinder sensors are available.

Keypad/Display

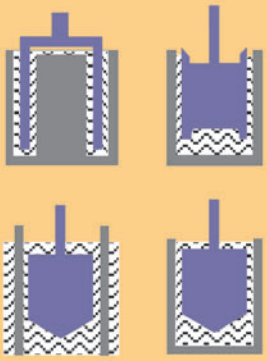
The LED-display with its excellent readability shows all the values entered via a dustsealed keypad. There are no double functions on the keypad. Operation is self-explanatory with separate cursor keys for the selection of the parameters.

Routines

10 factory set program routines with one common protocol are available. They include yield points, flow curves and cure testing. If necessary they can be edited and modified by the user.

Measuring Sensors

Standard



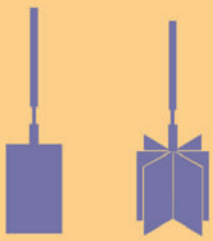
Sensor	NV	MV1	MV2	MV DIN	SV 1	SV 2	SV DIN
Cup	NV	MV	MV	MV/TMV	SV	SV	SV/TSV
Temperature Vessel	+	+	+	+/-	+	+	+/-
Application	Low viscosity	Medium viscosity liquids			High viscosity liquids		
Viscosity Range (mPas)	2-2000	3-10 000	8-30 000	8-18 000	$50\text{-}10^5$	$100\text{-}3 \cdot 10^5$	$50\text{-}10^5$
Recom. Viscosity Range (mPas)	5-300	10-7000	20-20000	15-10000	150-60000	$300\text{-}2 \cdot 10^5$	150-60000
Shear Rate (s^{-1})	27-27000	11.7-1170	4.5-450	6.5-645	4.5-445	4.5-445	6.5-645
Sample Volume (cm^3)	9	40	55	50	9	6	14
Gap (mm)	0.35	0.96	2.6	1.64	1.45	1.45	0.9
Radius, Length (mm)	20.1/60	20.04/60	18.4/60	19.36/58.08	10.1/61.4	10.1/19.6	10.65/31.95
Repeatability (+/- %)	1	1	1	1	1	1	1
Reproducibility (+/- %)	3	2	2	3	3	3	3

Special

Plate-cone

Sensor	PK 1,1°	PK 1,0.5°	PK 2,1°	PK 2,0.5°	MV 2P	SV 2P
Cup	–	–	–	–	MVP	SVP
Temperature Vessel	PK 100 D or PK 200			+	+	
Application	Small sample volume, high viscosity samples				Slippage	
Viscosity Range (mPas)	$50\text{-}10^5$	20-50 000	$100\text{-}3 \cdot 10^5$	$100\text{-}1.5 \cdot 10^5$	8-30 000	$100\text{-}3.5 \cdot 10^5$
Recom. Viscosity Range (mPas)	100-70000	50-40000	$200\text{-}2 \cdot 10^5$	150-800000	20-20 000	$350\text{-}2 \cdot 10^5$
Shear Rate (s^{-1})	30-3000	60-6000	30-3000	60-6000	4.4-440	4-390
Sample Volume (cm^3)	0.1	0.1	<0.1	<0.1	55	6
Gap (mm)	0.0174 rad	0.0087 rad	0.0174 rad	0.0087 rad	2.6	1.45
Radius, Length (mm)	14/–	14/–	10/–	10/–	18.4/60	10.1/19.6
Repeatability (+/- %)	2	2	3	3	2	2
Reproducibility (+/- %)	4	4	6	6	4	5

Immersion



Sensor	E 3	E 30	E 100	E 500	E 1000	FL 10	FL 100	FL 1000
Cup	Beaker and sample volume depend on application							
Adapter	Adapter is required (part.-no 808-0579 or 222-1359)							
Application	Fast and simple relative measurements					Relative measurem. of disperse samples		
Temperature	-30 - 200 °C					-30 - 200 °C		
Viscosity (mPas)	$3 - 10^2$	$10^2 - 10^5$	$10^3 - 10^6$	$5 \cdot 10^3\text{-}5 \cdot 10^6$	$10^4 - 10^7$	$10^2 - 10^5$	$10^3 - 10^6$	$10^4 - 10^7$
Radius, Length (mm)	25/116	12/50.5	8/34.5	5/9	3.5/17.7	20/60	11/16	5/8.8
Repeatability (+/- %)	3	3	3	5	5	3	5	5

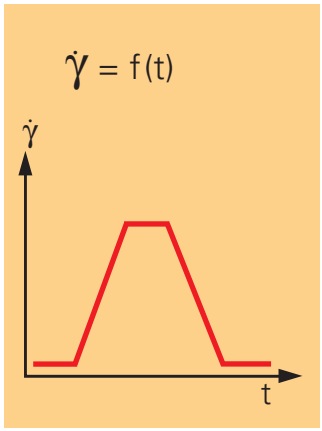
ISO/ASTM

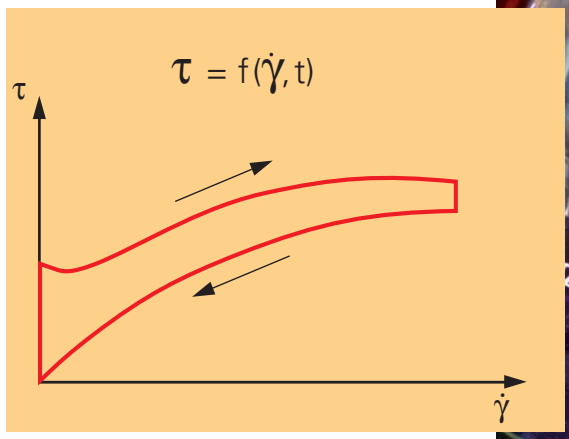
Sensor	B 1	B 2	B 3	B 4	B 5	B 6	B 7
Cup	Beaker and sample volume depend on application						
Adapter	ISO-Adapter is required, part.-no 222-1204						
Application	Viscosity measurement according to ISO 2555, ASTM D 115-72, D789-73, D2196-68						
Temperature	-30 - 200 °C						
Viscosity (mPas)	$10^2 - 10^5$	$500\text{-}5 \cdot 10^5$	$10^3\text{-}10^6$	$2 \cdot 10^3\text{-}2 \cdot 10^6$	$3 \cdot 10^3\text{-}5 \cdot 10^6$	$8 \cdot 10^3\text{-}10^7$	$3 \cdot 10^4\text{-}5 \cdot 10^7$
Radius, Length (mm)	28.13/22.5	23.5/1.65	17.35/1.65	13.65/1.65	10.55/1.65	7.3/1.65	1.6/50.4
Repeatability (+/- %)	3	4	5	5	5	5	7

Results

Flow Curve

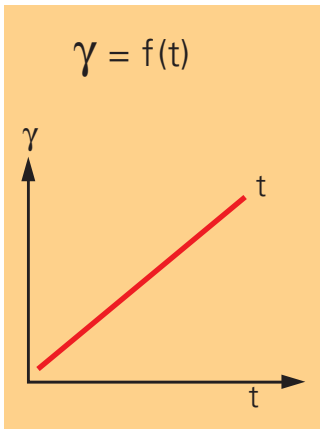
A flow curve characterizes the flow behaviour of a sample. It also allows estimations of storage stability and processing conditions. Important special characteristics like pseudoplasticity, plasticity and thixotropy are automatically quantified by the HAAKE Viscotester 550 and can easily be taken from the protocol.

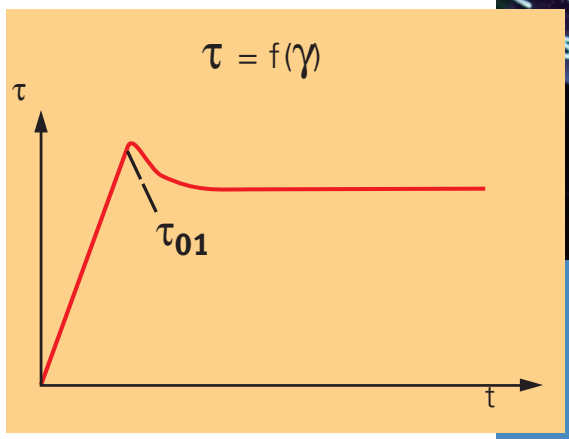




Yield Point

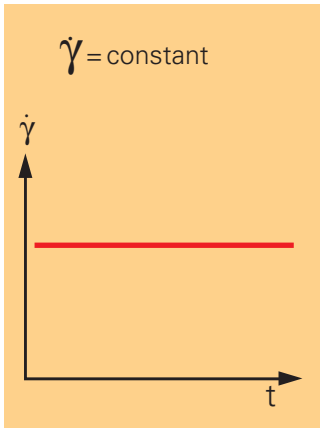
The yield stress is the force required to make a material flow. It controls the thickness of coating layers, ensures storage stability but inhibits free flow. By applying the CD-method (Controlled Deformation) the HAAKE Viscotester 550 characterizes the yield point with very high reproducibility.

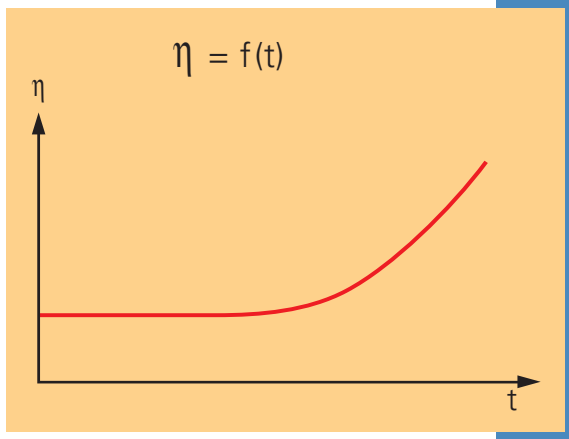




Time Curve

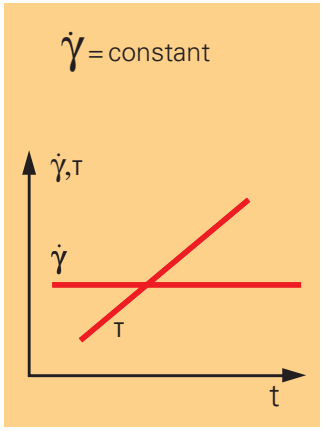
Chemical or physical changes in the sample can be tracked with a time curve. The test consists of applying a constant shear rate and monitoring the viscosity as a function of time. Time-dependant phenomena such as epoxy curing, chemical reactions and thixotropy breakdown can be precisely determined.

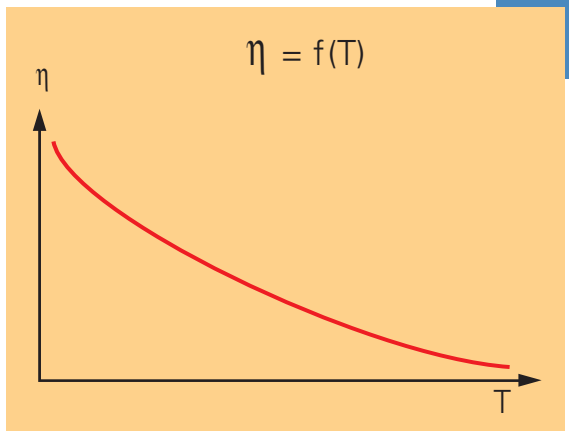




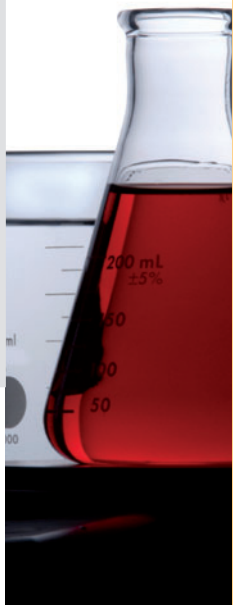
Temperature Curve

It is important to know the behavior of viscosity as a function of temperature. This can be realized by applying a constant shear rate to a sample and monitoring the viscosity as a function of temperature. Greases and oils must perform in summer and winter, and likewise food products must retain their shape under various temperatures.





Order-No.	Application	Description	Content
 **362-0021 European Version** **362-0022 US Version**	**Food Industry** Chocolate, beverages, thickening agents, stabilizer, starch, pectin **Cosmetic / Pharmaceutical Industry** Creams, lotions, shampoos, liquid soaps **Paint Industry** Water-based paints, latex paints, thickening agents **Chemical Industry** Liquid raw materials, oils, polymer solutions	**DIN package for measurements on liquids** for lower to higher viscosities, which are available in larger quantities and easy to clean	HAAKE Viscotester 550 (115-230V/50-60Hz) • Support stand for the base unit • Temperature control vessel with connector to circulator (Ø 8 mm) • PT100 temperature sensor • Coaxial cylinder geometries: MV/DIN and SV/DIN
 **362-0041 European Version** **362-0042 US Version**	**Food Industry** Dairy products (e.g. joghurt), jam, sauces **Construction Materials** Slurries **Others** Measurements in original containers	**Package for yield point determination** Suitable for highly thixotropic materials, samples which are difficult to measure (e.g. due to sedimentation) or with bigger particles	HAAKE Viscotester 550 (115-230V/50-60Hz) • Support stand for base unit • Universal joint for FL sensors • Vane rotor FL100, star shaped • HAAKE RheoWin 3 measuring and evaluation software, incl. computer cable
 **327-0001 European Version** **327-0002 US Version**	**Food Industry** Dough, margarine, fats, butter **Cosmetic / Pharmaceutical Industry** Creams, toothpaste, lipsticks **Paint and Electronic Industry** Thickening agents, resins, printing inks **Chemical Industry** Paste-like raw materials and intermediate products	**DIN package for measurements on pastes** with medium to higher viscosities, which are limited in volume, expensive or difficult to clean	HAAKE Viscotester 550 (115-230V/50-60Hz) • Support stand for base unit and plate-cone measuring system • Cone and plate measuring system PK100 with connector for circulator (Ø 8 mm) • PT100 temperature sensor included in the measuring plate • Measuring plate MP60 (Steel 18/8) • Cone PK1, 1°



Service Products for Thermo Scientific Viscometers

Our service products are as individual as our customers' expectations. For this reason we offer a wide range of differing service features optimized to the requirements of our customers.

Performance EXTEND

increase the original product warranty time by additional 12 months

- Replacement parts free of charge
- Same conditions as during the warranty period

Order information	
Order-No.	**Type**
777-5210	Performance EXTEND: HAAKE Viscotester 1 plus, 2 plus; 12 months warranty extension
777-0600	Certified standard factory calibration HAAKE Viscotester 01, 02, 1 plus, 2 plus
777-5228	Performance EXTEND: HAAKE Viscotester 6 plus, 7 plus (L and R version) 12 months warranty extension
777-0607	Certified standard factory calibration HAAKE Viscotester 5, 6 (plus), 7 (plus) L and R version
777-5229	Performance EXTEND: HAAKE Falling Ball Viscometer Typ C; 12 months warranty extension
777-0605	Certified standard factory calibration Falling Ball Viscometer B/C

Performance PRECISION

certified standard factory calibration

- Firmware-update
- Checking the functionality of the unit regarding motor, light barriers, switches and measuring systems
- Check of angular velocicity with calibrated digital tacho
- Torque calibration and adjustment with weights and check of torque reading linearity with Thermo Scientific calibration device.
- Test measurement with standard fluid

Standard Liquids

According to ISO 9000, measuring devices which are used in the production and quality processes have to be inspected…

- periodically at regular intervals
- with nationally traceable standards

The inspection intervals, criteria and admitted tolerances are defined in the quality handbook of the company using the instrument.

Thermo supplies liquids with different qualities.

Order information			
Order-No.	**Type**	**Description**	**η (20°C)***
082-5303	100BW	Standard liquid 100 ml	100 mPas*
082-5304	2000AW	Standard liquid 100 ml	2000 mPas*
082-5305	10000BW	Standard liquid 100 ml	10000 mPas*
082-5042	E7	Test fluid 100 ml	5 mPas
082-5043	E200	Test fluid 100 ml	120 mPas
082-5044	E2000	Test fluid 100 ml	1900 mPas
082-5046	E6000	Test fluid 100 ml	6000 mPas
082-5336	E15000	Test fluid 100 ml	15000 mPas
082-5335	E40000	Test fluid 100 ml	40000 mPas

* Viscosity values for further temperatures: 23, 25, 30, 40 and 100°C.

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Thermo Fisher Scientific successfully supports a wide range of industries with its comprehensive Thermo Scientific solutions for Material Characterization. Material Characterization products analyze and measure viscosity, elasticity, processability and temperature-related mechanical changes of plastics, food, cosmetics, pharmaceuticals and coatings, plus a wide variety of liquids or solids. Detailed information is provided at www.thermo.com/mc.

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