



# ASPHALT CATALOGUE

EDITION 2018



Dear Reader,

APS Antriebs- Prüf- und Steuertechnik GmbH (drive test and control technology company) is a highly regarded German enterprise due to its soil- rockasphalt and material testing machines, which are marketed under the brand name "Wille Geotechnik".

The initial activities of the company began in the 1990s in cooperation with universities and the implementation of research activities and development of scientific equipment.

The contact and collaboration with such institutes remains strong to this day, and has developed over the past years with the APS GmbH having now over 40 employees.

APS is located in the university town of Göttingen, which boasts the largest number of Nobel Prize winners in the country. Göttingen is in the south east part of the state of Lower Saxony, central Germany making it easily accessible. The town is best known for being the home of the Georg-August-Universität Göttingen, ranked the number one university in Germany in 2010 and forty-third in the world according to the QS, and Times Higher Education World University Rankings. In addition, Göttingen also hosts part of the highly prestigious and world renowned Max Planck Society, which setup centers for scientific research in Göttingen in 1948 that continue to develop and expand today, as does our collaboration with such institutions.

All parts of designing, construction, manufacturing, quality-control and delivery tests are conducted by our own qualified experts in our factory in Germany. With high-quality special testing machines the company has received international acknowledgement, in particular by research institutes and universities from all over the world. With such capabilities, the company manufactures standard testing systems as well as customized material testing systems for a wide range of applications. In the meantime the company has grown into a globally expanding enterprise. With our expertise we help a range of users in standard, routine challenges to highly complex investigations.



The comprehensive assortment of products and an attentive service satisfies the demands on testing devices for civil engineering and for laboratory equipment in both research and industry. Furthermore, our organization is able to arrange complete laboratories with standard devices and newly designed machines for soil, asphalt and material testing.

The APS Antriebs- Prüf- und Steuertechnik GmbH ensures that even the most "state of the art" developments are transformed into user friendly products of the highest quality.



APS is known for delivering advanced technological solutions and products of renowned quality. These cover research activities in the field of soil, asphalt, rock, and building material testing from a single transducer to a complete turnkey system. Whenever you need professional and standardized solutions for your testing demands, APS is a top address. The APS Antriebs- Prüf- und Steuertechnik GmbH is proud of its high quality product standards and will happily be your partner when quality is of the utmost importance.

To find out about our products and services, please refer to following pages.

Yours faithfully

Thorsten Wille  
General Manager



## INTRODUCTION

During the last 25 years our testing machines for the determination of soil parameters under dynamic loading received international compliment. Individual demands of our customers and latest developments will always be considered in our construction. This catalogue for soil mechanic and rock testing gives an overview of our comprehensive assortment. However, we are only able to present an extract of our product range in this brochure. You are welcome to contact us directly for further information and any questions. A capable team is at your command for your request and technical challenge!

### Make it in Germany

With many years of experience we are able to tailor our products and services to your aims and needs. Our customized solutions can help you achieve unique and specific requirements. We approach each project individually and openly, and would be proud to support you in achieving the desired laboratory testing system. We have the knowledge and experience to help with a variety of testing systems.

### The ideal solution

All of our testing solutions are manufactured to the highest quality and standards. This is something in which we pride ourselves and we strongly believe defines us as a company.

We deliver advanced technological solutions and products of renowned quality for our high range loading frames, pressure controllers and intensifiers, dedicated software, temperature controlling and everything related to this field of testing.



### Business Philosophy

All company staff have a common aim, to ensure one hundred percent customer satisfaction. This is achieved through close cooperation and internal team work, from project evaluation to design, manufacturing, quality testing and all other aspects of the company that are involved in each project. Working creatively and developing new ideas is a key part of the company's culture. This has helped us to be a leader when it comes to manufacturing and developing new, highly-accurate testing-systems. We have been involved in customized solutions for many years. Such customizations may cover all aspects of a product's life cycle, such as design, development and manufacturing.

Our work is in full compliance with ISO 9001 and



other German standards, meaning customers can fully rely on the results and data from our equipment, software and our solutions in working towards technical aims or research activities. It is therefore essential that APS ensures and improves the quality, accuracy and reliability of products and services. In this way, we remain the preferred partner and solution provider in our field. All of our efforts help to secure high quality, timely delivery of products and services.

### World class Service and support

We have gained years of experience from many successful installations and close cooperation with our customers. Our service engineers guarantee smooth, successful commissioning within the shortest time possible after delivery. Customers even have the opportunity to participate in an inspection prior to delivery at our factory. This enables the customer to conduct hands on 'function-testing', familiarizing themselves with the new device with the assistance of our engineers.



## TECHNICAL SUPPORT

APS GmbH provides a variety of technical support services for Wille Geotechnik® Products, starting from procurement till final installation and after sales services. Technical support covers all Wille Geotechnik® Products to new devices and older devices.

Our networks of overseas representatives are there to help you with any enquiries in your native language during office hours. Local representatives are supported directly by our engineering department who can advise and help solve your problems. As a customer you are also able to have direct contact with the designers and manufacturers, as well as receiving all technical advice directly from experienced engineers in our company.



### Procurement

All of our testing solutions are manufactured to the highest quality and standards. This is something in which we pride ourselves and we strongly believe defines us as a company.

We deliver advanced technological solutions and products of renowned quality for our high range loading frames, pressure controllers and intensifiers, dedicated software and everything related to this field of testing.

### Software

Our expert software engineers are well trained and keen to provide efficient and professional programming in line with customer requests and requirements. Upon delivery, customers receive the finished test program along with the relevant documentation needed to operate their new piece of equipment efficiently.

### Commissioning

We pride ourselves on our service and can guarantee smooth, successful commissioning immediately after delivery of our testing systems.

### Machine operation after installation

There are different available services to assist you in operating your testing system in best condition after final installation at your site.

- Calibration
- Maintenance / Inspection
- Repair work
- Spare parts

### After Sales Support

Our homepage provides customer access to technical details and background information about Wille Geotechnik®: [www.wille-geotechnik.com](http://www.wille-geotechnik.com).

Technical support is available via the following Email address: [support@wille-geotechnik.com](mailto:support@wille-geotechnik.com). We aim to reply to any support enquiry on the same day, and at least within 24 hours.

Although a more detailed technical support service is more effective by email contact, you can call our service department to talk with our technical support specialists. For an immediate answer via the central phone number (+49 (0) 551 307520) or by Fax (+49 (0) 551 30752 20). Our competent service staff is ready to give you detailed technical advice and support.



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## GEOsys Professional

GEOsys is multifunctional and modular controlling and data acquisition software, which also is the universal software for our products. It allows the simple programming of complex user defined test sequences by structured Windows operation on a graphic user interface.

GEOsys has a flexible programmable system environment, which controls test appliances that carry out and coordinate various test operations. The flexible operating panel provides tools to configure the appliance, editors to carry out load procedures, and functions for analysis, presentations and logs.

The software is designed to support a modular structure for the test environment so as it enables a flexible configuration and thus fulfils the specific requirements of the user.

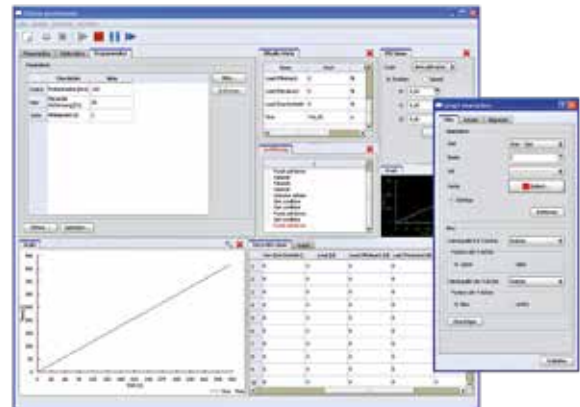
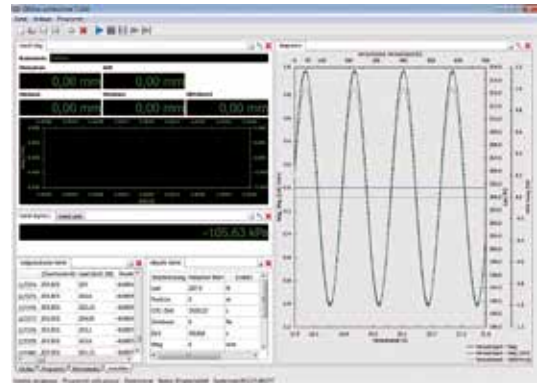
One unique platform addresses all of your testing needs, be it soil, asphalt, rock or construction related, both dynamically and statically. There are various test modules for GEOsys and cover all your test requirements.

The important key feature of this software is the ability to allow users for simple and completely free programming of standard or complex test sequences by structured Windows operation on a user friendly interface.

Thanks to the wide range and brilliant abilities of GEOsys, it is not only universal software for our products but also can be integrated with the hardware of familiar manufacturers to provide control functions and data acquisition.

The clearest advantage of the software is situated in relieved application. Even inexperienced users are within shortest time able to drive not only easy test sequences but complex running procedures.

GEOsys offers the possibility of making an optimization of the machine regulation (PID) even during operation. The effects of the automatic controller adjustments become immediately visible in the diagram. PID control data is storable as a file.

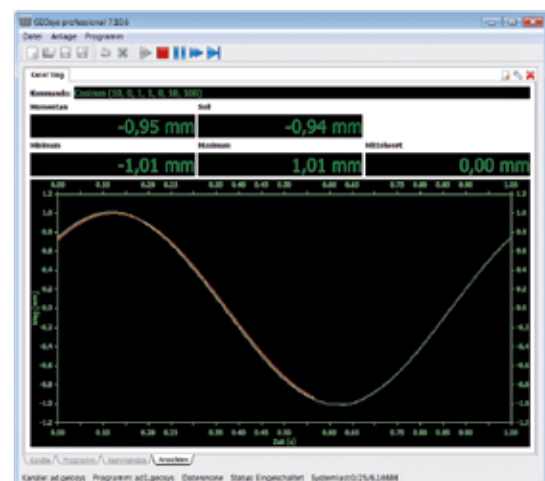
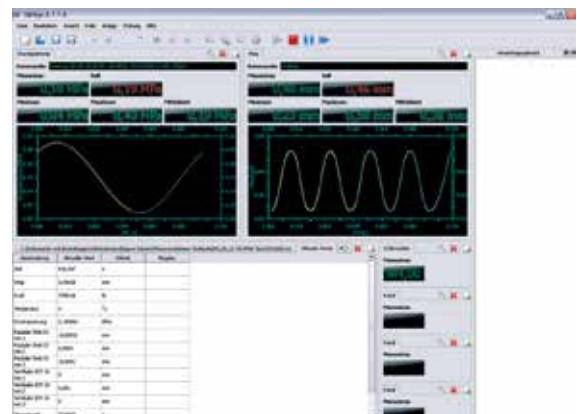
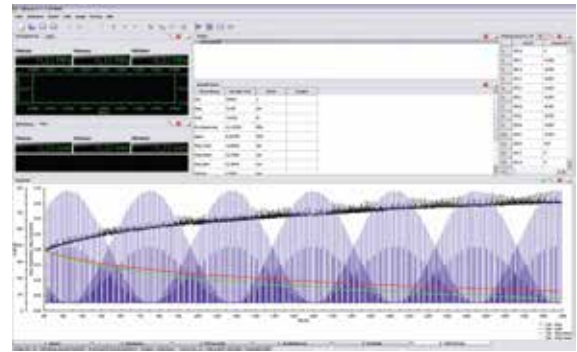




## GEOsys Professional

### Universal multifunctional controlling and data-acquisition software with report function

- One unique platform for all kinds of asphalt testing (soil, rock, construction) with dynamic and static applications
- The program supports numerous hardware and laboratory devices of familiar manufacturers. An upgrade and incorporation of existing devices into the system is possible
- Consistent and integrated user experience
- Platform independent design
- Optional interface enabling to integrate additional hardware
- User roles for easiest handling
- Modular composition of the test procedure
  - Management of hardware components
  - User supplied, calculated measurands
  - Easy to use front end for defining procedures
  - Interactive handling
  - Data acquisition
- Display elements
  - Numerous ways of displaying current and reference values
  - Diagrams consisting of various plots of arbitrary channels and scaling. Presentation can be widely adopted to users' needs.
  - Monitoring of individual channels and their activity with digital oscillograph
  - Content of logs is displayed as tables
  - Tree view for tracking the state of the test
  - Screen layout can be adjusted by the user. Therefore the available screen space can be split vertically and horizontally and display elements may be stacked
- Extract of available software modules for asphalt testing and unbound material:
  - Marshall stability
  - CBR test
  - Frost swelling tests, Freeze and thaw cycle tests
  - Simple performance test
  - Indirect tensile tests
  - Uniaxial compression / tension test
  - Dynamic triaxial compression test
  - 4-point beam fatigue test, 3-point beam fatigue test
  - Static and dynamic shear tests



## ELECTROMECHANICAL UNIVERSAL ASPHALT TESTING MACHINE FOR CYCLIC TESTS

The Dynamic Innovative Testing Machine Series UL-EM/C was developed for the cyclic loading to test the stiffness and fatigue properties of asphalt and unbound material and is currently unique on the market.

The testing machine is highly accurate, very quiet and extremely low energy consuming.

In comparison with previously known servo-hydraulic test equipment, this world's new generation of equipment has clear advantages.

### Technical specifications

- Maximal vertical load: +/- 10, 16 and 35 kN
- Test frequency up to 15 Hz
- Accuracy class: EN ISO 7500-1 class 0.5

Suitable for different testing facilities in accordance with EN 12697-24 sets, -25 and -26 as well as for static asphalt and soil tests.

### Main Features

- Optimal energy efficiency (reduction in cost by approximately 90%)
- Low noise system
- High precision
- Maximum operating safety
- High stiffness construction
- High positioning accuracy and implementation of the specified load profiles (cosine, rectangular, etc.)
- Best control accuracy by two super imposed control loops for each set point (force or displacement amplitude)
- Digital high-precision real-time control system with high resolution, high accurate time-synchronized data acquisition

### Options

removable temperature chamber for this series of machines is also available in a wide range of testing temperatures.



## STATIC AND DYNAMIC UNIVERSAL ASPHALT TESTING MACHINES FOR THE ANALYSIS OF RHEOLOGIC PROPERTIES OF BITUMINOUS MIXTURES

Servo-hydraulic testing systems provide best conditions for determining the rheologic properties of asphalt.

The high quality components and the servo-hydraulic drive guarantee high precision in control and measurement of load and strain amplitudes.

According to the modular design of load frame, hydraulic aggregate and environmental chamber we provide highest flexibility for standard and customised solutions.

### Main Features

Servo-hydraulic testing systems with loads of 5, 10, 15, 25, 40, 63, 80, 100, 120, 250, and 300 kN are part of our standard product range beside customised devices. For rock testing also larger load frames are available.

The testing machines consist of a rigid 2- or 4-column construction and have the possibility for manually or automatically adjustment of the upper traverse.

The testing machines contain a low friction, hydrostatic seated hydraulic cylinder for testing up to 400 Hz. The multi-axial real-time testing systems are modular designed and are expandable with additional features like dynamic confining pressure for Triaxial tests or cyclic shear tests.

The removable computer controlled environmental chamber is available in different sizes for any kind of material testing. The standard temperature range extends from 25° up to +80°C. An optional range from -40°C is executable. Due to the PC-control any kind of temperature test sequences can be performed.

The high frequency multi-channel control-system provides closed-loop controlling with adjustable frequencies up to 5000 Hz for each channel. The modern modular electronics have a pure parallel data-acquisition in real-time without phase shifting with a resolution up to 20 bit (more than 1.500.000 steps) per channel. The system is expandable with nearly any amount of measurement and control channels.

Due to the controlling software of latest technical standard all standard and individual test procedures with any control algorithm can be programmed by the multi-channel control system. There are unbound possibilities of selectable functions and definable stop or control parameter.



## STATIC AND DYNAMIC SERVO-HYDRAULIC TESTING MACHINES



The modular arrangement of the testing systems supplies a wide range of testing possibilities. Different versions of load, strain and displacement transducer, as well as numerous standardised testing jigs satisfy any needs of material testing. In addition many special solutions for scientific investigation are available.

## APPLICATION GUIDE FOR STATIC AND DYNAMIC TESTS

Standard	Test methode
<b>EN 12697-26C, AL-SP</b> ASTM D4123 AASHTO TP31-94	Indirect tensile stiffness
EN 12697-24E AL-SP	Indirect tensile fatigue test
EN 12697-25 A	<b>Cyclic compression test</b> Dynamic uniaxial compression test
TPA StB 25A 1 TPA StB 25A 2	Creep test
<b>EN 12697-25 B</b>	<b>Cyclic compression test</b> Dynamic triaxial compression test with static or dynamic confining pressure
<b>EN 12697-24 D</b> AASHTO TP8/94, T321 <b>EN 12697-26 B</b>	4-point beam fatigue test
<b>EN 12697-26D</b> <b>EN 12697-26E</b>	Direct tensile and compression test
<b>prEN 12697-46</b> TPA StB	<b>Low temperature cracking and properties by uniaxial tension tests</b> Thermal Stress Restrain Specimen test (TSRST)
prEN 12697-46	Uniaxial Cycling Tension Stress test (UCTST)
<b>EN 12697-23</b> (EN 12697-12) TPA StB 23	<b>Determination of Indirect tensile strength</b> of bituminous specimens
<b>TPA StB 80</b>	<b>Static shear test</b> for pavement layers
prEN 12697-48	Dynamic shear test
EN 13286-7	<b>Unbound and hydraulically bound mixtures</b> Cyclic load triaxial test for unbound mixtures
AASHTO TP62	Simple Performance Test dynamic modulars



## DIFFERENT ASPHALT TESTING DEVICES FOR UNIVERSAL MACHINE



**Dynamic triaxial compression test with static or dynamic confining pressure**

- EN 12697-25B



**4-Point beam fatigue test with mechanical or automatical clamping**

- EN 12697-24D
- EN 12697-26B



**Direct tension / compression test  
Uniaxial low temperature tension test  
Thermal Stress Restrain Specimen test**

- EN 12697-26D/E
- EN 12697-46
- TPA-StB:  
Asphalt characteristics at low temperatures



**Creep Test and Cyclic compression test**

- TPA StB 25, A1 (mastic asphalt)
- TPA StB 25, A2 (rolled asphalt)
- TPA StB 25, B1
- EN 12697-25A



**Indirect tensile test**

- EN 12697-24E
- EN 12697-26C
- EN 12697-23



**Shear test for pavement layers**

- TPA StB T80



**Dynamic Shear Test**

- EN 12697-48 (static and cyclic)



**Dynamic uniaxial  
compression / tension test**

- EN 12697-46

## STATIC AND DYNAMIC SERVO-HYDRAULIC UNIVERSAL TESTING MACHINE 5/15/40 KN

The modular testing system consists of load frame, hydraulic power pack, environmental chamber, real time control unit, GEOsys Professional software. Test specific software packages or free programmable software solutions for highest demands in research are available.

To meet the high accuracy requirements of dynamic tests all testing machines consist of best quality components.

Different test modules according to EN 12697-24/25/26 are available (see table).

### Main Features:

- High stiffness construction, precision aligned
- High accuracy, low friction hydraulic linear actuator for best performance of dynamic material tests
- With high resolution displacement transducer integrated into the hydraulic linear actuator
- Servo valve with manifold platen, accumulators and filter, which is mounted directly at the actuator
- Including hydraulic power pack with noise protection
- Stainless steel environmental chamber for incorporated material testing frame for temperatures from -25° (-40°) to +70°C with forced ventilation

Digital Multi-Axis Real Time Control System WDCdyn  
Including 20 bit high resolution data acquisition system with expandable high speed, low noise channels for data acquisition or closed-loop control for each actuator.

### Main Technical Specifications:

- Maximum load:  $\pm 5, 15$  or 40 kN
- Accuracy according EN ISO 7500-1 class 0.5 %



## STATIC AND DYNAMIC MODULAR SERVO-HYDRAULIC UNIVERSAL TESTING MACHINE 25/40/60/100 KN for high accuracy and high frequency tests up to 100 Hz

The modular testing system consists of load frame, hydraulic power pack, environmental chamber, real time control unit, GEOsys Professional software. Test specific software packages or free programmable software solutions for highest demands in research are available.

To meet the high accuracy requirements of dynamic tests all testing machines consist of best quality components.

### Main Technical Specifications:

- Maximum load:  $\pm 25, 40, 60, 100$  kN
- Accuracy according EN ISO 7500-1 class 0.5 %

Different test modules according to EN 12697-24/25/26/46 and for unbound materials (e.g. EN 13286-7) are available (see table p. 9)

### Main Features:

- High stiffness construction, precision aligned
- High accuracy, frictionless hydraulic linear actuator for best performance of dynamic material tests
- With high resolution displacement transducer integrated into the hydraulic linear actuator
- Servo valve with manifold platen, accumulators and filter, which is mounted directly at the actuator
- Including hydraulic power pack with noise protection
- Stainless steel environmental chamber for incorporated material testing frame for temperatures from  $-25^{\circ}$  ( $-40^{\circ}$ ) to  $+70^{\circ}\text{C}$  with forced ventilation

Digital Multi-Axis Real Time Control System WDCdyn 5000

Including 20 bit high resolution data acquisition system with expandable high speed, low noise channels for data acquisition or closed-loop control for each actuator.



## HIGH ACCURACY UNIVERSAL TESTING SYSTEM 25/50 KN for measuring asphalt characteristics at low temperatures according to EN 12697-46 / ASSHTO TP10

consisting of load frame, -40°C environmental chamber with special measuring device, high accuracy control unit, GEOsys Professional software.

This testing system was specially designed for evaluating crack resistance and the performance of asphalt at low temperatures, created in corporation with several research institutes.

Test specific software packages or free programmable software solutions enable all standard and individual test procedures for highest demands in research.

Using the cryogenic test procedures tension stress and strain behavior could be tested in relationship to the corresponding temperature. The testing machine for example could be used for the following test procedures according to EN 12697-46:

- Uniaxial Tension Test (UTST)
- Thermal Stress Restrained Specimen Test (TSRST)
- Relaxation Test (RT)
- Tensile Creep Test (TCT)

Otherwise different other test applications could be realised in this universal load frame with closed-loop controlled stress, strain or position. To meet the high accuracy requirements of these special cooling tests all system components consist of best quality

Different specimen sizes can be tested in the same device:

- Prism from 160 x 40 x 40 mm up to 300 x 80 x 80 mm
- Cylinder dia. 100 up to 300 mm length
- Other dimensions on request
- Additional testing devices for static and dynamic testing (e.g. CBR or bending tests) are optional available for this testing machine

### Main Technical Specifications:

- Max. tension/load:  $\pm 25$  or 50 kN
- Accuracy according to EN ISO 7500-1 class 0.5 %
- High resolution closed-loop control of strain, stress or position with 20 bit resolution
- Stainless steel environmental chamber, incorporated material testing frame for temperatures from -40° to +60°C with forced ventilation





## DYNAMIC SPECIAL TRIAXIAL TESTING MACHINE WITH DYNAMIC AXIAL LOAD AND CONFINING PRESSURE FOR UNBOUND MATERIAL

- Dynamic universal testing machine LO7025/2 DYN with electro-mechanical precision drive for compression and tension tests up to 25 kN and for high accuracy cyclic tests
- Specially designed and configured for static and cyclic uniaxial and triaxial test methods regarding EN, AFNOR, ASTM and AASHTO
- For all requirements of seismic research, unbound material testing for road research and all kinds of stress and strain path tests
- Cyclic pressure controller for generating hydrostatic pressures up to 10 bar to perform static or cyclic confining pressures between 0.1 and 5 Hz For use with cLc and cLV tests according to EN 13286-7
- Special triaxial cell for unbound and granular material
  - for sample diameter  $\varnothing$  160 / 320 mm
  - for use with internal, local transducers
- With automatic elevation device for the cell mantle for easy specimen preparation and positioning of the interior measuring sensors
- Submersible local axial-deformation measuring devices for static and dynamic tests
- Submersible local radial-deformation measuring devices for static and dynamic tests
- Submersible load cell for triaxial test cells for accurate measurement of axial loads with confining pressure compensation, 25 kN
- Special cell-/porewater-pressure transducer

### Technical Specifications:

- Static axial load: Up to 25 kN
- Cyclic axial load and frequency: Up to 25 kN
- Cyclic frequency: Up to 15 Hz
- Confining pressure: 0.3 / 1 / 2 MPa
- Confining pressure frequency: Up to 10 Hz
- Sample size: 100 / 150 / 160 / 300 mm



## STATIC UNIVERSAL LOAD FRAME UL-10 UP TO UL-300

This high precision load frame UL-xx is available in different designs with different and load ranges. The big advantage of the UL load frames is technical flexibility and usability for all sorts of application

### Main Features:

- The UL-xx load frames can be used for all types of compression tests, whether used with load or speed ramps, and loading or unloading cycles.
- All test parameters and presets are supervised by closed-loop control. These include, depending on the version of the test machine an integrated force, position and velocity control.
- Due to the integrated keyboard or alternatively to the external controller, the automatic zero-point setting and software-based calibration the operation is very user-friendly and individual tests can be performed
- Menu-driven test performance with monitoring system
- The robust and functional design of the apparatus coincides excellent with the well-proven measurement and control electronics
- Siemens®) with worldwide million fold usage and guarantee of spare parts
- Exchangeable, pre-calibrated measuring sensors guarantee a high accuracy over a wide measuring range
- Control and data transmission via serial and ethernet port
- Integrated sensor connection with AD converter

### Technical Specifications:

- Normal force: 0–10 kN / 0–25 kN / 0–60 kN / 0–300 kN
- Spindle lift: 50 / 100 / 200 mm
- Speed range: 0.000001 mm/min to 10 / 30 / 60 / 100 mm/min



## AUTOMATIC WEHNER/SCHULZE FRICTION TEST DEVICE

### for determination of friction after polishing according to EN 12697-49:2014

Fully automatic laboratory testing system for skid resistance prediction and polishing resistance of asphalt, concrete and aggregates by Wehner/Schulze



#### Main Features:

- Polishing station with polishing rolls (original technical concept)
- Better function of pump and mixing system for abrasive-water-mixture
- Skid resistance measuring station (original technical concept) with new developed high accuracy torque measuring system
- Combined fully automatic test procedure for polishing and skid resistance measuring
- Stainless steel construction for long lifetime and corrosion protection
- New corrosion resistant temperature control system
- High quality industrial controller with touch panel and graphic display for simultaneous monitoring of measured values and test procedures
- Different control modes and functions with graphic output are available
- Programmable test cycles for polishing, cleaning and measuring procedures, including definition of traveling speed of test table
- Control-, data acquisition, monitoring and test report with advanced software solution for windows 10
- Different moulds for mounting the samples in the Wehner/Schulze test device available

#### Technical Specifications:

- Dimension including electronic cabinet and abrasive mixture station (HxWxD): approx. 2500 x 2600 x 1200 mm
- Power supply: 400 VAC (3Phase) / 16 A
- Weight: 1.800 kg (Machine 1.500 kg, Control box 300 kg)
- Environmental condition: +5 to +40 °C, max. 40% rel. humidity

## CORE DRILLING MACHINE

This compact core drilling machine is used in laboratories to cut cores from uniform and non-uniform hard samples, such as asphalt, natural stone and concrete.

The 3 kW electric motor is equipped with a 4-speed mechanical gearbox to provide high torque drilling capability throughout the drilling speed range. This enables the drill bit to maintain speed under loading to produce a uniform core sample.

### Technical Specifications:

- Motor power: 3 kW
- Coring speed: 240/580/1160/2220 rpm
- Coring range: AX to NX from 8 to 150 mm diameter
- Level of acoustic power emitted by the LWA device: 98 dB (A)
- Dimensions (approx.): 900×900×2200 mm
- Weight (approx.): 350 kg



## CORE TRIMMER AND CUTTING MACHINE

The cutting machine is used to cut asphalt samples of irregular shapes, as well as surfacing and machining the ends of the cylindrical or cubical samples.

### Main Features:

- Stainless steel cutting bed
- Compact, powerful, easy and quick operation
- Maximum safety standards with electronic brake and interlocking safety device
- Includes cooling fluid inlet for cutting blade
- Transparent sample holder chamber

### Technical Specifications:

- Wheel speed: 2800 rpm
- Operation: manual
- Wheel Diameter: Ø 250 mm / Ø 350 mm
- Cutting Capacity: Ø 90 mm / Ø 115 mm
- Cutting Capacity: 50 x 165 mm / 50 x 195 mm
- T-Slot table dimension: 255 x 250 mm



## GRINDING MACHINE

This grinding machine has two electronic motors and is used for the vertical grinding and polishing of asphalt samples on two parallel sides. It can be used for working with natural stones, concrete, as well as ceramic and other materials.

The height of the grinding table can be adjusted in micrometres for various sample lengths from 50 to 320 mm via a hand wheel.

Cube or cylinder samples are easily locked in place on the grinding table. Grinding is carried out automatically by moving the sample from one side to the other side through the grinding wheels.

The machine is equipped for grinding cubic samples from 50 and 200 mm in size, as well as cylindrical samples with diameters from 50 to 150 mm.

### Technical Specifications:

- Dimensions (approx.): 1800 × 1500 × 1700 mm
- Weight (approx.): 350 kg
- Electrical connection: 400 V, 50 Hz
- Sensitivity: 0.1 mm
- Cooling unit capacity (available on request): 50 l/h





## GYRATORY COMPACTOR to produce asphalt specimen

Standard: EN 12697-31, AASHTO T312, ASTM D6925

### Main Features:

- Robust testing device with electro-drive and stiff test chamber
- For specimen sizes diameter 100 x h. 200 mm and diameter 150 x 250 mm
- Compression pressure 200 to 1000 kPa, speed of Gyration  $30 \pm 0.5$  rpm
- Digital control unit with user-friendly menu for test parameter setting and calibration
- Programmable angle of gyration, operates at internal or external angle
- The actual measuring values of gyration number, specimen height, angle and pressure are shown on the display and stored during the compaction process
- The device is network compatible and includes an USB data port, the test data can be saved to a USB memory stick or printed directly with the optional printer kit
- Built in specimen extruder

### Accessories:

- Gyrator compression mould dia. 150 mm with end plate
- Gyrator compression mould dia. 100 mm with end plate
- Gyrator compression mould dia. 4" with end plate
- 100 mm machine conversion kit
- 4" machine conversion kit



## PERMEABILITY APPARATUS for asphalt samples

Standard: EN 12697-19, TPA StB 19

### Main Features:

- Control panel for horizontal and vertical permeability tests on asphalt specimen
- Control panel with inlet for constant water level
- Valve connectors for level adjustment
- Base frame with water bath for permeability cells
- Water container made of stainless steel

### Accessories:

- Asphalt permeability cell diameter 100 mm
- Asphalt permeability cell diameter 150 mm



## AUTOMATIC MARSHALL COMPACTOR to produce marshall specimen from hot mix asphalt

Standard: EN 12697-10, EN 12697-30, DIN 1996 T.4

### Main Features:

- The rammer and anvil are made of special hardened steel to ensure a longer product life
- The balance weight is lifted from two sides, thus ensuring a free fall.
- The device is possible for calibration
- Supplied complete but without mould set

### Accessories:

- Compaction mould acc. to EN 12697-10, EN 12697-30, DIN 1996
- Base plate for A 2000/2
- Extension collar for A 2000/2
- Filling funnel
- Marshall mould set consisting of:  
3 compaction moulds, 1 base plate, 1 extension collar, 1 filling funnel
- Storage plate for 6 Marshall test pieces
- Storage plate for 9 Marshall test pieces



## BOTTLE ROLLING MACHINE

Standard: EN 12697-11, EN 13108

This device serves for the determination of the affinity between aggregate and bitumen. The machine can roll 3 or 6 bottles at one time.

Rotation speed: 0 to 85 rpm



## TEST BOTTLE

with screw cap for bottle rolling machine for the determination of the affinity between aggregate and bitumen

Standard EN 12697-11, EN 13108

### Main Features:

- Volume: 500 ml
- Material: borosilicate glass
- Diameter: 86 mm
- Height: 176 mm
- Neck opening diameter: 34 mm



## GLASS ROD

Diameter 6 mm, with 35 mm long fitting rubber tube

## RING- AND BALL SOFTENING POINT APPARATUS

Standard: EN1427, ASTM D36, AASHTO T53

Set consisting of:

- brass frame
- Pyrex beaker 600 ml
- 2x brass tapered rings
- 2x steel balls dia. 9,5 mm
- 2x ball centering guide
- magnetic stirrer for temperatures of 30 up to 80°C



## AUTOMATIC DIGITAL RING AND BALL APPARATUS

Standard: EN 1427, ASTM D36, AASHTO T53

- Digital testing device with high resolution display for determining the softening point of asphalt samples
- Two laser sensors detect the balls fall
- Integrated heating plate with adjustable magnetic stirrer and electronic system to maintain the temperature of the water bath
- Two different basic test programs for tests on boiled distilled water
- (30° to 180°C) and on glycerol (80° to 130°C)
- User friendly menu driven selection of the test parameter
- RS 232 port for PC or printer connection



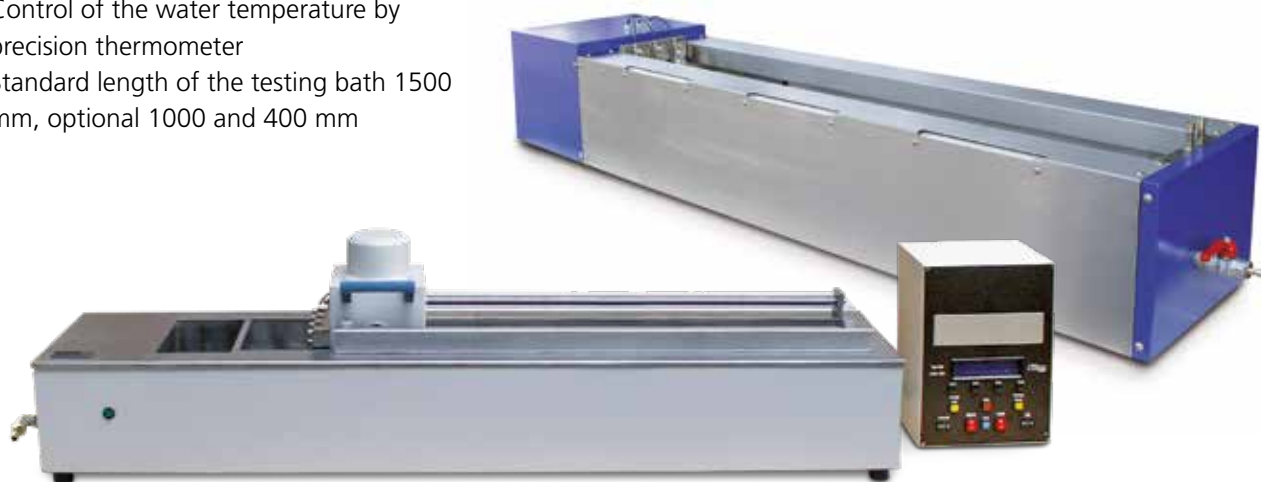
## DUCTILOMETER

to determine the bituminous ductility and the elastic revealing of bitumen

Standard: DIN 52013, EN 13398, EN 13589, ASTM D 113, AASTHO T 51

### Main Features:

- Water bath made of stainless steel with isolation at the side walls and bottom
- Integrated closed-loop controlled heating system with temperature adjustment
- Corrosion resistant precision drive with adjustable speed
- Control of the water temperature by precision thermometer
- Standard length of the testing bath 1500 mm, optional 1000 and 400 mm



### Accessories:

- Ductility briquette mould, Standard: DIN 52013, EN 13398, brass made
- Ductility briquette mould, Standard: ASTM P226, EN 13589, brass made
- Ductility briquette mould, Standard: ASTM D113, SN 670546, brass made
- Cooling device for Ductilometer waterbath with closed cooling solution circuit, connectable to any ductilometer with cooling coil



## AUTOMATIC PENETROMETER WITH DIGITAL DISPLAY to analyze the consistency of bituminous samples

Standard: EN 1426, ASTM D5

With magnetic controller to release the plunger head and digital programmable timer to ensure free falling of the needle during the 5-seconds test. The device is equipped with digital readout of the penetration values by LCD display with 5 digits and 0,01 mm resolution. Zero setting at any position.

Stiff frame with penetrometer plunger, incl. penetration needle, two brass sample cups (dia. 55 mm h. 35 mm, dia. 70 mm h. 40 mm)

### Accessories:

- Penetration needle, made of hardened steel according to EN 1426 specification, weight  $2,5 \pm 0,05$  g
- Mirror for easier placement of the needle
- Sample cup, brass made dia. 55 x h. 34 mm
- Sample cup, brass made dia. 70 x h. 45 mm
- Additional weight 50 g
- Additional weight 100 g



## DIGITAL PENETROMETER

Designed for measure the penetration values of the bitumen materials, which used for the quality control and evaluation. A standard conic tip or needle dropped on the sample under standard temperatures for five seconds with free fall method and penetration depth can be obtained automatically on the LCD screen.

### Main Features:

- Measuring range: 0-350 penetration units (equivalent to 0-35mm)
- Resolution: 0.04 mm
- Test load: 100g for needle penetration, 150g for conic penetration
- Test time: 5 sec (adjustable from 1 to 99 seconds)
- Dimensions (WxDxH): 27 x 48 x 75 cm
- Weight: 24 kg
- Power supply: 100/240 V, 50/60 Hz



## THERMOSTAT AND EXTERNAL WATER BATH FOR PENETROMETER

Digital controlled thermostat with motor pump, immersion heater and cooling coil device for current water operation. The external water bath with heating coil for the sample cup is connected to the thermostat via tubes.

- Temperature: 25°C,  $\pm 0,1^\circ\text{C}$



## ROLLING THIN-FILM OVEN to measure the air and heat effect on a moving film of bitumen

Standard: EN 12607-1

External frame and internal chamber are made of stainless steel with an intermediate chamber of insulating fiberglass. The oven door contains a large glass window for inspections. The oven needs to be connected to a suitable air pressure supply. A digital precision thermostat, a control thermometer and a ventilation device provide constant temperature of 163°C. The apparatus is supplied completely with a set of 8 glass containers (dia. 64 x 140 mm).

### Accessories:

- Glass container dia. 64 x 140 mm





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