TANNAS CO.
LABORATORY INSTRUMENTS

SBT®+2

Low-Temperature Pumpability | Gelation Index

ASTM D5133, D7110, D2983, D4684, D445, D97, D2500, D2386

Principle

Multi-Purpose Low-Temperature Bath: The versatile SBT®+2 liquid bath offers a broad cooling range, both manual & automatic temperature control, a large viewing window, and five easily replaceable bath covers (Insert Modules) for analyzing lubricants and fluids meeting numerous low-temperature test methods.

History

The SBT®+2 bath was developed as an expansion of the first low-temperature scanning device developed by Savant Labs in the early 1980's. The original bath was primarily used in the development of the viscosity-temperature scanning technique known as the SBT® test per ASTM D5133 and D7110 for measuring low-temperature behavior of automotive lubricants. Over the years, the SBT®+2 applications expanded to include other ASTM methods. With its versatility and low-temperature range, it has become a widely used lab instrument within the industry.

Innovation

The two most recognized applications of the SBT®+2 are the SBT® (ASTM D5133, D7110) and the Low-Temperature Viscosity test (ASTM D2983). The SBT®/*Gelation Index* test is exclusive to Tannas Co. with the SBT®+2 and non-liquid Direct Cool II instruments.

For the D2983 test, the use of the patented SimAir® Test Cell, developed by Tannas, allows the SBT®+2 to hold at a constant temperature during the 16-hour soak period while simulating the sample cooling profiles of an air bath. This provides greater adaptability, increased sample through-put and improved precision over air bath and programmable liquid baths.

Features

- Large viewing window for visual monitoring of sample conditions.
- Multi-purpose liquid bath for analyzing lubricants and fluids.
- Easily replaceable Insert Module for each test method.

- Programmable & Manual temperature controls.
- Meets numerous low-temperature test methods.
- Designed for use with patented SimAir® Test Cells for ASTM D2983 testing.
- One of Tannas' two exclusive instruments used to measure SBT®/*Gelation Index*.
- Ideal for low-temperature work with fresh, sooted, or highly oxidized oils, ATFs, hydraulic fluids, and fuels.
- Compatible with MS Windows® 10.

ASTM D5133, D7110
Viscosity-Temperature Scanning Technique

ASTM D2983
Low-Temperature Viscosity SimAir® Test Cells

ASTM D4684
MRV-TP1
Mini-Rotary Viscometer

ASTM D445
Low-Temperature Kinematic Viscosity

ASTM D97
Pour Point

ASTM D2500
Cloud Point

ASTM D2386
Freezing Point of Aviation Fuels

FTM 203C
Stable Pour Point

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SBT® | Gelation Index - ASTM D5133, D7110

The SBT® Insert Module, paired with the SBT® Software Package and up to two exclusive Tannas SBT® Viscometers, measures the apparent viscosity of fresh, sooted, or highly oxidized engine oils at low-temperatures. The SBT® test, per D5133, determines the susceptibility of engine oils to exhibit flow-limited and air-binding responses during slow cooling conditions (1°C/hour from –5°C to –40°C). It does this by providing continuous rheological data throughout the test. With real-time viscosity/temperature graphing and reporting over the selected temperature range, the SBT® Software generates the *Gelation Index* and Gelation Index Temperature at the end of the test using the first derivative of the MacCoull-Walther-Wright viscosity/temperature equation.

Viscometric data from this technique provides essential insights into the effects of base oils, wax content, VI Improvers, Pour Point Depressants, and other additives on the pumpability and gel structure of engine oils, fuels, and other liquid petroleum products. The SBT®/*Gelation Index* is a required test for several OEM engine oil specifications, including the ILSAC GF series, GM dexos™, and IFC specifications

Cloud & Pour Point Module - ASTM D97, D2500 | FTM 203C

The Pour Point (ASTM D97) of a petroleum product is an index of the temperature at which the sample becomes semi-solid and loses its flow characteristics. The D97 test method is exclusive to the manual operation of the test. After preliminary heating, the sample is cooled at a specified rate and manually lifted and tilted, at intervals of 3°C, to check for flow characteristics. The lowest temperature at which movement of the specimen is observed is recorded as the pour point.

The Cloud Point (ASTM D2500) of a petroleum product or a biodiesel fuel is an index of the lowest temperature of its utility for certain applications. Chilled at a specified rate and examined periodically, the temperature at which a cloud of wax crystals is first observed at the bottom of the test jar is recorded as the cloud point.

The SBT®+2 tests four (4) Cloud & Pour Point samples at a time. Accessories used with this Insert Module include Copper Sleeves, Glass Stators, Cork Rings & Discs, and Test Jar Stoppers.

Kinematic Viscosity (KV) Module - ASTM D445

The ASTM D445 test procedure determines the kinematic viscosity of liquid petroleum products, both transparent and opaque, by measuring the time for a volume of liquid to flow, under gravity, through a calibrated glass capillary viscometer tube. Multiplying the kinematic viscosity by the density of the liquid generates the dynamic viscosity.

Results obtained depend upon the sample behavior and apply primarily to Newtonian liquids that exhibit proportional shear stress and shear rates. The viscosity of many petroleum fuels is important for the estimation of optimum storage, handling, and operating conditions.

The KV Insert Module for the SBT®+2 holds up to four (4) KV Viscometer Tubes. The constant temperature liquid bath cools the test samples within the requirements and precision (±0.03°C) of the D445 test method.

Mini-Rotary Viscometer (MRV TP-1) Module - ASTM D4684

The ASTM D4684 method determines the yield stress and viscosity of fresh engine oils after a slow cooling profile period (exceeding 45 hours) through a temperature range where wax crystallization occurs. At the end of this period, a series of increasing low torques (weights) are applied to the rotor shafts until rotation occurs to determine the yield stress, if exhibited. Higher weight applications then determine the apparent viscosity of the samples at the final test temperature.

The MRV TP-1 Insert Module accommodates up to ten (10) test samples per run. Removable stators permit easy recovery of the sample and simple cleaning.

The SBT®+2 liquid bath provides highly reliable and accurate temperature ramping and control for D3829, D4684, D6821 (Drive Line) and D6896 (used oils) test methods.

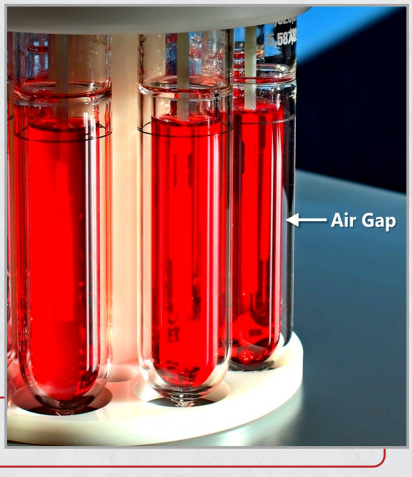
D2983 Viscosity Module - ASTM D2983

The D2983 test method includes the use of an appropriate rotational viscometer to determine the low-shear-rate viscosity of Automatic Transmission Fluids (ATFs), gear oils, torque and tractor fluids, and industrial and automotive hydraulic oils.

The 'constant' temperature SBT®+2 liquid bath, in combination with the SimAir® Test Cell, cools the test sample within the requirements and precision of the D2983 test method. The mounted Viscometer easily attaches to the SimAir® Spindle via a Quick Connector for viscosity measurements at the end of the designated soak time while the sample remains at temperature in the liquid bath. The D2983 Insert Module utilizes a removable sample carousel that holds up to eight (8) SimAir® Stators.

The large viewing window allows the operator to properly align the Spindle immersion mark with the meniscus of the sample according to D2983 requirements.

SimAir® Test Cell Innovation for ASTM D2983



The patented SimAir® Test Cell offers simple, precise, and more efficient data acquisition for low-temperature D2983 testing. The SimAir® Glass Stator design incorporates an insulating chamber between two glass walls to simulate the cooling influence of the original cold air cabinet and ASTM method.

The SimAir® Test Cells are used exclusively in the 'constant' temperature Tannas SBT®+2 and King BLB Liquid Baths. Each Test Cell functions with its own independent cooling profile in the bath, and they can be added or removed at any time without affecting the other samples. This increases productivity, ease-of-use, and eliminates the need to run batch sample tests.

The patented SimAir® Test Cells, held in the (8) position SBT®+2 Carousel, utilize a unique air-gap between the test sample and the liquid bath medium to simulate the original air bath method.

TANNAS CO.
LABORATORY INSTRUMENTS

ISO 9001

Parts & Accessories

SBT®+2 Instrument:

100100: SBT®+2 Bath, 208-230 VAC, 50/60 Hz Power

SBT® (D5133 & D7110) Components:

100898: SBT® Viscometer Assembly (TAV)
100750: Tannas SBT2010 Automation Package
100030: SBT® Rotor
100055: SBT® Glass Stator
100031: Female Hook
100032: Male Hook
040013: LNP-5 Calibration Fluid (1.89 L)
030007: GIR-150, Gelation Index Reference Oil (0.94 L)

Additional Insert Modules:

100170: D2983 Carousel Insert Assembly (ASTM D2983)
350400: MRV-TP1 Module Assembly (ASTM D4684)
100203: Low Temperature Kinematics Module (ASTM D445)
100205: Pour Point/Stable Pour Point (ASTM D97/FTM 203C)
100074: Aviation Fuel Insert Assembly (ASTM D2386)

Components & Accessories:

100235: Tannas D2983 SimAir® Test Cell Assembly
100236: SimAir® Glass Stator
100105: DV2Plus Viscometer
170033: Spindle Storage Block
170028: Test Cell Holding Rack
350190: Desiccant Assembly
550175: Desiccant Media
100863: Tannas Pre-Heater (110 V)
100856: Tannas Pre-Heater (220 V)
970137: Bath Lamp - LED
100015: RTD Assembly - 9"

Instrument Specifications

Dimensions (W x D x H)	Bench-top: 48 x 61 x 69 cm (19 x 24 x 27 inches)
Weight	~86 kg | (190 lbs.)
Voltage	220 VAC, Single Phase | 60 Hz. *(Also available in 50 Hz.)*
Cooling Capacity	Two-stage cascade refrigeration system Approximately +30°C to –70°C and below
Bath Control	Programmable: ±0.1°C Manual: ±0.03°C
Bath Size	~7.5 liters (2 gallons)
Bath Medium	Methanol recommended *(depending on temperature)*
Test Methods & Applications	ASTM D5133 & D7110 - SBT® ASTM D2983 - Low-Temperature Viscosity of Lubricants ASTM D4684 - MRV-TP1 (Mini-Rotary Viscometer) ASTM D445 - Kinematic Viscosity ASTM D97 - Pour Point ASTM D2500 - Cloud Point ASTM D2386 - Freezing Point of Aviation Fuels FTM 203C - Stable Pour Point
Safety	High Temperature Cut-out Low Liquid Level Cut-out *CE* Marked
Shipping Weight	Bath System: ~123 kg | (271 lbs.) Auto System: ~59 kg | (130 lbs.)
Shipping Dimensions (W x D x H)	Bath System: 66 x 59 x 122cm | (26 x 23 x 48 inches) Auto System: 61 x 81 x 125cm | (24 x 32 x 49 inches)

Additional TANNAS CO. Precision Laboratory Instruments

Tapered Bearing Simulator (TBS) Viscometer

- ASTM D4683, D6616, CEC L-36-90, IP370
- High-Temperature, High-Shear (HTHS) Viscosity

Tannas Foam *Air* Bath (TFAB)

- ASTM D892, D6082, D1881, D7840, IP146
- Non-liquid bath
- 24°C to 150°C range

TEOST®

- Thermo-oxidation Engine Oil Simulation Test
- High Temperature Deposit Control
- ASTM D6335, D7097

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