Paving materials testing equipment

CONTROLS
PAVELAB® SYSTEMS
EXCELLENCE IN PAVEMENT TESTING SOLUTIONS

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Томск (3822)98-41-53
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CONTROLS PAVELAB® SYSTEMS
EXCELLENCE IN PAVEMENT TESTING SOLUTIONS

PAVELAB® SYSTEMS, the asphalt division of CONTROLS, has inherited the consolidated know-how and qualified experience accumulated in this sector by CONTROLS, who has had more than 40 years of partnership and collaboration with the academic world and major international laboratories, as well as an active participation in trade associations and Standard's organizations.

Superpave™ methods are directing the market of asphalt pavement testing towards more advanced systems and the new division is aligned with these requirements. CONTROLS have adopted a distinctive and innovative concept which leads the development strategy: the **CVI-Tech** concept.

New products, technologies and services provide the MAXIMUM POSSIBLE VALUE for the customer. As a result of the CVI-tech philosophy, CONTROLS can offer:

CVi TECH
CUSTOMER'S VALUE
DRIVES
THE INNOVATION

- The best quality/price ratio
- Conformity to Standards
- Quality and repeatability of industrial production
- Ergonomic design
- Qualified after sales service to keep machines running at peak efficiency even with intensive use
- Modular and expandable systems
- Retention of value overtime

Paving materials testing equipment

Index

Determination of asphalt mix composition (Binder content)

Automatic closed-system asphalt analyzer 8
Asphalt binder analyzer by ignition method 12

Asphalt sample preparation and compaction

Automatic laboratory mixer 16
Gyratory compactors 18
Internal angle measurement apparatus 24
Electromechanical slab compactors 26

Dynamic testing systems

Dynamic testing systems for road paving materials 34
Test modules and accessories for dynamic testing 42

Wheel tracking

Double wheel tracking 54
Single wheel tracking 60

Pavement testing

Skid resistance tester 64
Accelerated polishing machine 65

Bitumen testing apparatus

Ductility testing machines 68
RTFOT Asphalt ovens 73
Automatic ring ball apparatus 74
Pressure aging vessel 75
Bending beam rheometer 76
Dynamic shear rheometer 77
Rotational viscometers 78
Kinematic and Dynamic viscosity 80

Standards index, Code index 83

PAVELAB® SYSTEMS

Determination of **Asphalt Mix** Composition

→ Automatic closed-system asphalt analyzer

→ Asphalt binder analyzer by ignition method


WASHING CYCLES
3
5
DRYING CYCLES
1
2
3
4
5
START EXTRACTION
PAVELAB SYSTEMS
Automatic
closed type
bitumen extractor
by solvent

Automatic closed-system asphalt analyser

Standards ASTM D2172, EN 12697-1

75-PV50A05 75-PV50C05 series

» Binder extraction and recovery is important for both determining the binder content and recovering, using a Rotary evaporator, a representative bitumen sample which can be used to perform other tests such as penetration, softening point, etc.
Aggregates, including filler, are also separated and remain available for sample grading.
In conclusion this method allows the complete analysis of an asphalt sample. The analyser must be connected to a suitable water cooling system (see accessories).

For separation
and extraction of bitumen,
filler and aggregates
from asphalt samples
by use of solvents

OPERATING PRINCIPLE

The asphalt sample (maximum 3.5 kg) is placed in a washing drum lined with woven mesh cloth with openings 0.063, 0.075 or 0.090 mm wide and it is fitted into the washing chamber. Bitumen and filler are separated from the sample by washing with solvent and ultrasonic motion. The mixture of filler/bitumen/solvent is then centrifuged and the filler is separated. The aggregates and filler are dried by forced air circulation and the residue of solvent recovered by condensation.

The remaining bitumen/solvent solution is distilled and separated in two different tanks. Part of the bitumen/solvent solution can be drained off before distillation and connected to a flask for use with a rotary evaporator to recover a bitumen sample for other tests. The clean distilled solvent is recycled for other extractions.

The analyser should be connected to a suitable water cooling unit to feed the three different cooling coils of the apparatus (see accessories).

Note
The machine can be configurated for use with the following solvents:

- Perchloroethylene (tetrachloroethylene)
- Trichloroethylene
- Dichloromethane (methylene chloride)

75-PV50A05

Main features

- > Fully automatic test cycle:
  - Washing of the asphalt sample (up to 3.5 kg) with solvent and ultrasonic motion, with simultaneous heating and rotation of the drum lined with screening mesh
  - High speed extraction centrifuge for separation of filler from binder solution
  - Condensation of solvent vapour in a stainless steel tank including cooling coil, conforming to latest anti-pollution requirements
  - Automatic recovery of solvent by a continuous distillation process
  - Easy binder recovery for further tests such as penetration, softening point, etc.
  - Fast connection for rotary evaporator flask included
- > Extraction time reduced to approx. 55 minutes (including drying)
- > No toxic fumes in the laboratory
- > High extraction capacity: up to 200 g of filler for each extraction
- > Automatic sample drying after extraction
- > Silent operation

Automatic closed-system asphalt analyser

75-PV50C05

The PAVELAB Automatic closed-system asphalt analyser consists essentially of the following:

Machine body
Steel sheet, powder coated with epoxy resin. Wheel mounted.

Washing chamber
High quality stainless steel fitted with ultrasonic equipment, heating system, driving device for the rotation of the washing drum, valves, connections, etc.

Washing drum (Separate accessory)
Lined with screening mesh, 0.063 or 0.075 or 0.090 mm opening. This unit includes seating, support and closing ring for the cover. Each model should be fitted with the appropriate cover (see accessories).

Centrifuge
High speed centrifuge for 120 mm diameter cup, complete with safety switch.

Condenser
Stainless steel tank complete with cooling coil for condensation of solvent vapour during the drying operation.

Self-priming pump for solvent Vacuum pump
For drying aggregate and filler.

Recovery/distillation unit
Double chamber: one for distillation, one used as a reservoir. The distillation chamber comprises a base and upper heater providing solvent recovery up to approx. 30 litres/hour, and cooling coils above the chamber, incorporated in the cover. Both chambers are fitted with drain valves. A fast connection for the Rotary evaporator flask for bitumen solution collection is included.

Sampling device for Rotary evaporator

7" Touchscreen control panel
For controlling and operating the machine.

Safety features
The machine stops immediately if a lack of water, electric motor malfunctions etc. are detected and the reason for the stoppage is shown on the control panel display. The door is locked when the test is running.

Standard outfit
Two models with different accessories are available. See ordering information for details.

Technical specifications

- Maximum sample size: 3.5 kg
- Centrifuge rotation speed: 6000 rpm
- External cup dimensions: 120 x 200 mm (diameter x height)
- Maximum filler capacity: approx. 200 g
- Extraction time (including drying of aggregate and filler): approx. 55 minutes
- Solvent used per extraction: approx. 10 litres (recycled)
- Power rating: 6 kW (excluding water cooling system)
- Overall dimensions: approx.1400x750x1500 mm (wxdxh)
- Weight: approx. 240 kg

Detail of centrifuge inlet

Placing the centrifuge cup into the centrifuge unit

Placing the washing drum into the machine

Detail of fast connection for Rotary evaporator flask, for bitumen solution sampling

Detail of control panel dysplay

Ordering information

Two versions of the analyser are proposed:
-**models 75-PV50A05**
and **75-PV50A06**
without accessories
-**models 75-PV50C05**
and **75-PV50C06**
that are supplied complete with washing drum with 0.063 mm mesh, lid, cup, paper and water cooling system which is also offered as an accessory.

75-PV50A05

PAVELAB Automatic Closed-System Asphalt Analyser.
For separation and extraction of bitumen, filler and aggregates from asphalt samples by use of solvents. 380 V, 50 Hz, 3 ph.

75-PV50A06
PAVELAB Automatic Closed-System Asphalt Analyser.
As above but 220 V, 60 Hz, 3 ph.

75-PV50C05

PAVELAB Automatic Closed-System Asphalt Analyser.
For separation and extraction of bitumen, filler and aggregates from asphalt samples by use of solvents. Complete with washing drum with 0.063 mm mesh, closing lid, centrifuge cup, lining paper and water cooling system. 380 V, 50 Hz, 3 ph.

75-PV50C06
PAVELAB Automatic Closed-System Asphalt Analyser.
As above but 220 V, 60 Hz, 3 ph.

Accessories

Washing drums and closing lid

75-PV5X010

Washing drum, 0.063 mm mesh

75-PV5X010

75-PV5X020

Washing drum, 0.075 mm mesh

75-PV5X030

Washing drum, 0.090 mm mesh

75-PV5X040

Closing lid for washing drums

75-PV5X040

Solvent testing device

75-PV5X110

Testing device to verify the stability of recycled solvent from the pH value.

75-PV5X120

Solvent stabilizer. 1000 ml bottle. For stabilization of recycled solvent.

Water cooling system

75-PV5X135

Water cooling system providing water between 10 and 15°C, flow rate 5 litres/min, pressure 3 bar. 380 V, 50 Hz, 3 ph.

75-PV5X136
As above but 220 V, 60 Hz, 3 ph.

75-PV5X135

Centrifuge cup

75-PV5X150

Centrifuge cup, 120 mm diameter.

75-PV0005/2

Lining paper for centrifuge cup.
Pack of 100.

Detail 75-PV5X010 with 75-PV5X040

Asphalt binder analyser by ignition method

Standards EN 12697-39 | ASTM D6307 | AASHTO TP53

75-PV0008 series

›› The PAVELAB asphalt binder analyser is a high precision apparatus that combines an ignition oven with a continuous weighing system to monitor the weight decrease of the asphalt sample, and to automatically determine, at the end of the test, the binder content and percentage. An independently controlled auxiliary afterburner chamber significantly reduces the furnace emissions.
The PAVELAB Analyser is supplied complete with a double sample basket, safety cover, extraction fork and 3 metres of metal exhaust ducting.

PC software-Typical weight/ time curve

Main features

- Fully automatic test cycle with simultaneous display of all test parameters, including weight loss and percentage
- Highly efficient heating system with additional afterburner for complete combustion of exhaust fumes, conforming to CE requirements
- PID closed-loop temperature control
- Built-in weighing system
- Reduced test time of 30-40 minutes
- Test performance menu comprising the simultaneous display of all test data
- Internal database stores up to 100 tests. Each test can be displayed and printed or sent to a PC via the RS232 port

Technical specifications

Oven and afterburner

- Highly efficient heating system with afterburner for total combustion of fumes to minimize emissions in accordance with CE requirements
- No need for filters or hoods = low maintenance costs
- Sample sizes up to 4500 g for a more representative test result
- Maximum power rating: 10 kW
- Holding power during the test: 3.5 kW
- Supplied complete with double sample tray, fork to handle the pan, cooling cage and 3 m of exhaust ducting

Hardware

- Large permanent memory to store test results
- On-board 40-column serial printer
- Weighing system: 10,000 g capacity, 0.1 g resolution, ±0.1 g repeatability
- Closed-loop PID thermoregulation for both oven and afterburner
- 240 x 128 pixel large graphic display
- RS232 output for PC connection

Firmware

- Language selection
- Clock/calendar
- Bi-directional real-time communication with the weighing system
- Test setting menù, complete with physical and descriptive sample parameters
- Calibration menù for temperature and weight
- Optional manual control of test performance
- Test performance menu with simultaneous display of all test data
- Internal database for up to 100 tests. Each test can be sent to PC, displayed, printed or deleted
- Possibility to connect an external balance for automatic weight input (see accessories)

Safety features

- Door is automatically locked during the test, even if the power is interrupted
- Door closure is automatically monitored before the test starts

Overall dimensions:
590 x 830 x 973 mm (w x d x h)

Weight: approx.: 125 kg

Test setup

Accessories

75-PV0008/5

Metal stand for 75-B0008.

75-PV0008/10

Safety visor

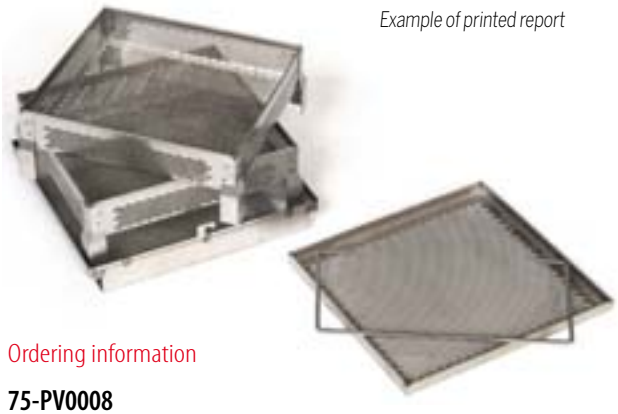
75-PV0008/12

Safety cover for sample basket.

75-PV0008/14

Additional double sample basket

Example of printed report



Ordering information

75-PV0008

PAVELAB, Asphalt binder analyser by ignition method.
Complete with double sample basket/safety cover, extraction fork and 3 metres of metal exhaust ducting. 380 V, 50 Hz, 3 ph.

75-PV0008/Z

PAVELAB, Asphalt binder analyser by ignition method.
As above but 220 V, 60 Hz, 3 ph.

75-PV0008/2

Auxiliary top pan digital balance, 10,000 g capacity, 0.1 g sensitivity, for connection to Asphalt binder analyzer 75-PV0008 via the RS232. 230 V, 50-60 Hz, 1 ph.

***Note**: this balance, or a similar suitable model, is used to weigh the sample before the test execution.*

Metal stand 75-PV0008/5, safety visor 75-PV0008/10 and exhaust ducting (supplied with the machine)

Extraction fork (supplied with the machine)

PAVELAB® SYSTEMS

Asphalt Sample Preparation and Compaction

- Automatic laboratory mixer
- Gyratory compactors
- Internal angle measurement apparatus
- Electromechanical slab compactors


GYROCOMP
CONTROLS
PAVELAB
SYSTEMS
START
STOP
GYROCOMP
gyratory compactor

BITUMIX Automatic laboratory mixer

Standards EN 12697-39 | ASTM D6307 | AASHTO TP53

77-PV0077/B series

›› The design and testing of bituminous mixtures includes various laboratory tests such as Marshall stability (EN 12697-34), Gyratory compaction (EN 12697-31), Slabs laboratory compaction (EN 12697-33) to prepare specimens for Wheel tracking (EN 12697-22) and Determination of stiffness including Beam fatigue testing (EN 12697-26, EN 13108).

To produce samples for performing the above tests, it is essential that the preparation of a bituminous mixture is carried out at a reference temperature and within a limited time period in order to reduce mechanical degradation of the aggregates. The mixer should also be capable of entirely coating all mineral substances in not more than 5 minutes as stated by EN 12697-35.

The 76-PV0077/B PAVELAB BITUMIX Automatic Laboratory Mixer fully satisfies the requirements of the Standards.

Main features

- Conforms to EN 12697-35
- Ideal for preparing laboratory samples for mix design
- Mixing capacity up to 30 litres
- Mixing speed adjustable from 5 to 35 rpm
- Mixing temperature adjustable up to 250° C
- Stainless steel (AISI 304) mixing container
- Temperature control with PT 100 probe
- Digital temperature display
- Easy unloading by motorized tilting system

The mixer consists essentially of a horizontal stainless steel mixing container with a helical mixing shaft. The container is thermally insulated and comes complete with a heating element and probe sensor which provide uniform temperature control. The container can be easily tilted by the electric motor for the unloading operation.

The control panel includes: a digital display to monitor mixing temperature, a digital thermo-regulator, a mixing speed controller and various commands

76-PV0077/B Detail of drum with helical mixing shaft

76-PV0077/B Detail of aggregate loading

76-PV0077/B Detail of unloading. The mixing cylinder is rotated by a motorized tilting system for easy unloading

76-PV0077/B Detail of control panel

Technical specifications

- Mixer capacity: 30 litres
- Mixing speed: adjustable from 5 to 35 rpm
- Mixing temperature: adjustable from ambient to 250° C
- Heater: 4500 W
- Temperature control: PT 100 sensor
- Power: 7000 W (total)
- Voltage: 380-400 V, 50 Hz, 3 ph or 220 V, 60 Hz, 3 ph
- Overall dimensions: 1350 x 650 x 1205 (w x d x h)
- Weight: approx. 320 kg

Ordering information

76-PV0077/B

PAVELAB BITUMIX automatic laboratory mixer, 30 litres capacity.
380-400 V, 50 Hz, 3 ph.

76-PV0077/BZ
As above but 220 V, 60 Hz, 3 ph.

76-PV0077/B

GYRATORY COMPACTORS series

GYROCOMP 76-PV2522, 76-PV2522/E
RESEARCH MODELS 76-PV0251, 76-PV0251/E

›› Standards specify the method for compaction of cylindrical specimens of bituminous mixtures using a gyratory compactor. Such compaction is achieved by combining a rotary shearing action with a vertical force applied by a mechanical head. The method can be used for:

- Preparation of specimens of a given height at a predetermined density, for subsequent testing of their mechanical properties;
- Derivation of a curve of density versus number of gyrations;
- Void content for a given number of gyrations.

Standards apply to bituminous mixtures (made either in laboratory or from on-site sampling), with aggregates not larger than 37.5 mm.

During operation the bituminous mixture is contained in a cylindrical mould (100 or 150 mm diameter). Compaction is achieved by the simultaneous application of a low-static compression and a shearing action, which results in the motion of the centre-line of the test piece, which generates a conical surface of revolution while the ends of the test piece remain approximately perpendicular to the axis of the conical surface.

The PAVELAB GYROCOMP Research gyratory compactors also feature continuous measurement of shear resistance during compaction which is particularly important in the research sector.

GYROCOMP GYRATORY Compactors

Standards EN 12697-10, EN 12697-31 | ASTM D6925 | AASHTO T312 | SHRP* M002

**Strategic Highway Research Program*

Discover more about GYROCOMP

The third generation of Gyratory compactors

Hundreds of unit successfully operating worldwide

76-PV2522, with extruder 76-PV2520/15

Operating principle

It is based on the motion of the bituminous sample which generates a conical surface of revolution, characterized by the gyratory angle. This motion produces shearing forces and, consequently, the sample compaction. See the drawing at the bottom of the page.

High stability frame

The very rigid but lightweight frame, is due to the exclusive body design, resulting in high stability values exceeding the EN 12697-31 Standards

Change of internal gyratory angle

The internal gyratory angle can be easily and quickly changed to any value, between 0.7 and 1.4°, following a factory calibrated conversion scale.

Periodical verification and re-calibration

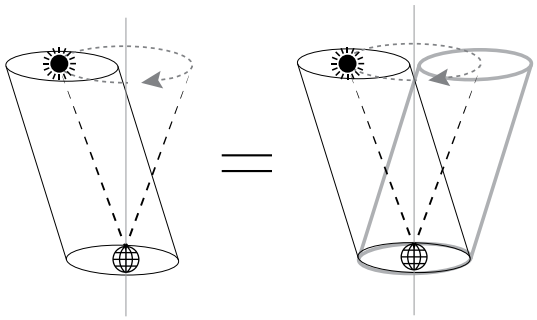
The Gyrocomp compactors can be easily verified and re-calibrated by the operator, using the ILS Internal angle measurement apparatus model 76-PV0255 (see page 24). This apparatus is verified with traceable (ACCREDIA) calibration instruments.

Main features

- Full conformity to ASTM, AASHTO and EN Standards
- Approved by the SUPERPAVE™ CENTER (USA)
- Easy and quick change of the internal gyratory angle by a factory calibrated conversion scale.
- All models supplied complete with traceable calibration certificate (ACCREDIA)
- Extremely rigid but lightweight structure, allows the precise calibration of the internal angle (it is a mandatory prescription of the relevant Standards)
- Double control mode using independent touch-screen display or PC
- User-friendly hardware and software
- Handy, easy to use, lightweight, ideal for site and mobile laboratories

Representation of the gyratory motion of the Gyratory compactor 76-PV2522

The operating principle of Controls' Gyratory compactor 76-PV2522 is based on an ingenious system consisting on the elementary resolution of the gyratory motion conforming, to use a well known example, to the Galileo theory for which is the earth that rotates around the sun ". . .eppur si muove". . . yet it moves. For more detailed information visit our web site.

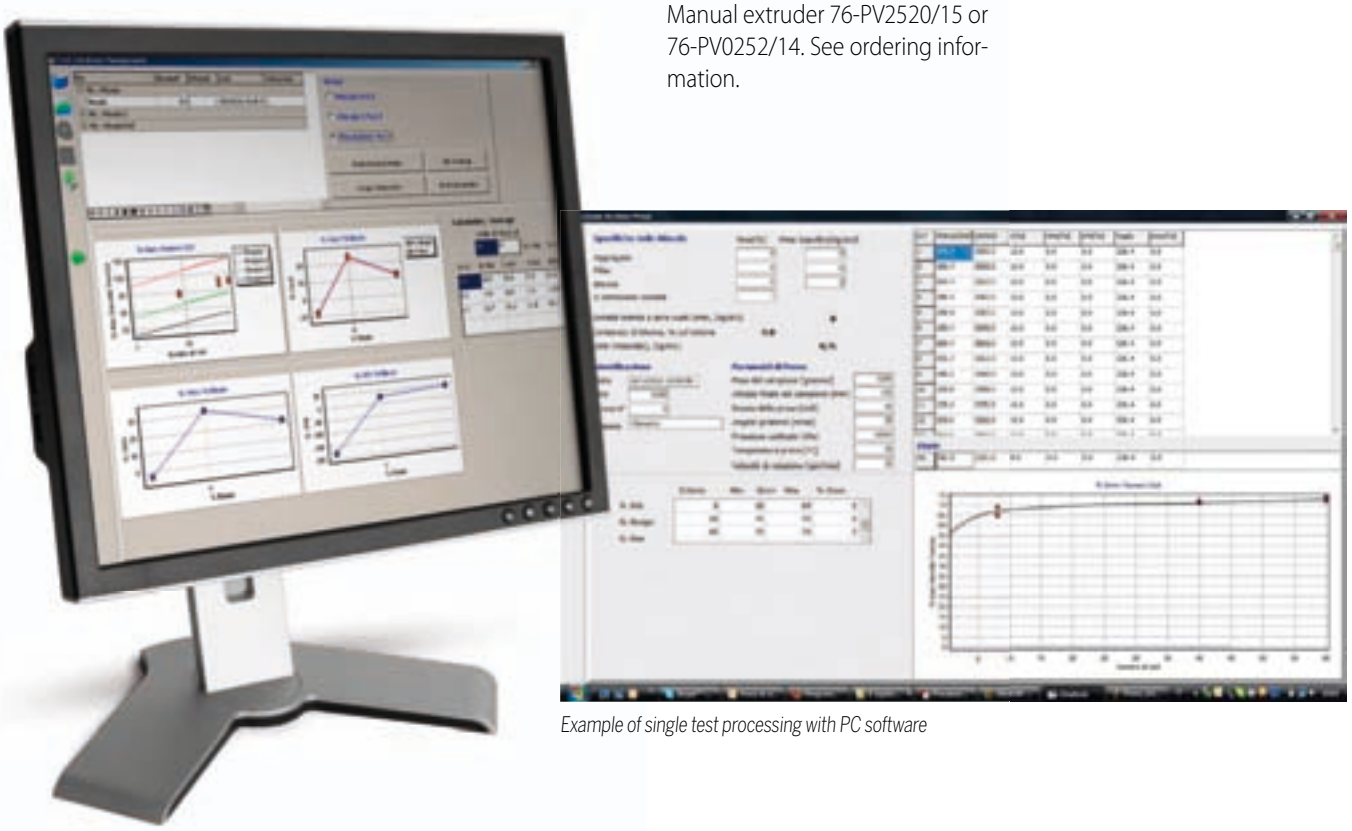


GYROCOMP GYRATORY Compactors

These machines have a robust yet light high-stiffness steel monocoque structure that incorporates a pneumatic cylinder for vertical load application and an electromechanical mechanism for the gyration system. The exclusive mould rotation system grants high accuracy and repeatability of test results, together with stiffness and angle stability values widely within the limits defined in EN 12697-31. The user-friendly integrated touchscreen control panel has a large display showing the test graph in real time, and on-board firmware in 12 languages. The test can be also remotely controlled by PC software. The software language can be user-defined making the interface suitable for any user's needs. The machine is supplied complete with a height calibration tool and PC software, and can be fitted with Electromechanical or Manual extruder 76-PV2520/15 or 76-PV0252/14. See ordering information.

All models are supplied complete with ACCREDIA traceable certificates of load, displacement and internal angle. EN models are also certified for all the other parameters required by EN 12697-31 Annex C ("stability factor", "parallelism factor" and "full rotation factor").

Cylinder moulds, distance plates and air compressor are not included. See accessories.



Example of single test processing with PC software

Technical specifications

- Compacted specimen sizes: 150 and 100 mm diameter
- Sample heights: 80 to 200 mm (150 mm diameter) and 50 to 125 mm (100 mm diameter)
- Consolidation pressure: 80 to 800 kPa (150 mm diameter) and 160 to 1400 kPa (100 mm diameter)
- Internal gyration angle: Adjustable from 0.70 to 1.40°
  - Preset to 1.16° (76-PV2522, ASTM/AASHTO models)
  - Preset to 0.82° (76-PV2522/E, EN models)
- Speed of gyration: adjustable from 15 to 60 rpm
- Number of gyrations: adjustable up to 999
- Test programmable either by number of gyrations or specimen height
- Communication with PC via RS232
- Internal memory: thousands of tests
- Power rating: 1000 W
- Dimensions (including extruder bench): 502 x 753 x 1940 mm (w x d x h)
- Dimensions: 469 x 615 x 1130 mm (w x d x h)
- Weight: approx. 100 kg

Ordering information

76-PV2522

PAVELAB GYROCOMP gyratory compactor, internal gyration angle preset to 1.16° conforming to AASHTO T312/ASTM D6925. 230-110 V, 50-60 Hz, 1 ph.

76-PV2522/E

PAVELAB GYROCOMP gyratory compactor, internal gyration angle preset to 0.82° conforming to EN 12697-31 Annex C. 230-110 V, 50-60 Hz, 1 ph.

Note

All models basically comply with EN 12697-10, EN 12697-31, ASTM D6925, AASHTO T312 and SHRP M-002. The only difference between the 76-PV2522 and the 76-PV2522/E versions is the angle of gyration, which is factory set for either ASTM/AASHTO or EN.
This means that it is possible to modify the angle of gyration and convert one version to the other.

Calibration of internal gyratory angle with the ILS apparatus 76-PV0255. See page 24

Integrated worktop with extruder

The worktop is the perfect size for the GYROCOMP compactor and provides an ergonomic workspace for the operator. The electromechanical 550 W motor with speed reducer produces a maximum load that is also suitable for cold mix specimens.

Integrated worktop with electromechanical extruder option 76-PV2520/15

76-PV2520/15

Integrated worktop with electromechanical specimen extruder. 230 V, 50-60 Hz, 1 ph.

76-PV2520/15Z
As above but 110 V, 60 Hz, 1 ph.

76-PV2520/14
Integrated worktop with manual specimen extruder
(as an alternative to the above version).

Accessories

For cylinder moulds, distance plates and air compressors, see page 23

76-PV2522 with PC (not included)

GYRATORY Compactors **RESEARCH MODELS**
with Shear Resistance Measurement

Standards EN 12697-10, EN 12697-31 | ASTM D6925 | AASTHO T312

76-PV0251 (ASTM-AASHTO), 76-PV0251/E (EN) series

›› With a robust bench-mounted steel structure, these machines incorporate a pneumatic cylinder for vertical load application and an electro-mechanical mechanism for the gyration system. It is PC controlled, results are displayed in real time and are processed using Windows® based software. The machine is supplied complete with a height calibration tool, air hose, operating instructions and calibration certificate. External specimen extrusion is provided by the 76-PV0251/15 Integrated worktop with electromechanical extruder. See ordering information.

All models are supplied complete with ACCREDIA traceable certificates of load, displacement and internal angle. EN Models are also certified for all the parameters required by EN 12697-31 Annex C ("stability factor", "parallelism factor" and "full rotation factor").

The internal gyratory angle can be easily verified and subsequently adjusted using the Internal angle measurement apparatus, ILS model 76-PV0255. Cylinder moulds, distance plates, worktop with extruder, PC, air compressor, and distance pieces are not included. See accessories.

Main features

- **High reliability and accuracy**
- **Certified to EN and ASTM/AASHTO**
- **Includes shear resistance measurement during compaction. Results displayed in real time**
- **Individual control of test parameters**
- **Windows® based software for data processing**

Technical specifications

- Sample dia.: 150 and 100 mm diameter
- Sample heights: 80 to 200 mm (150 mm diameter) and 50 to 125 mm (100 mm diameter)
- Consolidation pressure: 80 to 800 kPa (150 mm diameter) and 160 to 1400 kPa (100 mm diameter)
- Internal gyration angle: Adjustable from 0 to 3°.
- Preset to 1.16° (76-PV0251, 76-PV0251/Z ASTM/AASHTO models)
- Preset to 0.82° (76-PV0251/E, 75-PV0251/EZ EN models)
- Speed of gyration: adjustable from 15 to 60 rpm
- Number of gyrations: adjustable up to 512
- Test programmable either by number of gyrations or target specimen height
- Communication with PC RS232
- Power rating: 1000 W
- Dimensions: 600 x 650 x 1150 mm (w x d x h)
- Weight: approx. 190 kg

Ordering information

76-PV0251

PAVELAB GYROCOMP Research gyratory compactor featuring continuous shear measurement during compaction. Internal angle of gyration set to 1.16° conforming to AASHTO T312/ASTM D6925.
230 V, 50-60 Hz, 1 ph.

76-PV0251/Z
As above but 110 V, 60 Hz, 1 ph.

76-PV0251/E

PAVELAB GYROCOMP Research gyratory compactor featuring continuous shear measurement during compaction. Internal angle of gyration set to 0.82° conforming to EN 12697-31 Annex C.
230 V, 50-60 Hz, 1 ph.

76-PV0251/EZ
As above but 110 V, 60 Hz, 1 ph.

Note
All models basically comply with EN 12697-10, EN 12697-31, ASTM D6925, AASHTO T312 and SHRP M-002. The only difference between the 76-PV0251 76-PV0251/Z and the 76-PV0251/E 76-PV0251/EZ versions is the angle of gyration, which is factory set for either AASHTO or EN. This means that it is possible to modify the angle of gyration and covert one version to the other.

Integrated worktop with extruder

The worktop is the perfect size for the compactor and provides an ergonomic workspace for the operator. The electro-mechanical 550 W motor with speed reducer produces a maximum load that is also suitable for cold mix specimens.

76-PV0251/15

Integrated worktop with electromechanical specimen extruder. 230 V, 50-60 Hz, 1 ph.
76-PV251/15Z
As above but 110 V, 60 Hz, 1 ph.

76-PV0251/15

Accessories

for Gyratory Compactors

Cylinder moulds and distance plates

76-PV0250/2

Cylinder mould, 150 mm diameter, special alloy steel hardened to 53-55 HRC, internally grinded. Complete with top and bottom plates.

76-PV0250/5

Cylinder mould, 100 mm diameter, special alloy steel hardened to 53-55 HRC, internally grinded. Complete with top and bottom plates.

76-PV0250/10

Cylinder mould, 150 mm diameter, special alloy steel hardened to 53-55 HRC, internally grinded, with holes for cold mix compaction. Complete with top and bottom plates.

76-PV0250/3

Distance plate, 150 mm diameter, 50 mm high, for preparing short samples.

76-PV0250/6

Distance plate, 100 mm diameter, 38 mm high, for preparing short samples.

76-PV0250/4

Accessories for compacting 100 mm diameter specimens, including 100 mm height calibration device.

Air compressor
10bar maximum pressure, 130 litres/min air delivery, 10 litre capacity, power rating 750 W, quiet operation (less than 59 dB, ISO 3744, r=4 m).
- Overall dimensions: 370 x 410 x 650 mm (w x d x h)
- Weight: approx.27 kg

76-PV0250/7

Low noise air compressor. 230 V, 50 Hz.

76-PV0250/7Y
As above but 220 V, 60 Hz.

76-PV0250/7Z
As above but 110 V, 60 Hz.

76-PV0250/7

CONTROLS Cylinder moulds:

- Surface hardness: 53-55 HRC
- Internal roughness Ra: less than 1µm

Fully conforming to EN 12697-31 and exceeding ASTM D6925

76-PV0250/6, 76-PV0250/5, 76-PV0250/4, 76-PV0250/3, 76-PV0250/2,

76-PV0250/10, 150 mm diameter mould, with holes for cold mix compaction.

Internal angle measurement apparatus

Standards EN 12697-31 Annex C | ASTM D7115 | AASHTO T344

76-PV0255

›› The importance of a precise gyratory angle has been widely noted. Measurement of the internal angle represents, in practice, the most accurate method of calibration. This method involves the determination of two individual values:

• the angle between the cylinder and the top plate;

• the angle between the cylinder and the bottom plate.

The average of these two values is taken as the "internal angle". To date, measuring the internal angle of gyratory compactors has been considered a difficult task, leading to wide variations in results even between machines of the same brand.

The 76-PV0255 ILS device fully satisfies the verification requirements of measuring the internal angle in conformance with EN 12697-31 Annex C. It can be used on any make of gyratory compactor.

Our GYROCOMP gyratory compactor and GYROCOMP Research gyratory compactor are verified and calibrated with the 76-PV0255 ILS apparatus.

Main features

- Accurate calibration of internal angle of Gyratory compactors and verification of frame stability, to Standard requirements
- Quick and accurate measurement of the internal gyratory angle: less than 30 minutes
- No hot mix required: the device, placed into the mould, reproduces the internal shearing forces generated by the hot mix during compaction
- The variation of the gyratory angle (eg. from ASTM to EN) is quick and easily verified
- Ideal for periodic verification of the internal gyratory angle
- Compatible with any make of Gyratory compactors
- Battery operated

OPERATING PRINCIPLE

The ILS apparatus is a cylindrically shaped electro-mechanical device which fit perfectly into any 150 mm diameter gyratory mould. One short run (10 cycles) is performed to measure the internal compaction angle of the upper end plate inside the mould. The same is repeated for the bottom end plate. The overall gyratory angle is determined from these two values. While taking measurements, the ILS generates an accurate mechanical tilting moment simulating the presence of mixture during compaction.

By applying a high tilting moment level the angle response of the compaction machine allows to verify the compliance to stability frame requirement.

The 76-PV0255 ILS apparatus is supplied complete with Excel Macro© for data acquisition and processing.

In just 30 minutes it is possible to verify the Gyratory compactor with high accuracy and without the need for hot mix.

The apparatus consists of a structure incorporating a high precision digital gauge, housed in a steel cylinder.

- Battery operated
- Reproducibility is in 0.01° Class, meeting the requirements of all Standards
- Overall dimensions: 150 x 115 mm (diameter x height)
- Weight: approx. 5.6 kg

Ordering information

76-PV0255

ILS Internal angle measurement apparatus complete set


Certificate of Calibration

Calibration certificate obtained with the 76-PV0255 ILS apparatus, using the Macro Windows® based software.

76-PV0255 complete set

Electromechanical **slab compactors**

Standards EN 12697-33

77-PV40B05, 77-PV44A05 series

›› These apparatus can compact asphalt slabs to a target density at specific loads corresponding to those of pavements rollers used in highway construction.
We offer two series with different levels of sophistication and performance:

		mm slabs	320 x 260	300 x 300	400 x 300	500 x 300
Multi Size Advanced Version						
	77-PV40B05		✓	✓	✓	✓
Standard Versions						
	77-PV42A05		✓			
	77-PV43A05			✓		
	77-PV44A05				✓	
	77-PV45A05					✓

CVi TECH
CUSTOMER'S VALUE
DRIVES THE INNOVATION

Application

The slabs produced can be:

- Used for wheel tracking tests (see page 54)
- Cut into beams for bending fatigue tests (see page 47)
- Cored to provide specimens for indirect tensile, static and dynamic creep tests (see from page 42)

77-PV40B05

77-PV40B05

MULTI-SIZE ELECTROMECHANICAL SLAB COMPACTOR

The compactor features a compacting system with a 535 mm radius roller segment head. The roller segment moves freely by simple friction for improved compaction uniformity. A stepper motor moves the roller segment vertically under displacement and load control. The vertical load is applied orthogonally to the axis of the direction of travel. A crank handle system drives the mould carriage back and forth and minimizes acceleration when the direction of travel reverses and any consequent disturbance of the specimen. The longest (major) mould dimension corresponds to the compaction direction so it is possible to obtain specimens of the proper length conforming to Standards. The lifting machine cover allows the mould area to be easily accessed. In the "rest" position, the mould is closed to the operator while the roller segment is lifted and positioned at the back of the machine.

The machines features a customized electronic hardware integrated with a touchscreen PC.

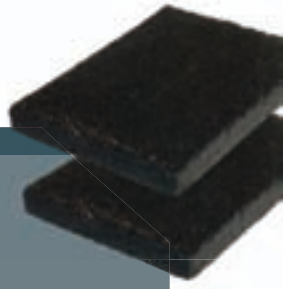
The machine features a solid high-stiffness steel frame, with ergonomic design and safety devices conforming to CE Standards.

Note *The sector head, as specified, has to be ordered separately together with the relevant mould (see page 30).*
The horizontal travel, conforming to the mould size, has to be adjusted by the dedicated machine device.

Vertical sliding cover for easy access and complete three side view

Machine control via touchscreen PC

Moulds easy to install and remove



PRO-COMPACT closed-loop.

All our slab compactors include an innovative mechanical and electronic control that combines orthogonality of the load, pendulum motion of the head and sinusoidal non-friction forward carriage movement. This results in an optimally compacted sample that features **Planarity Regularity and hOmogeneity** (**PRO**).

Main features

- Machine control via touchscreen PC
- Heated head and roller vibration options
- Completely electro-mechanically operated
- Conforms to EN 12697-33, method 5.2
- Possibility to enter and store user-defined automatic compaction profiles for load, displacement or combined load/displacement control
- Allows the compaction procredure conforming to EN 12697-33 Annex A
- PRO-COMPACT closed-loop system
- Can be fitted with interchangeable segment heads for compaction of slabs 500 x 300, 400 x 300, 300 x 300 or 320 x 260 mm with a thickness from 38 to 120 mm
- Easy and simple mechanical substitution of the sector head for the other slab dimensions
- Compaction direction in the longest (major) mould dimension to obtain specimens of the proper length conforming to Standard
- Vertical sliding cover for easy access and complete three side view
- 30 kN compaction load by vertical direct transmission
- Load measurement by two load cells
- Automatically compacts to target density/height
- Trolley speed adjustable up to 10 cycles/min
- Ideal for producing test beams for 4-Point Bending (EN 12697-24, EN 12697-26, AASHTO T321)
- Moulds easy to install and to remove
- Safety systems conforming to CE Standards

Note *The machine has to be fitted with the selected sector head and relevant mould (see accessories).*

Models 77-PV40B05, 77-PV40B06	
Machine control	By touchscreen PC
Operation	Electro-mechanical
Maximum vertical force	30 kN
Load measurement	by two load cells
Compacting device	Roller segment radius 535 mm (not includes. See accessories)
Forward and backward horizontal travel	Adjustable: 300/320 mm 400 mm 500 mm
Trolley speed	Adjustable up to 10 cycles/min
Mould dimensions	320 x 260 mm 300 x 300 mm 400 x 300 mm 500 x 300 mm
Compacted slab thickness	38 to 120 mm
Heated head	Yes, optional
Roller vibration	Yes, optional
Power rating	3000 W
Electrical supply	380 V, 50 Hz, 3 ph or 220 V, 60 Hz, 3 ph
Overall dimensions (lxwxh)	1300 x 800 x 2000 mm
Weight	approx. 650 kg

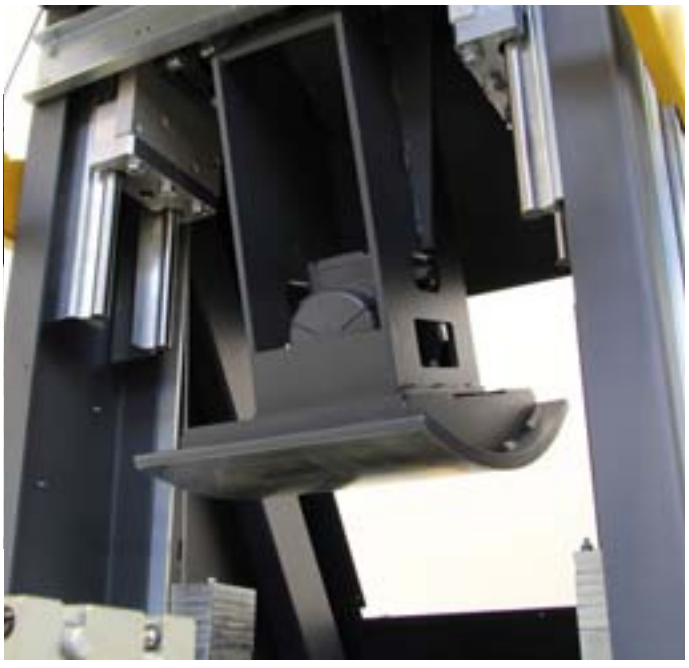
Main features of the control interface

- All in one PC with touchscreen monitor
- Setup of compaction and speed/displacement control
- Selection, customization and storage of test parameters
- Customization of compacting cycle which can be saved and recalled from the data base
- Graphic display of vertical displacement vs. load vs. number of passes
- Fully programmable PC software operating in Windows®
- Setup of the compaction mode: load, displacement or combined load/displacement
- Data processing and storage conforming to Standards

Mould dimensions:

500 x 300, 400 x 300, 300 x 300 and 320 x 260 mm.

The longer (major) mould dimension corresponds to the compaction direction, for obtaining specimens of the proper length that conform to the Standards.



Detail of segment head incorporating vibration unit

Machine control

- Vertical displacement of the roller segment is measured directly by a linear transducer to verify the specimen thickness in real-time, and controlled by a stepper motor, thereby eliminating errors arising from the deformation of the machine structure.
- Real-time measurement and control of compaction load is achieved with closed-loop logic and two high-precision load cells. This dual load cell system permits the identification of possible discrepancies in the compaction due to inconsistent distribution of asphalt in the mould or any other unexpected malfunctions, and warns the operator.
- The machine is fitted with sensors to confirm that the mould is in position and to provide an automatic display of the set horizontal travel.

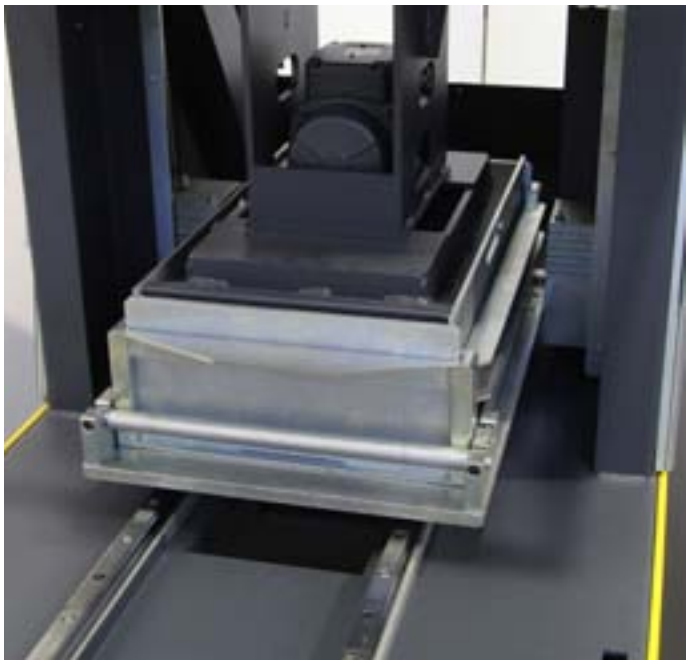
Ordering information

77-PV40B05

PAVELAB, Advanced multi-size electro-mechanical slab compactor. To be fitted with the selected sector head and relevant mould not included (see accessories). Controlled by touchscreen PC. 380 V, 50 Hz, 3 ph.

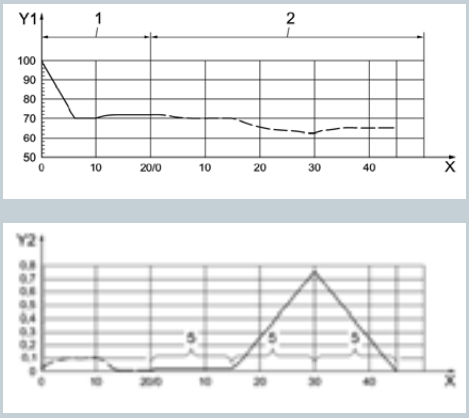
77-PV40B06

PAVELAB, Advanced multi-size electro-mechanical slab compactor. As above but 220 V, 60 Hz, 3 ph.



Detail of segment head and mould

Both versions allow the performance of the energy-controlled compaction procedure required by EN 12697-33 Annex A, composed by a fixed combination of displacement controlled cycles and load controlled cycles.



Typical screenshot: testing diagrams

Accessories

Interchangeable sector heads, radius 535 mm

77-PV42001

Interchangeable sector head to produce slabs 320 mm long x 260 mm wide. Weight 14 Kg

77-PV43001

Interchangeable sector head to produce slabs 300 mm long x 300 mm wide. Weight 15 Kg

77-PV44001

Interchangeable sector head to produce slabs 400 mm long x 300 mm wide. Weight 19 Kg

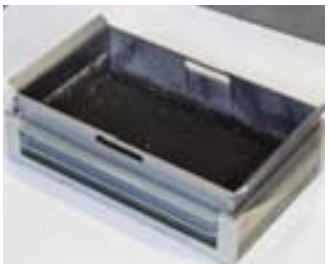
77-PV45001

Interchangeable sector head to produce slabs 500 mm long x 300 mm wide. Weight 25 Kg

Moulds

77-PV42002

Steel mould 320 x 260 mm. Weight 19 Kg



77-PV43002

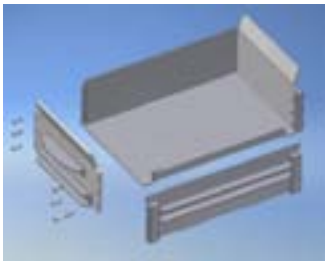
Steel mould 300 x 300 mm. Weight 20 Kg

77-PV44002

Steel mould 400 x 300 mm. Weight 23 Kg

77-PV45002

Steel mould 500 x 300 mm. Weight 26 Kg



Moulds. Schematic assembly layout. Two sides only are removable, to guarantee the correct geometry.

Detail of interchangeable sector head
The sector head can be easily removed and replaced to produce slabs of the alternative dimensions. See accessories.

Upgrading options

(must be factory installed)

Heated head option.
Temperature control system.
To be factory installed

Heated head option

77-PV43012

Sector head temperature control system.

Interchangeable sector heads, radius 535 mm, complete with heating system.
To be completed with the 77-PV43012, Temperature control system (see Heated head option).

77-PV42011

Interchangeable sector head to produce slabs 320mm long x 260 mm wide. Complete with heating system. Weight 14.5 kg

77-PV43011

Interchangeable sector head to produce slabs 300mm long x 300 mm wide. Complete with heating system. Weight 15.5 kg

77-PV44011

Interchangeable sector head to produce slabs 400mm long x 300 mm wide. Complete with heating system. Weight 19.5 kg

77-PV45011

Interchangeable sector head to produce slabs 500mm long x 300 mm wide. Complete with heating system. Weight 25.5 kg

Vibrating roller option

77-PV43022

Vibrating roller for 380 V, 50 Hz, 3 ph models.

77-PV43024

Vibrating roller for 220 V, 60 Hz, 3 ph models.

Standard electromechanical slab compactor

Standards EN 12697-33, method 5.2

77-PV42A05 to 77-PV45A06

The apparatus can compact asphalt slabs to a target density using loads per unit roll width, which are consistent with those of pavement rollers used in highway construction.

The slabs produced can be:

- Used for wheel tracking tests
- Cored to provide specimens for indirect tensile, static and dynamic creep tests
- Cut into beams for bending fatigue tests

Four models are proposed: one for each slab size: 320x260 mm, 300x300 mm, 400x300 mm and 500x300 mm .

All models can be fitted with heated sector head and relevant temperature control system, and vibrating roller option . See upgrading options. This option has to be specified on time of order.

Firmware

- 8" touchscreen display
- Setup of compaction and load or displacement control
- Selection, customization and storage of test parameters
- Customization of the compacting cycle to be saved and recalled from the data base
- Graphic display of vertical load vs displacement vs. number of passes
- Possibility to download data onto USB

Ordering information

77-PV42A05

PAVELAB, electromechanical slab compactor. Fitted with segment head to produce 320x260 mm slabs. Supplied complete with 320x260 mm mould. 380 V, 50 Hz, 3 ph

77-PV42A06

PAVELAB, electromechanical slab compactor. As above but 220 V, 60 Hz, 3 ph

77-PV43A05

PAVELAB, electromechanical slab compactor. Fitted with segment head to produce 300x300 mm slabs. Supplied complete with 300x300 mm mould. 380 V, 50 Hz, 3 ph

77-PV43A06

PAVELAB, electromechanical slab compactor. As above but 220 V, 60 Hz, 3 ph

77-PV44A05

PAVELAB, electromechanical slab compactor. Fitted with segment head to produce 400x300 mm slabs. Supplied complete with 400x300 mm mould. 380 V, 50 Hz, 3 ph

77-PV44A06

PAVELAB, electromechanical slab compactor. As above but 220 V, 60 Hz, 3 ph

77-PV45A05

PAVELAB, electromechanical slab compactor. Fitted with segment head to produce 500x300 mm slabs. Supplied complete with 500x300 mm mould. 380 V, 50 Hz, 3 ph

77-PV45A06

PAVELAB, electromechanical slab compactor. As above but 220 V, 60 Hz, 3 ph

Main features

- Heated head and roller vibration options
- Completely electro-mechanically operated
- Conforms to EN 12697-33, method 5.2
- PRO-COMPACT closed-loop system
- Compaction profiles for load or displacement control
- Includes the compaction procedure
- Compaction direction in the longest (major) mould dimension to obtain specimens of the proper length conforming to Standard
- Vertical sliding cover for easy access and complete three side view
- 30 kN compaction load by vertical direct transmission
- Automatically compacts to target density/ height
- Trolley speed adjustable up to 10 cycles/min
- Ideal for producing test beams for 4-Point Bending (EN 12697-24, EN 12697-26, AASHTO T321)
- Moulds easy to install and to remove
- Safety systems conforming to CE Standards

Models 77-PV42A05 to 77-PV45A06	
Machine control	By touchscreen display
Operation	Electro-mechanical
Maximum vertical force	30 kN
Compacting device	Roller segment radius 535 mm
Trolley speed	Adjustable up to 10 cycles/min
Compacted slab thickness	38 to 120 mm
Heated head	Yes, optional
Roller vibration	Yes, optional
Power rating	3000 W
Electrical supply	380 V, 50 Hz, 3 ph or 220 V, 60 Hz, 3 ph
Overall dimensions (lxwxh)	1300 x 800 x 2000 mm
Weight:	approx. 650 kg

Upgrading options

To be factory installed

Heated head option. Temperature control system.

77-PV42012
Sector head temperature control system including heating element

PAVELAB® SYSTEMS

Dynamic
Testing System

→ Dynamic testing systems for road paving materials

→ Test modules and accessories for dynamic testing

DYNAPAVE

Dynamic testing systems for road paving materials

›› The importance of performance based dynamic tests on bituminous mixtures

Fundamental Tests

Road traffic is continuously developing and paving may be severely tested by the increasingly intense dynamic stress to which it is subject. Consequently, empirical tests on the product may no longer be sufficient to support a leap in quality. The specificity of the approach is provided by the introduction of tests which measure the physical magnitudes directly linked with the performance characteristics.

The most important ones are:

EN 12697-24, Resistance to fatigue **EN 12697-25, Cyclic compression tests** **EN 12697-26, Stiffness**	**ASTM D4123, Resilient modulus** **ASTM D7369, Resilient modulus**

AASHTO T307, Resilient modulus of soils and aggregates
AASHTO T321, Resistance to fatigue
AASHTO T322, Creep/Strength
AASHTO T342, Dynamic modulus
AASHTO TP79, Dynamic modulus and flow number
NCHRP 9-19/9-29, Dynamic modulus, Flow time and flow number

The Dynamic test systems that we propose, fitted with the relevant accessories, can perform all above tests. In detail we summarize, in the following table, all test determinations by the short form identification mark (ITM, ITF etc.), the relevant Standard and clause, the dynamic systems that can perform the test and accessories.

Testing module	Standards	With dynamic system:	and the follwing accessories	See page
ITM Indirect Tensile Modulus	**EN 12697-26 Annex C** Indirect tensile test on cylindrical specimens **ASTM D4123** Indirect tensile test for resilient modulus of bituminous mixtures **AASHTO TP31** Resilient modulus of bituminous mixtures by indirect tension	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194 78-PV7015 with Cabinet 78-PV7192	78-PV7111 Test jig 78-PV7115 LVDT transd.. 78-PV7131 Proving ring 78-PV7132 10 cm PVC Spec. 78-PV7133 15 cm PVC Spec. 78_PV7134 Torque scewdr.	42
ITF Indirect tensile fatigue	**EN 12697-24 Annex E** Indirect tensile test on cylindrical specimens	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194 78-PV7015 with Cabinet 78-PV7192	78-PV7111 Test jig 78-PV7120 LVDT transd. 78-PV7122 LVDT mount. str. 78-PV7123 LVDT mount. str.	43
UCC Uniaxial	**EN 12697-25 Method A** Uniaxial cyclic compression test	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194 78-PV7015 with Cabinet 78-PV7192	78-PV7118 Def. jig 78-PV7114 LVDT transd.	44
UCC Uniaxial Creep	**NCHRP 9-19/9-29** "Flow time" and "Flow number" **BS DD 226** **AS 2891.12.1** Uniaxial creep test	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194 78-PV7015 with Cabinet 78-PV7192	78-PV7112 Jig 100 mm 78-PV7113 Jig 150 mm 78-PV7114 LVDT transd.	45
RM Resilient modulus and Triaxial test	**EN 12697-25 Method B** Triaxial cyclic compression test **AASHTO T307 (ex TP46)** Resilient modulus of soils and aggregate materials	78-PV7030 78-PV7130	78-PV7160 Std. triax. cell Or 78-PV7180 Adv. Triax. Cell 78-PV7152 Pneum. Res. 78-PV7152/1 Conf. res. 78-PV7153 Press. Transd. 78-PV7114 LVDT transd. 78-PV7154 Transd. Kit + cell accessories	46
4PB 4-Point Bending	**EN 12697-24 Annex D** Resistance to fatigue: Four-point bending test on prismatic specimens **EN 12697-26 Annex B** Stiffness: Four points bending test on prismatic specimens **AASHTO T321** Fatigue life of compacted hot-mix asphalt (HMA) subjected to repeated flexural bending	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194 78-PV7015 with Cabinet 78-PV7192	78-PV7181 Fatigue jig or 78-PV7181/A same as above less load cell 78-PV7171 Dummy b. 78-PV7182 Al. ref . b.	47
2PB 2-Point Bending	**EN 12697-24 Annex A** Resistance to fatigue: Two-point bending test on tyrapezoidal specimens **EN 12697-26 Annex A** Stiffness: Two-point bending test on trapezoidal specimens	78-PV7030 with Cabinet 78-PV7193	78-PV7140 2-point acc. 78-PV7141 Base plate 78-PV7141 Alu. beam	47
AMPT Dynamic modulus	**AASHTO TP79** **NCHRP 9-19/9-29 "Dynamic Modulus"** Determination of the Dynamic modulus and Flow Number for hot mix asphalt using the Asphalt Mixture Performance Tester (AMPT, ex SPT)	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194	Uniaxial test acc. 78-PV7112 Jig 100 mm 78-PV7175 Mount jig 78-PV7176 Pr. Ring 78-PV7177 Gauge p. 78-PV7178 LVDT transd. 78-PV7179 Mount. Studs Triaxial test acc. 78-PV7180 Triax. Cell 78-PV7152 Pneum. Res. 78-PV7152/1 Conf. res. 78-PV7153 Press. transd. 78-PV7177 Gauge p. 78-PV7178 LVDT transd. 78-PV7179 Mount. Studs	48
DYN Dynamic modulus	**AASHTO T342 (ex TP62)** Dynamic modulus of hot mix asphalt (HMA)	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194	78-PV7145 Test set	49
CR-S Creep/Strength	**AASHTO T322 (ex TP9)** Creep compliance and strength of hot mix asphalt (HMA) using indirect tensile test device **ASTM D7369** Resilient modulus for bituminous mixtures by indirect tensile test	78-PV7030 with Cabinet 78-PV7193 78-PV7130 with Cabinet 78-PV7194	78-PV7111 Test jig 78-PV7165 LVDT transd. and acc.	50
TSRST	**EN 12697-46** Low temperature cracking and properties by uniaxial tension tests **AASHTO TP10** Thermal stress restrained specimen tensile strength	78-PV7030 with Cabinet 78-PV7193/HP 78-PV7130 with Cabinet 78-PV7194/HP	78-PV7185 TSRST kit	51

DYNAPAVE

Dynamic testing systems for road paving materials

» The development of the testing techniques based on the Asphalt Pavement Performances, started in 1987 by the Strategic Highway Research Program (SHRP) in USA, after 5 years of research SHRP released the SUPERPAVE™ (SUperior PERforming asphalt PAVEments) introducing new testing systems and specifications for road materials..

130 kN capacity

78-PV7130*, 130 kN cap. complete with temperature controlled cabinet

30 kN capacity

78-PV7030*, 30 kN cap. complete with temperature controlled cabinet

*Hydraulic power pack also included but not illustrated

78-PV7130, 130 kN cap., frequencies up to 70 Hz
78-PV7030, 30 kN cap., frequencies up to 70 Hz

Main features **Servo-Hydraulic Systems**

- High performance double acting hydraulic actuator for testing frequencies up to 70 Hz
- Fatigue-rated servo-hydraulic actuator with internal displacement transducer
- Fast and easy motorized crosshead positioning with automatic hydraulic clamping
- Large testing chamber
- Fully stand alone system, hydraulic pump and pressure regulator included
- Complete range of accessories and test software conforming to EN, AASHTO and ASTM
- Software drives the operator through the test execution
- Software language fully customizable

Servo-Hydraulic models excel at HIGHER FORCES and HIGHER FREQUENCIES

15 kN capacity

78-PV7015, 15 kN cap., complete with temperature controlled cabinet

78-PV7015, 15 kN cap. frequencies up to 30 Hz

Main features **Servo-Pneumatic System**

- High stiffness testing frame
- Fatigue rated servo-pneumatic actuator with internal displacement transducer
- Fast and easy crosshead positioning
- Large testing chamber
- Complete range of accessories and softwares conforming to EN, ASTM and AASHTO Standards
- Easy to use software driving the operator through the test
- Software language fully customizable

This **Servo-Pneumatic model** outstands for the performance/price ratiocies

DYNAPAVE

78-PV7030
with temperature controlled cabinet and accessories

78-PV7030, 78-PV7130

SERVO-HYDRAULIC TESTING SYSTEMS, 30 and 130 kN cap.

›› The system performs load or displacement controlled test with programmable wave shape over a large range of frequencies up to 70 Hz simulating the traffic effect.

The user-friendly interface allows the operator to monitor the test performance and to evaluate results. The system has to be completed by the accessories conforming to the test to be performed. See accessories. The temperature controlled cabines are also offered separately. See accessories.

Frame, hydraulic actuator and hydraulic power pack

Models	78-PV7030 78-PV7030/Z	78-PV7130 78-PV7130/Z
High stiffness frame		
-Cap.	30 kN	130 kN
-Vertical daylight	800 mm	1000 mm
-Distance between columns	450 mm	600 mm
-Motorized adjustable crosshead and hydraulic clamping	Yes	Yes
-Load cell capacity	±30 kN	±130 kN
Double action actuator		
-Dynamic capacity	25 kN	100 kN
-Static capacity	30 kN	130 kN
-Inbuilt displacement transd.	50 mm	100 mm
-Max frequency	70 Hz	70 Hz
-Hydraulic accumulator	1,5 l cap.	1,5 l cap.
-High pressure filter 45 µm with clogging sensor	Yes	Yes
Hydraulic power pack		
-Max working pressure	210 bar	210 bar
-Max flow rate	5 litres/min	18 litres/min
-Mains power	2.2 kW	7.5 kW
-Cooling system by:	Air cooling	Water oil heat exchanger 10 litres/min
-Oil tank capacity	45 litres	220 litres
Dimension and weights		
-Frame (wxdxh) mm	660x560x1800	1000x1000x3000
-Hydraulic power pack (wxdxh)	600x500x800	1200x650x1200
-Control unit (wxdxh)	420x270x150	420x270x150
-Total weight (frame+power pack+ controller) approx. kg	(180+90+12) 282	(600+160+12) 772

Control system-CDC Compact Dynamic Controller

- Inputs: No. 16 analog input channels, 8 digital inputs
- Outputs: No. 2 16 bit analog output, 8 digital outputs.

Control and feedback

- 10 kHz control loop with 2.5 kHz data acquisition rate for all channels
- Two servo-controlled axes (vertical actuator and confining pressure)
- Vertical actuator can be controlled by different feedback signals (load cell, internal displacement transducer, external displacement transducer)
- Confining pressure controlled by pressure transducer
- Analog inputs can be calibrated with multi-point linearization
- User defined calibration ranges via software
- 100 Mb/s Ethernet

PC software

- All-in-one monitoring and control software
- User-friendly calibration management
- Wide range of modules for asphalt, unbound materials and user-defined tests
- Sine, Haversine, Square and user-defined programmable waveshapes
- Real-time channel readouts
- Programmable test procedures
- Programmable "end of test" function

Ordering information

78-PV7030

Servo-hydraulic dynamic testing system, 30 kN static capacity, 25 kN dynamic capacity. Includes testing frame, load cell, hydraulic power pack and control unit. 230 V, 50-60 Hz, 1 ph.

78-PV7030/Z

As above but 110 V, 60 Hz, 1 ph.

78-PV7130

Servo-hydraulic dynamic testing system 130 kN static capacity, 100 kN dynamic capacity.Include stesting frame, load cell, hydraulic power pack and control unit. 380 V, 50 Hz, 3 ph.

78-PV7130/Z

As above but 220 V, 60 Hz, 3 ph.

78-PV7130 with temperature controlled cabinet and accessories

Accessories

Testing modules.
(see page 35)

***Note**: the various testing modules include the relevant testing software.*

Temperature controlled cabinet, heat and cool control

These units are required to perform, practically all type of tests. In particular, the 78-PV7193/HP and 78-PV7194/HP, featuring a temperature range from -50 to +100°C, can also perform the TSRST test (see page 45).

Specifications

Stainless steel AISI 304, 18/10 construction, triple-glazed door, forced ventilation, closed-loop temperature controller, cooling unit complete with defrost system, internal lighting.

78-PV7193

Temperature controlled cabinet, -25 to +60°C for the 78-B7030 Servo-Hydraulic testing system. 230V, 50-60Hz, 1ph.
78-PV7193/Z
As above but 110 V, 60 Hz, 1 ph.

78-PV7193/HP

Temperature controlled cabinet, -50 to +100°C for the 78-B7030 Servo-Hydraulic testing system. 230V, 50-60Hz, 1ph.
78-PV7193/HPZ
As above but 110 V, 60 Hz, 1 ph.

78-PV7194

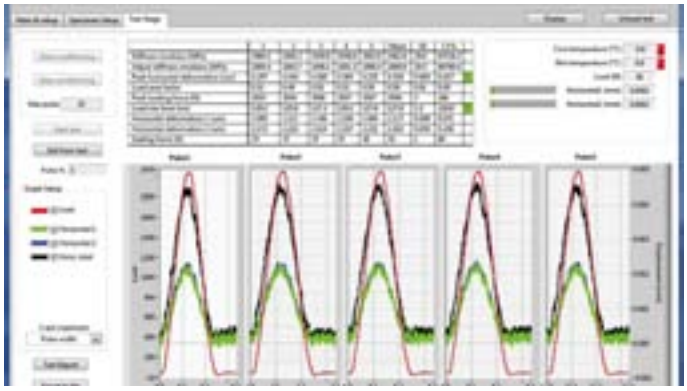
Temperature controlled cabinet, -25 to +60°C for the 78-B7130 Servo-Hydraulic testing system. 230V, 50-60Hz, 1ph.
78-PV7194/Z
As above but 110 V, 60 Hz, 1 ph.

78-PV7194/HP

Temperature controlled cabinet, -50 to +100°C for the 78-B7130 Servo-Hydraulic testing system. 230V, 50-60Hz, 1ph.
78-PV7194/HPZ
As above but 110 V, 60 Hz, 1 ph.

78-PV7116

Temperature measuring kit comprising two 8+100 probes



Screenshot of indirect tensile modulus software

Models	78-PV7193 78-PV7193/Z	78-PV7193/HP 78-PV7193/HPZ	78-PV7194 78-PV7194/Z	78-PV7194/HP 78-PV7194/HPZ
For Servo-Hydraulic System model:	78-PV7030 78-PV7030/Z	78-PV7030 78-PV7030/Z	78-PV7130 78-PV7130/Z	78-PV7130 78-PV7130/Z
Temperature range	-25 to + 60°C	-50 to +100°C	-25 to + 60°C	-50 to +100°C
Power rating	2300 W	4000 W	2300 W	4200 W
Dimensions (wxdxh), mm	790x900x1560	920x810x1790	580x1000x1000	580x1180x1020
Weight approx.:	180 kg	220 kg	150 kg	210 kg

DYNAPAVE

78-PV7015

SERVO-PNEUMATIC TESTING SYSTEM, 15 kN cap.

›› The system performs load or displacement controlled tests with programmable wave shapes over a large range of frequencies, simulating the effects of traffic. The user-friendly interface allows the operator to monitor the test performance and to evaluate results. The system must be completed with the correct accessories according to which tests will be performed. (See accessories).

The temperature controlled cabinet is offered separately. (See accessories).

Tests conforming to any of the standards mentioned can be performed using the suitable test software modules. See accessories.

78-PV7015 with 78-PV7192 temperature controlled cabinet and accessories

Main features

- **Servo-pneumatic dynamic system offers outstanding value in terms of performance/price ratio**
- **Easy to use software leads the operator through the test**
- **Software language fully customizable**
- **High-stiffness testing frame**
- **Fatigue rated servo-pneumatic actuator with internal displacement transducer**
- **Fast and easy crosshead positioning**
- **Large testing chamber**
- **Complete range of accessories and software conforming to EN, ASTM and AASHTO Standards**

Technical specifications

Frame

- High-stiffness frame, 15 kN capacity, 650 mm vertical clearance, 339 mm distance between columns
- Double effect servo-pneumatic actuator, 30 mm stroke
- Actuator with 30 mm built-in displacement transducer
- Complete with pneumatic reservoir, 5 litre capacity, with pressure gauge, filter, connections and hoses
- Load cell ±25 kN capacity
- Maximum frequency 30 Hz

Control system-Compact Dynamic Controller (CDC)

- Inputs: 16 analogue input channels, 8 digital inputs
- Outputs: 2 analogue outputs, 8 digital outputs, dedicated solenoid valve channel for air supply

Control and feedback

- 10 kHz control loop with 2.5 kHz data acquisition rate for all channels
- Two servo-controlled axes (vertical actuator and confining pressure)
- Vertical actuator can be controlled by different feedback signals (load cell, internal displacement transducer, external displacement transducer)
- Confining pressure controlled by pressure transducer
- Analogue inputs can be calibrated with multi-point linearization
- User-defined calibration ranges via software
- 100 mb/s Ethernet

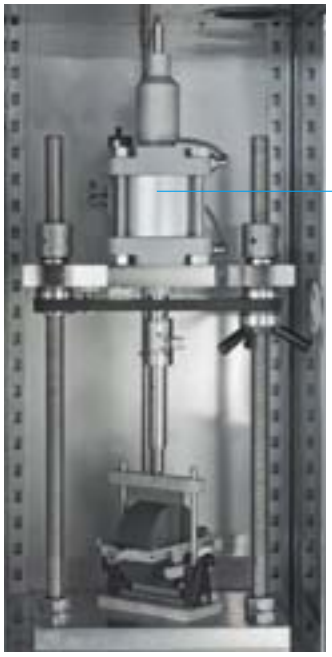
PC software

- All-in-one monitoring and control software
- User-friendly calibration management
- Wide range of modules for asphalt, unbound materials and user-defined tests
- Sine, Haversine, Square and user-defined programmable waveshapes
- Real-time channel readouts
- Programmable test procedures
- Programmable "end of test" function

Dimensions and weight

- Frame: 480x300x1200 mm (w x d x h)
- Weight.: approx.200 kg
- Control unit: 420x270x150 mm (w x d x h)
  Weight: approx.12kg

Note *PC and printer are not included. The system requires a suitable air compressor. We also recommend the use of a suitable air drying unit. See accessories, models 86-D2015/A and 86-D2019.*



Servo-Pneumatic actuator

Ordering information

78-PV7015

Servo-pneumatic dynamic testing system, 15 kN capacity. Includes testing frame, control unit, air reservoir and load cell. 110-230 V, 50-60 Hz, 1 ph.

Temperature controlled cabinet

78-PV7192

Temperature controlled cabinet, -25 to +60° C. 230 V, 50-60 Hz, 1 ph.

78-PV7192/Z

As above but 110 V, 60 Hz, 1 ph.

Specifications

- Temperature range: -25°C to +60° C, resolution 0.1°C
- Stainless steel AISI 304, 18/10 internal and external frame
- Triple-glazed door
- Forced ventilation
- Closed-loop PID temperature controller
- Cooling unit complete with defrost system
- Internal lighting
- Power: 1800 W
- External dimensions: 700x700x2030 mm (w x d x h)
- Weight: approx.140 k

78-B7116

Temperature measuring kit comprising two PT100 probes.

Air compressor

86-D2015/A

Air compressor, 8 bar continuous working pressure, 10 bar maximum pressure, 5.5 kW, 200 litrecapacity air tank. 400 V, 50 Hz, 3 ph.

86-D2019

Air treatment unit for the dehumidification of air,comprising: air dryer, 5 m particle filter, 1M oil filters and 0.01M coalescence filter. 230 V, 50-60 Hz, 1 ph.

86-D2019/Z

As above but 110 V, 60 Hz, 1 ph

Screenshot of indirect tensile fatigue software

Accessories

Testing modules.

(see page 35)

Note: the various testing modules include the relevant testing software.

DYNAPAVE

Test modules for dynamic testing systems

On page 35 are specified the suitable dynamic Testing Systems to perform the following tests.
Testing software is included.

Testing module

ITM Indirect Tensile Modulus

Standards

All the following Standards require the same test module and accessories.

EN 12697-26 Annex C

Indirect tensile test on cylindrical specimens

ASTM D4123

Indirect tensile test for resilient modulus of bituminous mixtures

AASHTO TP31

Resilient modulus of bituminous mixtures by indirect tension

Set of accessories for ITM test

Typical screenshot of a ITM test

Test accessories

78-PV7111

Indirect tensile test jig for 100 and 150 mm diameter samples
To be completed with the following accessories:

78-PV7115

Set of two 0.1mm LVDT transducers

78-PV7131

Asphalt proving ring for routine checking of load cell and deformation transducers

78-PV7132

100 mm diameter PVC specimen

78-PV7133

150 mm diameter PVC specimen

78-PV7134

Torque screwdriver

Testing module

ITF Indirect Tensile Fatigue

Standards

EN 12697-24 Annex E

Indirect tensile test
on cylindrical specimens

Set of accessories for ITF test

Typical screenshot of a ITF test

Test accessories

78-PV7111

Indirect tensile test jig for 100 and 150 mm diameter samples

To be completed with the following accessories:

78-PV7120

Set of two 3.75 mm LVDT transducers

78-PV7122

LVDT mounting strip for 100 mm diameter specimens

78-PV7123

LVDT mounting strip for 150 mm diameter specimens

DYNAPAVE

Test modules for dynamic testing systems

Testing software is included.

Testing module

UCC Uniaxial

Standards

EN 12697-25 Method A

Uniaxial cyclic compression test

Test accessories

78-PV7118

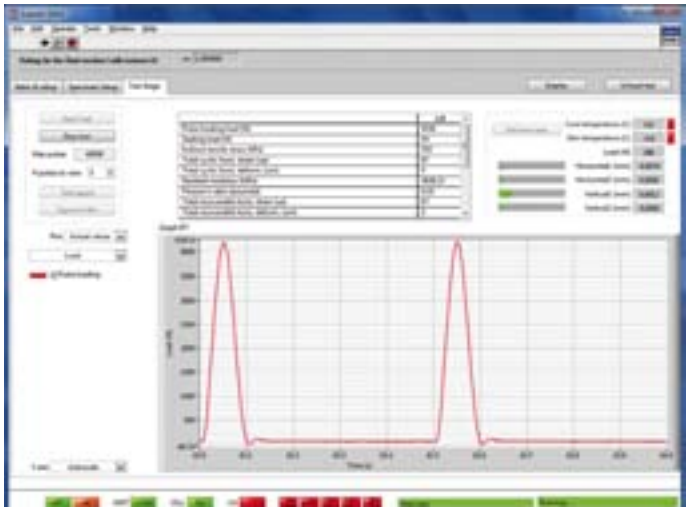
Uniaxial permanent deformation jig (indentation test) for 150 mm diameter samples

To be completed with the following accessory:

78-PV7114

Set of two 10 mm LVDT transducers

Set of accessories for UCC test to EN12697-25A test



Typical screenshots of a UCC test to EN 12697-25A

Testing module

UCC Uniaxial Creep

Standards

All the following Standards require the same test module and accessories.

NCHRP 9-19/9-29
"Flow time" and "Flow number"

BS DD 226
AS 2891.12.1

Uniaxial creep test

Set of accessories for UCC Creep test

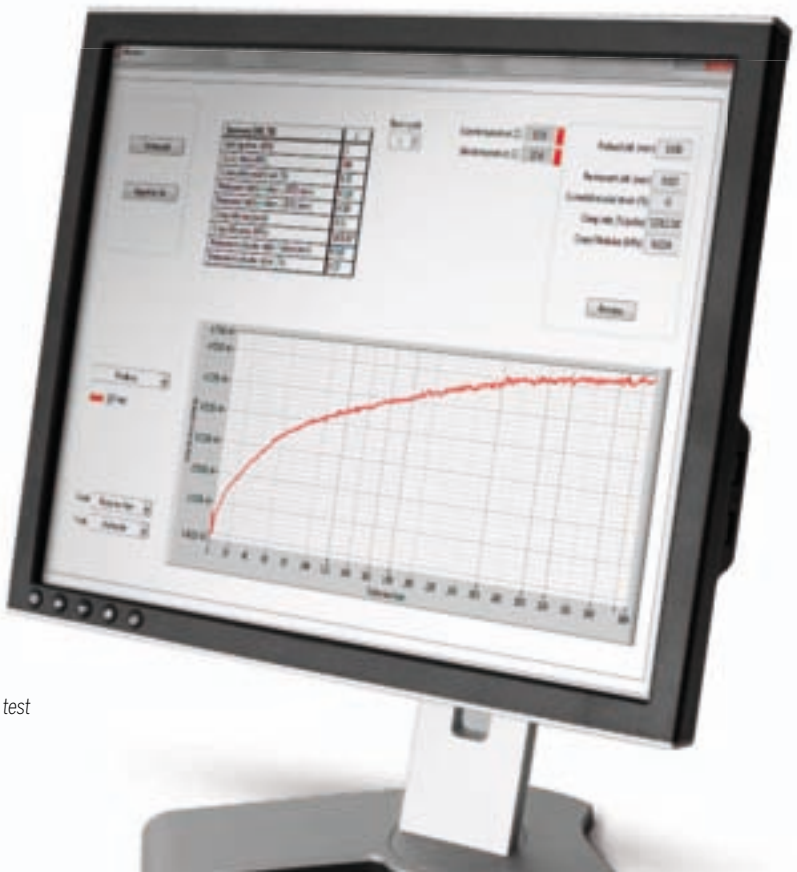
Test accessories

78-PV7112
Creep testing jig for 100 mm diameter samples

78-PV7113
Creep testing jig for 150 mm diameter samples

To be completed with the following accessory:

78-PV7114
Set of two 10 mm LVDT transducers



Typical screenshot of a UCC Creep test

DYNAPAVE

Test modules for dynamic testing systems

Testing software is included.

Testing module

RM **Resilient Modulus and Triaxial test**

Standards

All the following Standards require the same test module and accessories.

EN 12697-25 Method B
Triaxial cyclic compression test

AASHTO T307 (ex. TP46)
Resilient modulus of soils and aggregate materials

Test accessories

78-PV7160
Standard triaxial cell for 100 mm diameter samples

Or, alternatively,

78-PV7180
Advanced triaxial cell for 100 mm diameter samples with on-sample transducer facility.
To be completed with the following accessories:

78-PV7152
Pneumatic reservoir assembly with servo valve (for use with servo-hydraulic machines only)

78-PV7152/1
Confining pressure reservoir upgrade kit (for use with servo-pneumatic machines only)

78-PV7153
600 kPa pressure transducer

78-PV7114
Set of two 10 mm LVDT transducers

78-PV7154
Transducer mounting kit for 78-PV7160 or 78-PV7180 triaxial cells

Note *The 78-PV7180 cell could be preferred to perform also the AMPT test (see pag 48) to avoid duplication*

Typical screenshot of a RM test

RM, Resilient modulus test set with 78-PV7180 cell

RM, Resilient modulus test set with 78-PV7160 cell

Note:
Both 78-PV160 and 78-PV180 triaxial cells, have to be completed with the relevant accessories. As for example the 100 mm dia. sample requires the following:

Code	Description	Quantity
28-WF0416/A2*	Base adaptor for 100 mm dia samples for 78-PV7160	1
28-WF0432/A3	Porous cap for 100 mm dia samples	1
28-WF4101/A	Membrane placing tool for 100 mm samples	1
28-WF4101/B	O Ring placing tool for 100 mm samples	1
28-WF4104	Pair of porous disc 100 mm diameter	1
28-WF4105	Rubber membrane for 100 mm and 105 mm samples X 355 mm long (pack of 10)	2
28-WF4106	O Ring for 100 mm and 105 mm dia samples (pack of 10)	2

*28-WF4104 as alternative for 78-PV7180

Testing module

4PB 4-Point Bending

Standards

All the following Standards require the same test module and accessories.

EN 12697-24 Annex D
Resistance to fatigue: Four-point bending test on prismatic specimens

EN 12697-26 Annex B
Stiffness: Four-point bending test on prismatic specimens

AASHTO T321
Fatigue life of compacted hot-mix asphalt (HMA) subjected to repeated flexural bending

Test accessories

78-PV7181
Beam fatigue jig
Or, alternatively, for use with the 78-PV7015 Dynapave System:

78-PV7181/A
Beam fatigue jig
(Same as 78-PV7181 without the load cell)
To be completed with the following accessories:

78-PV7171
Dummy beam

78-PV7182
Aluminium reference beam

4PB, 4-Point Bending test set

Typical screenshot of a 4PB test

Testing module

2PB 2-Point Bending

Standards

All the following Standards require the same test module and accessories.

EN 12697-24 Annex A
Resistance to fatigue: Two-point bending test on trapezoidal specimens

EN 12697-26 Annex A
Stiffness: Two point bending test on trapezoidal specimens

Test accessories

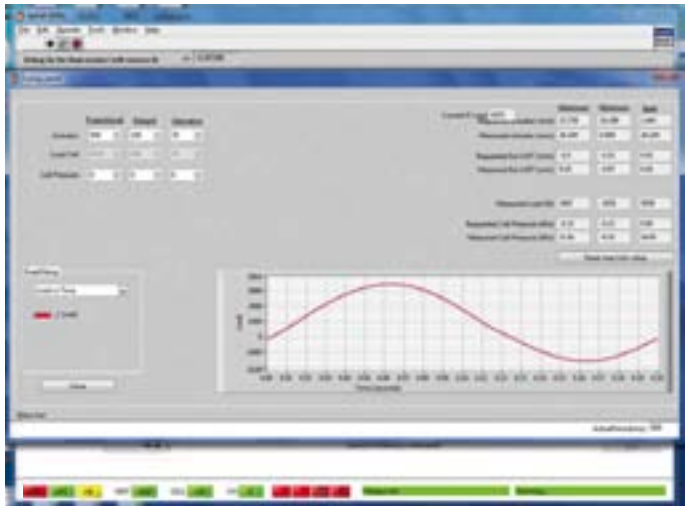
78-PV7140
2-point bending accessory
To be completed with the following accessories:

78-PV7141
Set including one base plate to be glued to the trapezoidal specimen

78-PV7142
Aluminium calibration beam

Note *This test can only be performed with the 78-PV7030, 30 kN cap. Servo-Hydraulic testing system*

2PB, 2-Point bending test set



Typical screenshot of a 2PB test

DYNAPAVE

Test modules for dynamic testing systems

Testing software is included.

Testing module

AMPT Dynamic modulus*

Standards

All the following Standards require the same test module and accessories.

AASHTO TP79

NCHRP 9-19/9-29
"Dynamic Modulus"

Determination of the Dynamic Modulus and Flow Number for hot mix asphalt using the Asphalt Mixture Performance Tester (AMPT, ex SPT)

*This test can only be performed with the servo-hydraulic controlled models 78-PV7130 and 78-PV7030

AMPT, Dynamic modulus, Uniaxial test set, detail of calibration test set including proving ring assembly, mounting clamps and LVDT transducers

Uniaxial test accessories

78-PV7112
Creep testing jig for 100 mm diameter samples
To be completed with the following accessories:

78-PV7175
LVDT Mounting stud fixing jig

78-PV7176
Proving ring assembly

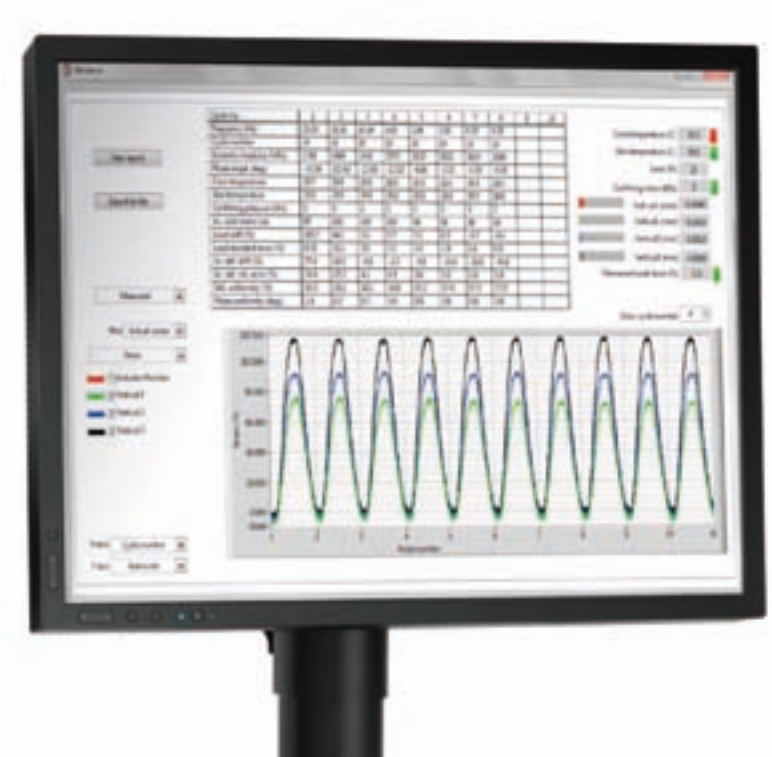
78-PV7177
On-specimen LVDT gauge points, set of 6

78-PV7178
On-specimen 1mm LVDT transducers, set of 3

78-PV7179
Mounting studs, set of 24

AMPT, Dynamic modulus, Uniaxial test set, including set of three LVDT transducers and mounting clamps.

AMPT, Dynamic modulus, Uniaxial test set, detail of fitting system for gauge points and vacuum



Typical screenshot of a AMP Uniaxial test

AMPT, Dynamic modulus, Triaxial test set.

Typical screenshot of a AMPT Triaxial test

Triaxial test accessories

78-PV7180

Advanced triaxial cell for 100 mm diameter samples with on-sample transducer facility.

To be completed with the following accessories:

78-PV7152

Pneumatic reservoir assembly with servo-valve (for use with servo-hydraulic machines only)

78-PV7152/1

Confining pressure reservoir upgrade kit (for use with servo-pneumatic machines only)

78-PV7153

600 kPa pressure transducer

78-PV7177

On-specimen LVDT gauge points, set of 6

78-PV7178

On-specimen 1mm LVDT transducers, set of 3

78-PV7179

Mounting studs, set of 24

Testing module

DYN Dynamic modulus

Standards

AASHTO T342 (ex TP62)

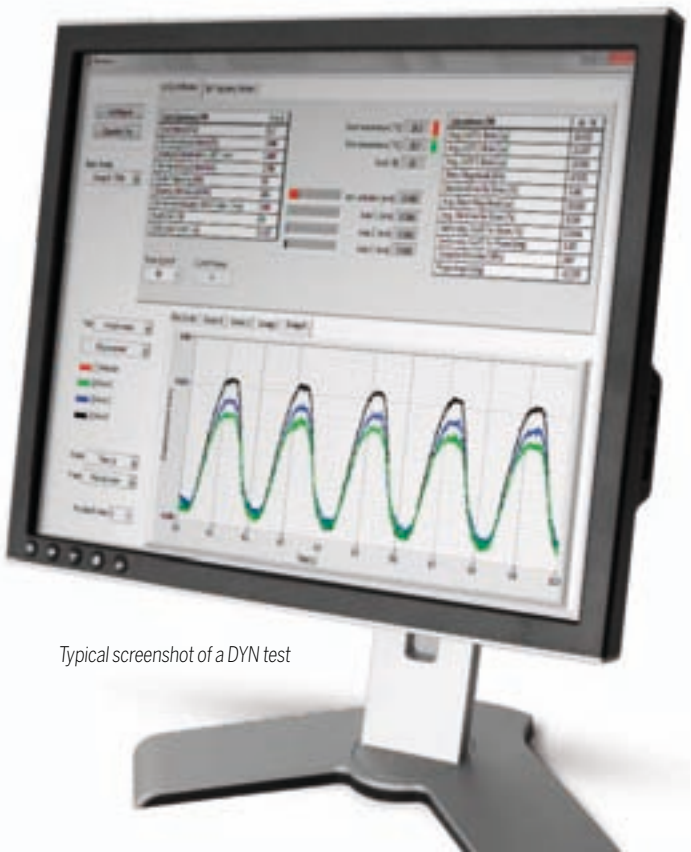
Dynamic modulus of hot mix asphalt (HMA)

Test accessories

78-PV7145

Test set including three LVDT transducers, gauge points, aligning rod and frictionless bushing.

DYN, Dynamic modulus test set



Typical screenshot of a DYN test

DYNAPAVE

Test modules for dynamic testing systems

Testing software is included.

Testing module

CR-S Creep/Strength

Standards

AASHTO T322 (ex TP9)
Creep compliance and strength of hot mix asphalt (HMA) using indirect tensile test device

ASTM D7369
Resilient modulus of bituminous mixtures by indirect tensile test

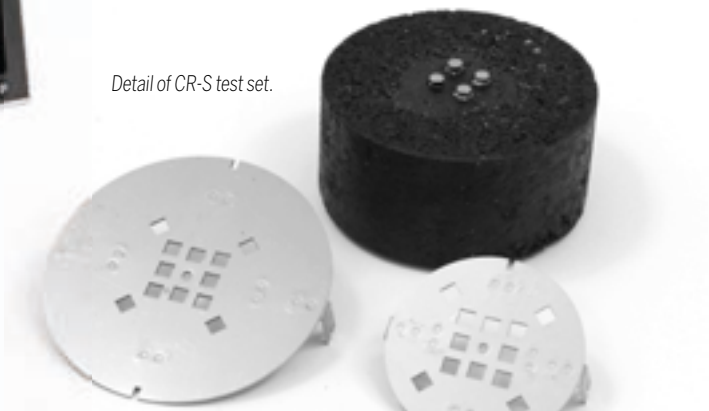
CR-S, Creep/Strength test set

Test accessories

78-PV7111
Indirect tensile test jig for 100 and 150 mm diameter samples
To be completed with the following accessories:

78-PV7165
Test set including mounting template, four LVDT transducers, gauge points and mounting studs.

Detail of CR-S test set.



Testing module

TSRST* **Thermal Stress Restrained Specimen test**

Standards

All the following Standards require the same test module and accessories.

EN 12697-46
Low temperature cracking and properties by uniaxial tension tests

AASHTO TP10
Thermal stress restrained specimen tensile strength

Test accessories

78-PV7185
TSRST kit including tension device and tension platen fixing jig

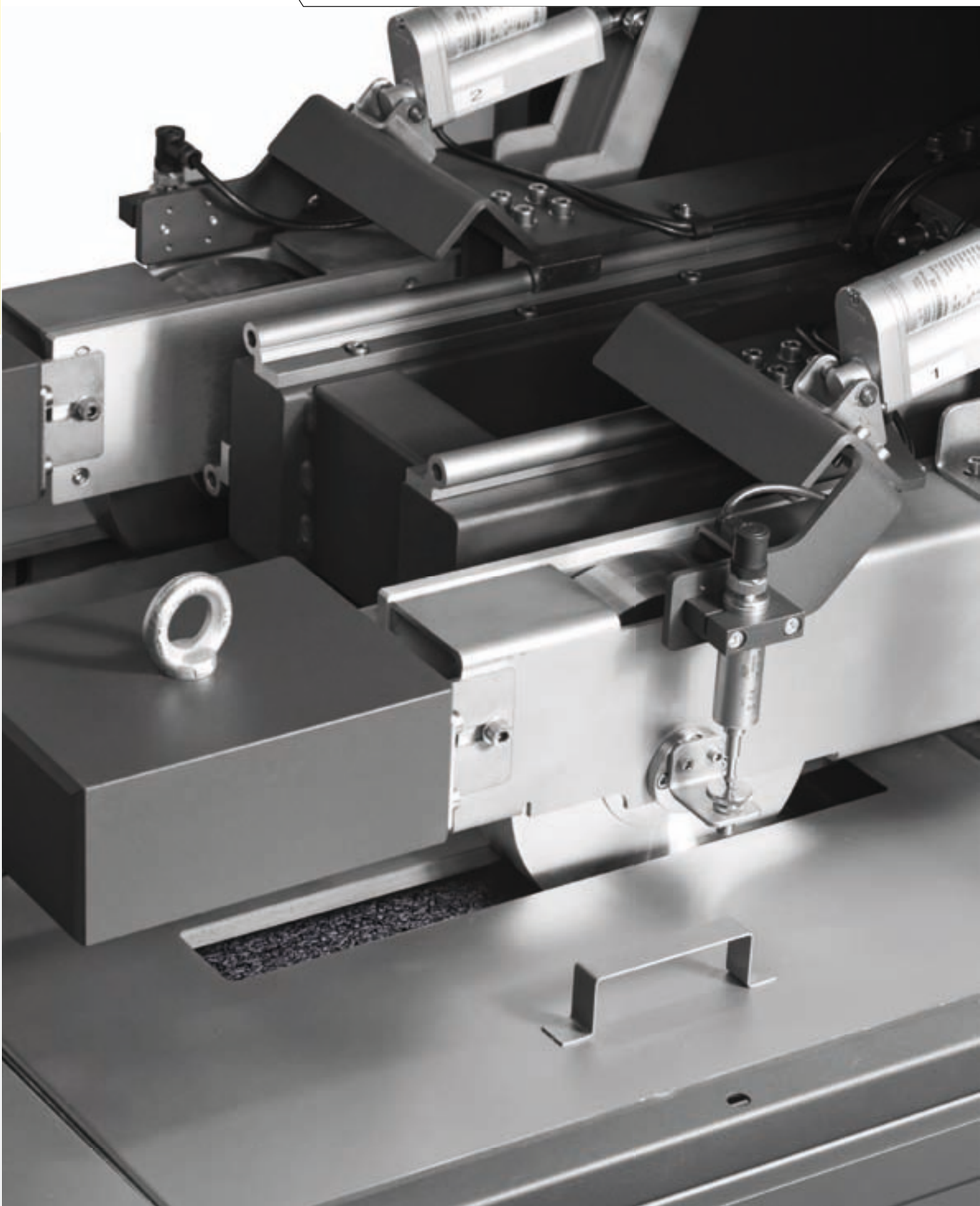
78-PV7185

TSRST test set.

**This test requires the temperature controlled cabinets with temperature range -50 to +70/100° C, models 78-PV7193/HP and 78-PV7194/HP.* *See page 37*

Wheel Tracking

- → Hamburg type double wheel tracker, AASHTO T324
- → Wet and dry double wheel tracker, EN 12697-22
- → Single wheel tracker, DYNA-TRACK model EN 12697-22



DWT DOUBLE WHEEL TRACKERS

Standards AASHTO HAMBURG type, EN and UNIVERSAL Models

Wet and/or dry versions

›› The wheel tracking test is used for determining the susceptibility of Hot Mix Asphalt (HMA) to deformation under load by measuring the rut depth formed by repeated passes of a loaded wheel at a fixed temperature.
The two methods according AASHTO T324 and EN 12697-22 are practically identical except for:

- **Test environment: Dry and wet for EN; wet for AASHTO**
- **Wheel material and size: rubber wheel, 203x50 mm (diameter x width) for EN; steel wheel, 203x47 mm (diameter x width) for AASHTO**

CONTROLS offer three models which satisfy all the above requirements.

CVi TECH
CUSTOMER'S VALUE DRIVES THE INNOVATION

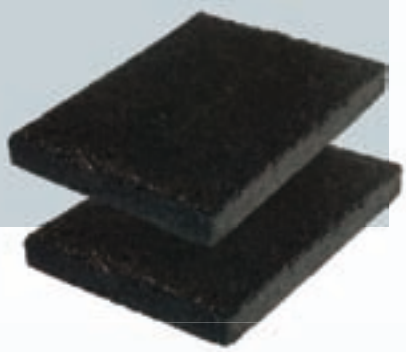
Main features

Common to all models and versions

- PC interface
- Double wheel with single wheel testing option
- Variable wheel speed from 20 to 30 cycles/min
- Fixed wheel, mobile table 230 mm travel
- Wheel load of 705 N* applied by weights
- Temperature range from ambient to 70° C
- Accurate temperature temperature control (±0.5°C) for both in water and air test
- Rut depth transducers feature 25 mm travel, 0. 1 mm accuracy
- Motorized wheel-assembly lifting system for easy removal of slabs

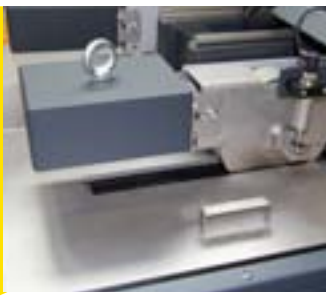
**1400 and 2000 N upon request*

- Optional independent lifting system for the loading wheels
- Slab mould size of 400x300 mm or 360x300 mm (for 320x260 mm slabs)
- Slab thickness adjustable from 40 to 100 mm (in 10 mm steps)
- Extensive use of stainless steel in the machine's construction; not limited to the parts in contact with water
- PC and software included



77-PV31A Series,
AASHTO T324

DWT Hamburg type double wheel tracker, wet conditioning version



77-PV32E Series,
EN 12697-22

(Small Size Device)
DWT double wheel tracker, dry conditioning version

77-PV33A Series,
AASHTO T324

DWT Hamburg type double wheel tracker, wet and dry conditioning version

77-PV33E Series,
EN 12697-22

(Small Size Device)
DWT double wheel tracker, wet and dry conditioning version

77-PV33B Series,

Universal model, conforming to **Standards** AASHTO T324 and EN 12697-22
(Small Size Devices)
DWT, Hamburg and EN type, double wheel tracker, interchangeable wheels (steel for AASHTO and rubber for EN), wet and dry conditioning

Machine body
Sheet steel, powder coated. Transparent sliding cover.

Loaded wheel system
The wheel load (for both systems) is 705 N (1400 and 2000 N upon request). The system includes a motorized lifting system for raising the wheel assembly at the end of the test.

Wheel tracking carriage
The test specimen in its carriage is moved 230 mm backwards and forwards under the loaded wheels in a fixed horizontal plane. The speed is adjustable via the PC from 20 to 30 cycles per minute (40 to 60 passes). The slab mounting system can hold moulds of 360x300 mm (for 320x260 mm slabs) and 400x300 mm, 40 to 100 mm thick (in 10 mm steps). The longest slab dimension is oriented to the wheel's direction of travel. Special slab moulds for circular samples obtained from coring or gyratory compactors are also available. See accessories.

Temperature control system
The AASHTO Hamburg type Standard states that the test must be performed in a water bath with a temperature range of 25 to 70° C±1°C, whilst the EN requires either an air or water environment. In both systems a water level of about 20 mm above the sample has to be maintained. Where a heated air environment is specified, the specimen, during testing, must be maintained at the specified temperature ±1°C. All versions fully satisfy and exceed the above requirements: the temperature accuracy is ±0.5°C.

Impression measurement system
Each wheel is fitted with a linear transducer for measuring deformations from 0 to 25 mm ±0.1mm (rut depht).

Detail of the testing wheel

Detail of the motorized lifting system that raises the wheel assembly at the end of the test, making the use of hoists obsolete.

Testing software
With the user-friendly Windows® software the operator can set the (fully customizable) test procedures to conform to AASHTO or EN Standards, and follow the test progress in real time, monitoring water (or air) temperature, specimen temperature, rut depth and a graph of deformation/cycles with the specimen profile, metric or imperial unit selection. Software also features exporting of test data to CSV format (Excel©), management of test data such as asphalt mix, client information, etc. and different screen background colours for water or air temperature control.

Safety features
The machine stops automatically when the protective cover is opened.

Air temperature overheating protection system.

Motor protection and other standard safety applications.

Standard outfit
The machine is supplied complete with PC,
Testing software and mould.
(See table).

	AASHTO in water	AASHTO in air and water	EN in air	EN in air and water	AASHTO/EN in air and water
Models 77	**PV31A06 PV31A05**	**PV33A06 PV33A05**	**PV32E05 PV32E06**	**PV33E05 PV33E06**	**PV33B05 PV33B06**
Material and dimensions (diameter x width) of the two loaded wheels	Stainless steel 203 x 47 mm	Stainless steel 203 x 47 mm	Rubber tyre 203 x 50 mm	Rubber tyre 203 x 50 mm	Stainless steel 203 x 47 mm and Rubber tyre 203 x 50 mm
Displacement motion	Fixed wheel-Mobile table				
Table travel	230 mm				
Wheel speed	Variable: 20 to 30 cycles/min				
Wheel load*	705 N by weights				
Temperature range	Ambient to 70° C				
Temperature control method (accuracy ±0.5°C for both water and air)	Three 1500 W heaters, re-circulating pump, automatic feed and control level	Air: Three 1200 W electronically controlled air blowers Water: Three 1500 W heaters, re-circulating pump, automatic feed and control level	Three 1200 W electronically controlled air blowers	Air: Three 1200 W electronically controlled air blowers Water: Three 1500 W heaters, re-circulating pump, automatic feed and control level	Air: Three 1200 W electronically controlled air blowers Water: Three 1500 W heaters, re-circulating pump, automatic feed and control level
Rut depth transducer range	25 mm, 0.1mm accuracy				
Moulds included	360x 300 mm (two pieces) for 320 x 260 mm slabs *Other dimensions available on request*	360x 300 mm (two pieces) for 320 x 260 mm slabs *Other dimensions available on request*	400 x 300 mm (two pieces)	400 x 300 mm (two pieces)	360x 300 mm (two pieces) for 320 x 260 mm slabs 400 x 300 mm (two pieces)
Slab thickness	Adjustable from 40 to 100 mm in 10 mm steps				
Power rating	5500 W	5500 W	4600 W	5500 W	5500 W
Overall dimensions	1540 x1020 x 1600 mm				
Weight (approx.)	450 kg				

**Special models with weight increased up to 2000 N available on request*

Typical screenshot: calibration

Typical screenshot: final test report

Typical screenshot: testing diagrams

Ordering information

AASHTO T324

Hamburg type DWT Double Wheel Trackers

(Small Size Device)

Stainless steel wheels
203 x 47 mm (diameter x width)

Wet conditioning series

77-PV31A05

PAVELAB DWT, Hamburg Type, double wheel tracker, conforming to AASHTO T324, water specimen conditioning system. Complete with PC and two 360 x 300 mm moulds (suitable for 320 x 260 mm slabs). 380 V, 50 Hz, 3 ph.

77-PV31A06
As above but 220 V, 60 Hz, 3 ph.

Wet and dry conditioning series

77-PV33A05

PAVELAB DWT, Hamburg Type, double wheel tracker, conforming to AASHTO T324, air and water specimen conditioning system. Complete with PC and two 360 x 300 mm moulds (suitable for 320 x 260 mm slabs). 380 V, 50 Hz, 3 ph.

77-PV33A06
As above but 220 V, 60 Hz, 3 ph.

EN 12697-22,

DWT Double Wheel Trackers

(Small Size Device)

Rubber tyre wheels 203 x 50 mm (diameter x width)

Dry conditioning series

77-PV32E05

PAVELAB DWT, Dry double wheel tracker, conforming to EN 12697-22 Small Size Device. Complete with PC and two 400 x 300 mm moulds. 380 V, 50 HZ, 3 ph.

77-PV32E06
As above but 220 V, 60 Hz, 3 ph.

Wet and dry standard conditioning series

77-PV33E05

PAVELAB DWT Wet and dry double wheel tracker, conforming to EN 12697-22 Small Size Device. Complete with PC and two 400 x 300 mm moulds. 380 V, 50 HZ, 3 ph.

77-PV33E06
As above but 220 V, 60 Hz, 3 ph.

AASHTO T324

Hamburg type and EN 12697-22 Universal DWT Double Wheel Trackers

(Small Size Device)

Interchangeable Stainless steel or rubber wheels 203 x 47/50 mm (diameter x width)

Wet and dry conditioning series

77-PV33B05

PAVELAB DWT, Wet and Dry Universal double wheel tracker, conforming to Hamburg type AASHTO T324 and EN 12697-22, Small Size Device. Complete with both stainless steel and rubber tyre wheels, PC, two 400 x 300 mm moulds and two 360 x 300 mm moulds (suitable for 320 x 260 mm slabs). 380 V, 50 Hz, 3 ph.

77-PV33B06

As above but 220 V, 60 Hz, 3 ph.

Accessories and spares

77-PV3/001

Two moulds for slabs 400 x 300 mm. Weight: approx. 34 Kg

77-PV3/002

Two moulds 360 x 300 mm for testing 320 x 260 mm slabs. (AASHTO)

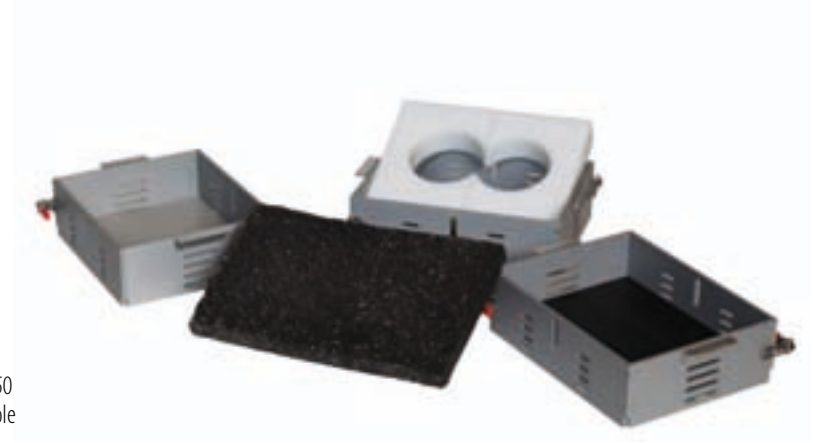
77-PV3/003

Set of two mould adaptors for double 150 mm diameter cylindrical samples, suitable for 360 x 300 mm moulds.

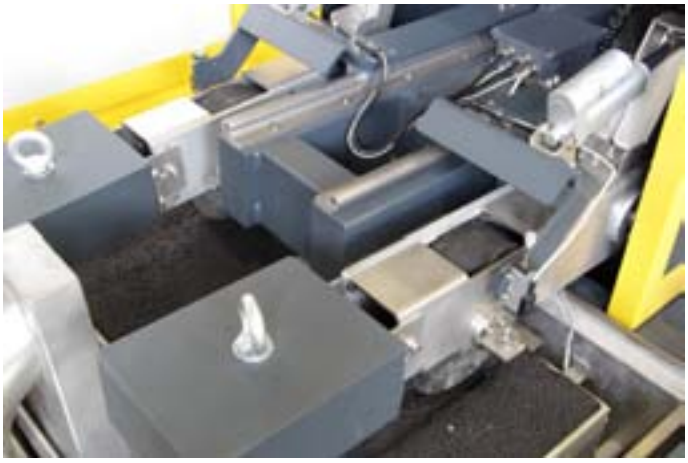
Upgrading options

77-PV3UP10

Independent lifting system for raising the loading wheel after reaching the target rut depth and continuing the test, without interruption, with the other wheel.

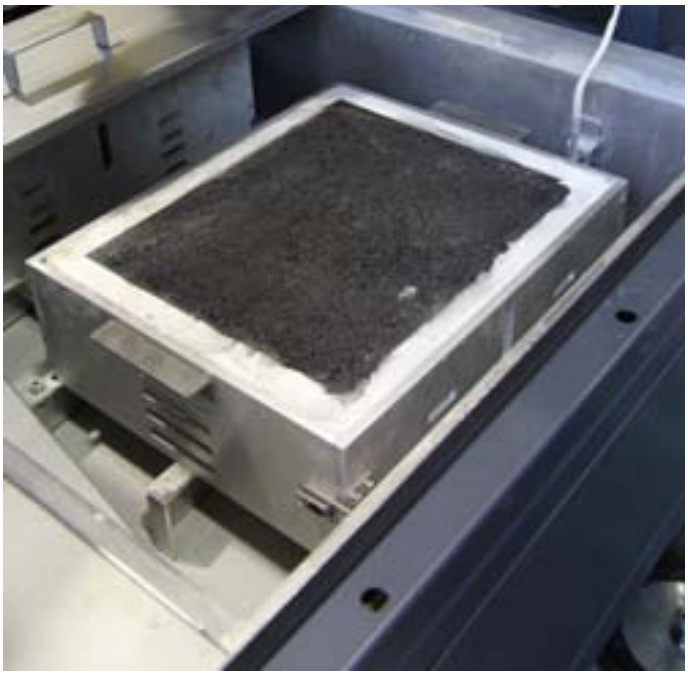


Moulds 360 x 300 mm, 400 x 300 mm and cylinders adaptor



77-PV3UP10 Upgrading option. One of the two wheels is automatically lifted after test is completed continuing the test with the other wheel up to the rut target.

Mould adaptor for double 150 mm dia. Cylindrical samples to AASHTO T324



Asphalt slab 320x260 mm, mounted with plaster to AASHTO T324

DYNA-TRACK Single wheel tracker

Standards EN 12697-22

77-PV3502 series

›› The wheel tracking apparatus consists of a loaded wheel, which bears on a sample held on a moving table. The table reciprocates with simple harmonic motion over a distance of 230 ± 5 mm with a frequency of 53 passes (± 1%) per minute. For research purposes the test speed can be adjusted by inverter control. The wheel is fitted with a solid rubber tyre with an outside diameter of 200 mm. The wheel load under standard conditions is 700 ±10 N. The wheel tracker is fitted with a temperature controlled cabinet with a temperature range from ambient to 65°C ±1.0° C.The sample may be either a 200 mm diameter core or a 300 x 400 mm slab of asphalt mixture from 25 mm to 100 mm thick. A displacement transducer with a 25 mm stroke is included for monitoring rut depth in the centre of the sample to an accuracy greater than 0.1 mm.
Deformation and sample temperature are recorded by the internal data acquisition and control system and transmitted to the Windows® compatible software (included).

Main Features

- Automatic test control
- Large permanent memory to store test data and results
- RS232 ports for connection to PC and printer
- Real-time display of number of cycles, rut depth and temperatures
- Tracks for a specified number of passes or to specific rut depth
- Adjustable load cycle frequency
- Double temperature measurement: inside the specimen and into the cabinet
- Test temperature range from ambient to 65°C
- Motorized loading arm for easy positioning
- Double-glazed doors for observation of testing cycle
- Testing software included for EN procedures, A and B, and user-defined

Technical specifications

- Conforms to EN 12697-22 Small scale device
- Table displacement with adjustable speed by inverter
- Motorized vertical adjustment of the loading arm
- Wheel with solid rubber tyre, 200 mm external diameter
- Wheel load 700 N (900 N available on request)
- Suitable for large core specimens and slabs up to 400x300 mm.
- Slab thickness from 25 to 100 mm
- 25 mm stroke transducer with resolution 0.1mm
- Integral temperature controlled cabinet
- Test temperature range adjustable from ambient to 65°C
- Double-glazed doors for test monitoring
- Large permanent memory to store test results
- 240 x 128 pixel graphical display
- RS232 output for PC connection
- Language selection
- Clock/Calendar system
- Fully automatic test control
- Test setting menu, complete with descriptive sample parameters
- Calibration menu to set and check temperature, table speed and displacement, and featuring a special function for manual control of the test performance
- Test performance menu with simultaneous display of all the test data (including real time table speed)
- Internal database for up to 100 tests. Each test can be downloaded to a PC, displayed, printed or deleted
- Data processing conforming to EN 12697-22 Small scale device, procedures A and B, and customised test
- Windows ® compatible software, for printing of test certificates and multiple test processing (mean values)

Start test

Safety Features

- Automatic stop of climatic chamber andmoving table when opening the door
- A **Universal Slab Holder** is included in the machine, allowing the use of the machine with slabs prepared with any kind of compactor (laboratory slab compactor, slab from field compaction) with maximum dimensions 310 mm wide x 410 mm long, or 200 mm diameter cores. The use of the confinement frames is recommended (see accessories).

Ordering information

77-PV3502

DYNA-TRACK, Wheel tracking machine. 230 V, 50-60 Hz, 1 ph.

77-PV3504

As above but 110 V, 60 Hz, 1 ph.

Accessories

Sample confinement frames

77-PV3502/L25

Sample confinement frame, size 400x300 mm, 25 mm high.

77-PV3502/L60

Sample confinement frame, size 400x300 mm, 60 mm high.

77-PV3502/L100

Sample confinement frame, size 400x300 mm, 100 mm high.

Compaction mould

77-PV3600/1

Compaction mould 400x300x120 mm

Spares

77-PV3502/11

Replacement rubber tyre

PAVELAB® SYSTEMS

Pavement Testing

→ Skid resistance tester

→ Accelerated polishing machine

SKID RESISTANCE Tester

Standards EN 13036-4, EN 1097-8 | ASTM E303

80-PV0190 series

›› A skid resistance tester is used in pavement testing conforming to EN 13036-4 for determining the Skid Resistance, i.e. the required property of a surface subjected to traffic to maintain the adhesion of a vehicle tyre. It is also used for other measurements such as:

- the determination of the Polished Stone Value (PSV) conforming to EN 1097-8
- testing Paving stones and Blocks conforming to EN 1341,EN 1342 and EN 1338

The apparatus consists of an adjustable pendulum arm and a spring loaded rubber slider (see accessories) mounted on the end of the arm. During operation the pendulum is raised and then allowed to swing freely, allowing the edge of the rubber slider to skid across the surface of the road or sample.

Two versions are available:

80-PV0190/A

conforming to the ASTM E303 standard and

80-PV0190/E

conforming to EN 13036-4 and other afore-mentioned EN Standards.

Main Features

- **New low friction release mechanism for the pendulum arm for better accuracy**
- **Extremely light pointer, for high precision results**
- **Slider lifting system integrated into the pendulum foot that guarantees reliable adjustment operations**
- **Strong and sturdy twin column structure**
- **Easy and reliable height adjustment system**
- **Integrated additional scale for tests on PSV specimens**
- **Complete with calibration certificate to EN 13036-4 or ASTM E303**

The pendulum is supplied complete with:

- Additional scale for tests on Polished Stone Value specimens
- Thermometer with a range from 0 to 220° C for surface temperature measurement
- 3 rubber sliders for field use
- Washing bottle, 1 litre capacity for surface wetting
- Tool set with case for machine assembly
- Rule for sliding length verification
- Carrying case
- Traceable certificate of conformity to EN 13036-4 or ASTM E303
- Case dimensions: 790x760x320 mm
- Weight (including case): approx.3 4 kg.

Ordering information

80-PV0190/A

Skid resistance and friction test set (Skid tester) conforming to ASTM E303, including: additional scale for PSV, 3 rubber sliders for field use, thermometer, washing bottle, tool set with case for machine assembly, rule, carrying case and traceable calibration certificate to ASTM E303.

80-PV0190/E

Skid resistance and friction test set (Skid tester) conforming to EN 13036-4 and EN 1097-8, including: additional scale for PSV, 3 rubber sliders for field use, thermometer, washing bottle, tool set with case for machine assembly, rule, carrying case and traceable calibration certificate to EN 1097-8.

Accessories

Rubber sliders

80-PV0190/1

Mounted rubber slider, TRL rubber, 32 mm width.

80-PV0190/2

Mounted rubber slider, TRL rubber, 76 mm width.

80-PV0190/6

Mounted rubber slider, 4S rubber, 32 mm width.

80-PV0190/7

Mounted rubber slider, 4S rubber, 76 mm width.

Base plates

80-PV0190/4

Metal base plate to clamp the Polished Stone Value specimen.

80-PV0190/5

Metal base plate for testing surface friction properties of Natural stones (EN 1341, EN 1342) and Paving blocks (EN 1338).

80-PV0190/A, 48-PV0190/E complete set

Rubber sliders

80-PV0190/5

ACCELERATED POLISHING MACHINE (PSV)

80-PV5262

Standards:

EN 1341, EN 1342, EN 1097-8, EN 1343

This machine is used to measure the resistance of road stone to the polishing action of vehicle tyres on a road surface, simulating actual road conditions, and is used in conjunction with the Skid Resistance Tester to determine the Polished Stone Value (PSV).

The machine is electronically controlled by a digital unit with a 4 row x 20 character LCD display and comes complete with an emergency stop button.

It is supplied complete with road wheel, side plate, rubber rings, two tyred wheels, drive belt, abrasive feed mechanism, corn emery, flour emery, tool kit, set of two specimen moulds and two mould plates.

Technical specifications

- Electronic control of rotation speed and feed mechanism
- Digital 4-row x 20-character display
- Aluminium wheel , 406 mm diameter
- Clamping device for specimen
- Rotation speed adjustable from 315 to 325 rpm
- Two rubber tyred wheels, 200±3 mm diameter
- Lever arm and weight loading the tyred wheel on the aluminium wheel to 725±10N
- Microprocessor-controlled feed mechanism for corn emery and flour emery
- Electric motor: 750 W
- Rated power: 850 W
- Overall dimensions: 1800x980x510 mm (h x w x d)
- Weight: approx. 200 kg

80-PV5262

Main Features

- Fully conforms with EN 1097-8
- Advanced digital interface for programming test steps and pauses
- Independent control of the two feeders
- Digital control of speed rotation
- Full protection of all the moving part areas with safety switch
- Removable water tank, easy refill

Ordering information

80-PV5262

Accelerated polishing machine.
230 V, 50 Hz, 1 ph.

80-PV5263
Same as above but 220 V, 60 Hz, 1 ph.

80-PV5264
Same as above but 110 V, 60 Hz, 1 ph.

Accessories

80-PV0525/12

Corn emery, 5 kg pack.

80-PV0525/13

Flour emery, 5 kg pack.

80-PV0525/14

Control stone (ungraded), 50 kg bag.

80-PV0525/15

Friction tester reference stone (Criggion stone-ungraded), 25 kg bag.

PAVELAB® SYSTEMS

Bitumen
Testing Apparatus

- → Ductility testing machines
- → RTFOT Asphalt ovens
- → Automatic ring ball apparatus
- → Pressure aging vessel
- → Bending beam rheometer
- → Dynamic shear rheometer
- → Rotational viscometers
- → Kinematic and Dynamic viscosity

DUCTIMETER

DUCTILITY TESTING MACHINES

Standard version	81-PV10A02
High performance version	81-PV10B02
Research version	81-PV10C02

›› The ductility test is performed for determining the ductility of bituminous materials by measuring the elongation before breaking when two ends of briquette specimens are pulled apart at a specified speed and temperature.

81-PV10A02 Standard version complies and exceeds the **ASTM D113**, **D6084**, **AASHTO T51** and **EN 13398** Standards which require the test to be performed in water at a temperature of 25° ± 0.5°C (ASTM/AASHTO) or 25° ± 0.2°C (EN) at a constant speed of 50 mm/min.

81-PV10B02 High performance version also satisfy **EN 13589** and **EN 13703** which require the test to be performed from 5° to 25°C ± 0.2°C at a testing speed adjustable up to 100 mm/min, and the determination of the tensile properties of modified bitumen.

81-PV10C02 Research version exceeds all the above mentioned Standardsrequirements, and it is fully dedicated to research (see page 71).

CVI TECH
CUSTOMER'S VALUE
DRIVES THE INNOVATION

81-PV10A02

DUCTILITY TESTING MACHINE

Standard version

This model fully satisfies and exceeds ASTM D113, ASTM D6084, AASTHO T51 and EN 13398 requirements. To obtain the required 25°C with ±0.2°C tolerance, circulation of cold water is necessary. A water chiller (see accessory 81-PV01002) is ideal for this and may already be available in the laboratory but mains water can also be used. If the ambient temperature goes over 25°C, as in tropical areas, and cold mains water is not available, the use of a water chiller is mandatory.

Water bath

Insulated stainless steel water bath with a heating system located over the entire base surface and a cooling coil (for connection to water mains or chiller)distributed over the three side walls assuring temperature uniformity without water turbulence inside the bath. All parts in contact with water are made of stainless steel.

Carriage displacement

Double-screw rods and mobile carriage enable test speeds from 5 to 100 mm/min. The system also permits the fast return of the carriage at the end of the test (500 mm/min) to reduce dead time and increase productivity. The carriage return is automatic so manual intervention is not required.

Temperature control

- A closed-loop PID system assures constant temperature within ±0.2°C.
- Plate-type base heaters give better temperature uniformity.
- The thermoregulation system is based on controlling the heater (which increases the temperature of the bath) and the flow rate of the cooling coil (which decreases the temperature).This important feature assures control of the temperature within strict limits and permits the use of suitable standard water chillers.

Machine control and elongation measurement

Control panel with digital display to set the testing speed: 5 to 100 mm/min, with the carriage return function. Elongation measurement by encoder.

Optional transparent cover

The machine can be completed with a transparent cover.

Ordering information

81-PV10A02

PAVELAB DUCTI-Meter
Ductility testing machine.
4-briquette capacity, 1500 mm carriage travel, 5 to 100 mm/min adjustable testing speed. 230 V, 50-60 Hz, 1 ph.

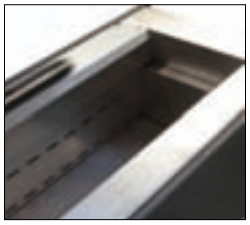
81-PV10A04
As above but 110 V, 60 Hz, 1 ph.

Upgrading option

81-PV10030

Transparent machine cover

For technical specifications see page 72



Detail of the stainless steel water bath with the protection for the lateral driving screw rods, by stainless steel too.

81-PV10A02 with cover 81-PV10030

Main features

- 4 tension lines (briquette capacity) x 1500 mm
- Easy and free access to the large testing space
- Closed-loop PID temperature control system
- Stainless steel insulated water bath
- Exclusive in-built thermoregulation system compensating the exchange of heat and cooling, resulting in very strict temperature control, optimized by the connection to chiller (optional)
- Adjustable speed range from 5 to 100 mm/min
- High carriage return speed of 500 mm/min for greater productivity
- Elongation measurement by encoder read on display

81-PV10B02

FORCE-DUCTILITY

High performance version

Machine control
By PC (not included).

Water bath
Insulated stainless steel water bath with a heating system located over the entire base surface and a stainless steel cooling coil (for connection to water mains or chiller)distributed over the three side walls assuring temperature uniformity without water turbulence inside the bath. All parts in contact with water are made of stainless steel.

Carriage displacement
Double-screw rods and mobile carriage enable test speeds from 5 to 100 mm/min. The system also permits the fast return of the carriage at the end of the test (500 mm/min) to reduce dead time and increase productivity. The carriage return is automatic, manual intervention is not required.

Temperature control
- A closed-loop PID system assures constant temperature of 25±0.2°C.

-Temperature range from 5 to 25°C±0,5°C with a water chiller (see accessories).

-Stainless steel cooling coil

-Plate-type base heaters give better temperature uniformity.

-The thermoregulation system is based on control of the heater (which increases the temperature of the bath) and the control of the flow rate of the cooling coil by an electro-valve. This important feature assures control of the temperature within strict limits and permits the use of suitable standard water chillers.

Load and elongation measurement
Automatic measurement of the elongation by a encoder and of the test load of the four testing lines.

Testing software
- Selection of test parameters (speed, temperature etc.) by PC. The test temperature, however, can be set in advance using the control panel of the machine.
- Test control by PC: Start-Stop-Carriage return
- Specimen failure recognition
- Real-time display of load/elongation graph with advanced visualization options (single or multi-graph).
- Data acquisition and processing conforming to Standards
- Function for multiple test data comparison
- Storage of test data

Water cooling
This model is proposed without a chiller (81-PV1002-04) for use with a suitable cooling system that could be available in the laboratory. It is important however, that this unit is capable of delivering a flow rate of 6 litres/min, 1 bar, at the minimum temperature of 2°C.

See-through cover
Essential for better temperature control of the bath.

Typical screenshot of the machine software

Main features

- 4 tension lines (briquette capacity) x 1500 mm
- Easy and free access to the large testing space
- Double drive screw rod
- Closed-loop PID temperature control system
- Stainless steel insulated water bath
- Exclusive in-built thermoregulation system compensating the exchange of heat and cooling, resulting in very strict temperature control, optimized by the connection to chiller (optional)
- High carriage return speed of 500 mm/min for greater productivity
- Adjustable speed range from 5 to 100 mm/min
- PC-controlled using dedicated software
- Includes a system for measuring forces up to 4x300 N with load cells (see accessories)
- Temperature range at 25±0.2°C and from 5 to 25 ± 0.5°C
- Elongation measurement system by encoder
- Real-time load and displacement graphics via PC

Ordering information

81-PV10B02
PAVELAB DUCTI-Meter
High Performance Ductility testing machine.
PC controlled, 4-briquette capacity, 1500 mm carriage travel, adjustable testing speed from 5 to 100 mm/min, thermostatically controlled water bath at 25°C ±0,2°C and from 5° to 25°±0.2°C, force measurement facility up to 300 N per line.
230 V, 50-60 Hz, 1 ph.

81-PV10C04
As above but 110 V, 60 Hz, 1 ph.

For technical specifications see page 72

81-PV10C02
FORCE-DUCTILITY
Research version

This research version further increases the high performance of the 81-PV10B02 model by more advanced specifications concerning temperature control, speed range and max. tension force, together with an extended use of stainless steel: frame, tank, cooling coil and cover. These features make this version ideal for research purposes. See specifications on page 72.
As the high performance version 81-PV10B02, this research model is PC controlled using dedicated software.

Additional main features

- Includes a system for measuring forces up to 2000 N (4x500 N) with load cells (see accessories)
- Temperature range from 5 to 30±0.2°C
- Speed range adjustable from 1 to 200 mm/min
- Extensive use of stainless steel for frame, cover and tank

Typical screenshot of the machine software

Detail of 81-PV10B02 and PV10C02 with four 81-PV10020 load cells and briquette moulds

Detail of water bath. Easy and free eccess to the large testing space, common to all versions

Ordering information

81-PV10C02

PAVELAB DUCTI-Meter
Research Ductility testing machine.
PC controlled, 4-briquette capacity, 1500 mm carriage travel, adjustable testing speed from 1 to 200 mm/min, thermostatically controlled water bath from 5 to 30±0.2°C, force measurement facility up to 500 N per line. 230 V, 50-60 Hz, 1 ph.

81-PV10C04
As above but 110 V, 60 Hz, 1 ph.

***Note**: Briquette moulds, Load cells and Water cooling system are not included and should be ordered separately. See accessories.*

DUCTIMETER

Technical Specifications

Models	81-PV10A02 81-PV10A04	81-PV10B02 81-PV10B04	81-PV10C02 81-PV10C04
Conforms to Standards	EN 13398 ASTM D113 ASTM D6084 AASHTO T51	EN 13398 EN 13589 EN 13703 ASTM D113, ASTM D6084, AASHTO T51	EN 13398 EN 13589 EN 13703 ASTM D113, ASTM D6084, AASHTO T51
Machine control by	Digital display panel	PC with dedicated Software (PC not included)	PC with dedicated Software (PC not included)
Thermostatically controlled water bath temperature:	at 25±0.2°C	at 25±0.2°C and from 5 to 25±0.5°C with water chiller (see accessories)	from 5 to 30±0.2°C with water chiller (see accessories). PID closed-loop control.
Temperature control system	Heater and cooling coil for connection to cold water or water chiller	Heater and cooling coil for connection to cold water or water chiller	Heater and cooling coil for connection to cold water or water chiller
Structure	Stainless steel tank	Stainless steel tank	Extensive use of stainless steel for frame, tank, cooling coil and cover
Briquette capacity	4		
Max carriage travel	1500 mm		
Testing speed	Adjustable from5 to 100 mm/min	Adjustable from 5 to 100 mm/min	Adjustable from 1 to 200 mm/min
Elongation measurement by	Encoder (Linear scale)	Encoder (Optical system)	Optical system
Max. load and tension load measurement	--	1200 N (4x300 N) by load cells (500N capacity.) (Cells not included. See accessories.)	4x500 N by load cells (2000 N in total). (Cells not included. See accessories.)
Tension load/elongation graph	--	Real-time graphs by PC	Real-time graphs by PC
Carriage return speed	500 mm/min		
Power rating (approx.)	1200 W		
Transparent cover	not included	included	included
Overall dimensions	(l x d x h) 2434 x 412 x 385 mm		
Weight (approx.)	100 Kg		

Accessories

Ductility briquette molds

81-B0141

Briquette mould conforming to EN 13389

81-B0141/A

Briquette mould conforming to ASTM D6084 and EN 13589

Briquette moulds

81-B0141/B

Briquette mould conforming to ASTM D113 and AASHTO T51

81-B0142

Ductility mould plate

Water chiller

81-PV1002

Water chiller, flow rate 6 litres/min, 2°C minimum temperature. 1200 W, 230 V, 50-60 Hz, 1 ph.

81-PV1004

Water chiller, same as above but 110 V, 60 Hz, 1 ph.

Specifications

- Pump water flow (maximum): 6 litres/min
- Dimensions: 450 x 450 x 825 mm (w x d x h)
- Weight: approx. 35 kg

81-PV1002

Load cells

(for use with 81-PVB02, PVC02, PVC04 and 81-PVB04 versions only)

81-PV10020

High precision strain gauge load cell 0-500 N capacity.

Machine base

81-PV10010

Support base for ductility machine, stainless steel table

- Dimension (l x d x h): 2370 x 600 x 670 mm
- Weight: approx. 50 kg

RTFOT Asphalt Ovens

Standards EN 12607-1 | ASTM D2872 | AASHTO T240

Detail of external stainless lining "linen patterned" resistant to scratches and shocks

These ovens are used for measuring the effect of heat and air on a moving film of semi-solid bituminous materials. The internal chamber is made from stainless steel, insulated with fiberglass or similar, with an external frame made from engine-turned stainless steel and a door with a centrally located window. Special attention has been given to the safety features which conform to CE requirements. The oven is supplied complete with flow meter, ASTM 13C thermometer and 8 heat resistant glass containers (64 mm high x 140 mm diameter). The oven must be connected to a compressed air source supplying 2 bar maximum pressure. If not available in the laboratory we recommend the 81-PV0161/11 Diaphragm pump. See accessories.

The ASTM and EN versions are basically identical except for a small difference of the internal dimensions of the testing chamber.

- Power: 3000 W
- External dimensions: 600x600x900 mm(w x d x h)
- Weight: approx.50 kg

Main Features

- **Safety features: Automatic over-temperature switch, door switch, pilot lamp and alarm for door open with fan still running; magneto-thermic switch; 24V low voltage door opening control**
- **High quality stainless steel structure, internal and external engine-turned finishing**
- **Door with double-glazed window**
- **Armoured heating resistance conforming to safety requirements**
- **Flow meter included**
- **Digital electronic thermo-regulator operating in PID mode**

Ordering information

ASTM/AASHTO versions:

81-PV0161

PAVELAB RTFOT, Bitumen oven for rolling-thin film oven test. ASTM version. 230 V, 50 Hz, 1 ph.

81-PV0161/Z
As above but 110 V, 60 Hz, 1 ph.

81-PV0161/Y
As above but 220 V, 60 Hz, 1 ph.

EN version:

81-PV0161/A

PAVELAB RTFOT, Bitumen oven for rolling-thin film oven test. EN version. 230 V, 50 Hz, 1 ph.

Accessories

Diaphragm pump

81-PV0161/11

Diaphragm pump 6 litres/min at 2.4bar. 230 V, 50 Hz, 1 ph

81-PV0161/11Z
As above but 110 V, 60 Hz, 1 ph.
81-PV0161/11Y
As above but 220 V, 60 Hz, 1 ph.

Description
Free air displacement 6 litres/min, maximum pressure 2.4 bar (when used as an air compressor), ultimate vacuum 100 mbar (when used as a vacuum pump). Complete with needle valve. Power: 65W Weight: approx. 1.9 kg

Spares

81-PV0161/10

Spare glass container

81-PV0160/10

ASTM 13C Thermometer, +155 to +170° C, 0.5° divisions.

Automatic ring and ball apparatus

Standards EN 1427 | ASTM D36 | AASHTO T53

81-PV0143

Support rings frame with samples

AUTOMATIC RING AND BALL APPARATUS

Standards:

EN 1427, ASTM D36, AASHTO T53

This advanced microprocessor controlled automatic tester is used to determine the softening point of bitumen using water or glycerol as heating fluid. The softening point is taken by two suitably positioned light barriers and the temperature is measured by a PT100 sensor placed in a central-position. During operation a magnetic stirrer with adjustable speed assures temperature uniformity in the vessel. The temperature gradient is strictly maintained throughout the test by the electronic system which conforms with the Standards.

Safety features

The hot plate is automatically turned off at the end of the test. The apparatus is also fitted with an emergency stop button. The test is automatically interrupted if the probe fails or is not correctly positioned. The hot plate will not be damaged or affected by accidental leakages of water or glycerol, or if the beaker breaks.

Specifications

The apparatus comprises the following parts:

- Heater and magnetic stirrer with speed control
- Temperature probe
- Glass beaker, test rings and ball support
- Application and centering device for steel balls
- Light barrier system
- Microprocessor system and large graphic display with membrane keyboard
- RS232 port for PC or printer

Firmware

Main menu:

- Test on boiled distilled or deionized water for softening point between 30 and 80° C
- Test on glycerol for softening point above 80 and up to 150° C
- Test configuration set-up
- File management
- Date and time
- Operator name, test number, general notes
- Language selection
- Test parameters conforming to the type of test: up to 80° C or above 80 up to 150° C, hot plate pre-heating temperature thermocouple calibration
- Magnetic stirrer speed adjustment from 0 to 150 rpm
- Baud rate selection 38400 for PC and 9600 for printer

Phisical specifications

- Power: 750 W
- Overall dimensions: 530x300x280 mm(w x d x h)
- Weight: approx.16 kg

Ordering information

81-PV0143
PAVELAB, Automatic ring and ball apparatus. 230 V, 50-60 Hz, 1 ph.
81-PV0143/Z
As above but 110 V, 60 Hz, 1 ph.

Accessories

82-P0172/1
RS232 cable

Spares

81-B0145/1
Brass ring

81-B0145/2
Steel ball

81-B0145/3
Ball centering guide

81-B0143/1
600 ml beaker

Pressure Aging Vessel (PAV)

Standards ASTM D652 | AASHTO R28 | EN 14769

81-PV2602

This apparatus is designed to simulate in-service oxidative aging of asphalt binder by exposure to elevated temperatures in a pressurized environment. This improved PAV model simplifies the running and documenting of asphalt binder aging operations.

The apparatus includes:

- Touch screen controller with front panel user interface with easy to use step-thru operation
- Bench top unit with integral vessel/oven design with top opening door
- CE certified vertical stainless steel pressure vessel with encased band heaters and integral pressure measurement control
- Thermo-regulation: Proportional control with integral and derivative function
- Network ready with remote capabilities: view and control the PAV with an APP designed for smart phones, tablets, iPads, iPhones, or other PCs
- Set time and date for automatic preheat functions
- Platinum RTD temperature measurement
- Includes 10 AASHTO T179 specimen pans
- Precision anodized aluminium sample rack
- Hex socket wrench, ½ in. drive, with 4 in. extension
- Includes Specimen Loading/ Unloading Tool
- Dimensions: approx. 760x460x762 mm (hxdxw)
- Shipping weight: approx.200 kg

Main Features

- **Large touch screen controller**
- **View data charts and graphs right on the screen**
- **Network ready**
- **When connected to a network, access the PAV screen with an APP and operate remotely from a Smart Phone, Tablet, iPad, iPhone, or other PC**
- **USB port on the front to download test data and perform software upgrades**
- **Slanted screen design for improved visibility**
- **Greater temperature range: 80 to 115°C**
- **English, Spanish, French; German, Russian, Italian, Mandarin, and Arabic language option**

Ordering information

81-PV2602

Pressure aging vessel. 230-240 V, 50-60 Hz, 1 ph.

81-PV2604

As above but 110 V, 60 Hz, 1 ph.

PAV App for smart-phone

VACUUM DEGASSING OVEN for PAV - Pressure Ageing Vessel

The ASTM D6521 and AASHTO R28 make degassing of the PAV-aged asphalt samples mandatory. This Vacuum degassing oven conforms fully with these Standards.

Stainless steel construction, holds up to 4 specimen containers, self contained automatic vacuum system, high precision controller featuring a digital display indicating time, temperature and the current stage of each process, maintains temperature up to 170° C with an accuracy of ±5°C.

- Dimensions: approx. 610x406x304 mm (w x d x h)
- Shipping weight: approx. 85 kg

Ordering information

81-PV0260/1

Vacuum degassing oven. 230 V, 50 Hz, 1 ph.

81-PV0260/1Z

As above but 110 V, 60 Hz, 1 ph.

Bending Beam Rheometer (BBR)

Standards ASTM D6648 | AASHTO T313

81-PV05902

The BBR System consists of a fluid bath base unit, a three-point bending test apparatus which is easily removed from the base unit for specimen loading and unloading, an external cooling unit with temperature controller, and a calibration hardware kit with carrying case. The system includes the testing software.

Ordering information

81-PV05902
Bending Beam Rheometer (BBR). 230 V, 50-60 Hz, 1 ph.
81-PV05904
As above but 115V, 50-60 Hz, 1 ph.

Spares

81-PV059/01
Extra aluminium beam mould.

81-PV059/02
Silicone rubber mould, 2-gang.

Main Features

- Durable, corrosion-resistant construction
- Computerized control, data acquisition and analysis
- PID temperature controller with digital display
- Two independent platinum RTDs for precise temperature control
- Mechanically-refrigerated cooling bath with environmentally-safe non-CFC coolant
- Integral LVDT and temperature compensated load cell for accurate test results
- Includes complete calibration kit with carrying case
- Includes ASTM/AASHTO-compliant specimen moulds

Load frame	Integral stainless steel frictionless construction
Loading shaft	In-line stainless steel with blunt point
Test load	Variable test range from 0 to 200 g standard. System maintains required test load to within ±0.5g throughout the test cycle
Test Cycle Times	Cycle times for pre-load, recovery, and test load are completely operator- adjustable
Load cell	500 g (temperature-compensated)
Mechanical overload protection	Standard
Test weights	Calibrated and traceable
Sample supports	25 mm (0.98 in.) diameter stainless steel spaced 101.6 mm (4.00 in.) apart
LVDT displacement transducers	6.35 mm (0.25 in.) calibrated range to provide 2 µm resolution throughout testing and verification range
Data display	Large on-screen display of load, displacement and bath temperature provides ease of setup and operation. Real-time displacement, loading, and temperature graphs are displayed during the test cycle and can be re-scaled as needed for easy viewing
Cooling unit	Included (non-CFC refrigerant)
Recommended Cooling Bath fluid	Non-flammable ethylene glycol mixture
Operating temperature	Ambient to -40° C (-40°F)
Temperature Measurement	Platinum RTD
Compressed air requirement	0.34 MPa (50 psi) clean, dry air supply required
Shipping weight:	approx. 115 kg

Dynamic Shear Rheometer (DSR)

Standards AASHTO T315 | ASTM D7145, ASTM D7405

81-PV6002

The DSR Rheometer is used for the determination of the elastic and viscous behavior of a bituminous binder.

Compact integrated unit designed specifically for ease of use and robustness in high throughput asphalt binder test environments. Air bearing and mechanical bearing options to provide robust and cost- effective measurement platforms for any industrial laboratory or remote field testing location.

- Integrated fluid immersion cell specifically based on patented principle for temperature control of highly thermally-sensitive asphalt or bitumen samples.
- Rapid thermal equilibration and elimination of thermal gradients in the sample - essential for consistent and reliable data, and optimized sample throughput.
- Excellent temperature stability and accuracy, with a resolution of ± 0.01°C.
- Rapid, robust manual gap set, with pre-set gaps for AASHTO tests for simplicity of use.
- Active thermal mode to ensure constant gap is maintained for all temperature test points.
- Plate measuring systems (both upper and lower plates) designed to comply with industry Standards (AASHTO).
- Dedicated AASHTO specification QC software package (TruGrade) available.

Specifications

- Torque range: 10 µNm to 10 mNm
- Torque range (mechanical bearing model): 50 µNm to 10 mNm.
- Torque resolution: 1µNm
- Position resolution: 1µrad
- Frequency range: 10µHz to 100 Hz
- Temperature control range (total immersion cell): 5°C to 95°C (range can be extended depending on circulator fluid)
- Temperature accuracy (total immersion cell): better than ±0.1°C.
- Weight and dimensions: Dimensions (with temperature control unit): 60cm (H) x 23cm (W) x 35cm (D).
- Weight (with temperature control unit): 18 kg.
- Nominal operating voltage: 110 V or 220 V
- Operating temperature: 15°C – 40° C
- Operating humidity: 35% - 80% non-condensing.

Ordering information

81-PV6002

DSR Dynamic Shear Rheometer. 110-220 V, 50-60 Hz, 1 ph

Accessories

81-PV6000/1

Kit for multiple stress creep recovery (MSCR) test to ASTM D7405

Main Features

- Designed specifically for Asphalt Testing
- Optimized for high throughput
- Meets and exceeds AASHTO T315 and all ASTM requirements
- Simple to use, proven design
- Precise and stable temperature control (patented)
- Rapid sample equilibrium to set temperature
- Significant reduction in need for regular re-calibration of temperature
- Pre set gaps for AASHTO tests - no zeroing necessary
- Automatic Expansion Compensation keeps gap constant with temperature
- Compact, integrated unit with small footprint
- Dedicated AASHTO specification software package including:
- - Pass/Fail medium temperature original binder test (T315-11)
- - Pass/Fail high temperature RTFO binder(T315-11)
- - Pass/Fail high temperature PAV binder(T315-11)
- - Linearity test (T315-12) - Grade determination test (R29-02)
- Optional research grade software

Rotational Viscometers

Standards ASTM D2196, ASTM D4402 | AASHTO T316 | EN 13302

81-PV0118 SERIES

Apparent viscosity of unfilled asphalt is evaluated by a rotational viscometer which measures the torque generated by a calibrated spindle rotating at a selected speed into a bitumen sample heated at precise temperature in the range from ambient to 260° C. The measured relative resistance to rotation is converted, with a factor, into viscosity units, cP or mPa.s.

81-PV0118

- Data displayed:
  - Selected speed
  - Selected spindle
  - Viscosity reading
  - Percentage of full scale
  - Relative and absolute viscosity
- Unit converter SI to CGS
- AUTO-TEST with visual and audible malfunction alarm
- AUTO-RANGE function
- User-enabled calibration
- High resolution
- Repeatability: 0.2%

Spindle models	Viscosity ranges (mPa·s) with model 81-PV0118	Viscosity ranges (mPa·s) with model 81-PV0118/A
TR8	50-170 k	20-500 k
TR9	250-830 k	100-2.5 m
TR10	500-1.7M	200-5 m
TR11	1K-3.3 m	400-10 m

We offer two versions of viscometer:

81-PV0118
Rotational viscometer, standard version,

81-PV0118/A
Rotational viscometer, high performance version

The high performance version features a superior level of test automation as further described.

81-PV0118

ROTATIONAL VISCOMETER

standard version

Technical specifications

- Viscosity range: 100-13,000,000cP
- Rotational speed range: 0.3-100 rpm
- Selectable speeds: 18
- Precision: ±1% of full scale
- Resolution:
- Using low viscosity adapter: 0.01cP
- For viscositylower than 10,000cP: 0.1cP
- For viscosity equal to or above 10,000cP: 1cP
- Repeatability: 0.2%
- Shipping weight:approx. 8 kg

Set of 4 spindles included in the rotational viscometers

Rotational Viscometers High performance version

Standards ASTM D2196, ASTM D4402 | AASHTO T316 | EN 13302

81-PV0118/A

Main features

- > 12-keytouchpad keyboard
- > Direct readout on a graphic display
- > Data displayed:
  - Selected speed
  - Selected spindle
  - Viscosity reading
  - Percentage of full scale
  - Sample temperature
  - Shear rate (with coaxial spindles)
  - Shear stress (with coaxial spindles)
  - Density (entered by the user)
  - Step program status
  - Analysis and visual characteristics (flow curves)
  - Viscosity reading: dynamic viscosity (cP or mPa·s) or kinematic viscosity (cSt)
- > Program features:
  - Time to torque: target torque pre-setting device
  - Time to stop: target time pre-setting device
  - 10 working memories
  - Customizable options
  - Programmable
  - Multistep
  - Ramp
- > AUTO-TEST with visual and audible malfunction alarm
- > AUTO-RANGE function
- > Temperature reading
- > User-enabled viscosity and temperature calibration
- > 10 language options

81-PV0118/A

81-PV0118/A

ROTATIONAL VISCOMETER

High Performance version

Technical specifications

- Viscosity range: 100-40,000,000 cP
- Rotational speed range: 0.01-250 rpm
- Selectable speeds: 2600

Resolution:

- Using low viscosity adapter: 0.01 cP
- For viscosity lower than 10.000 cP: 0.1 cP
- For viscosity equal to or above 10,000 cP: 1cP
- Repeatability: 0.2%

Thermometer features:

- Temperature range: 0 to 100° C; 32 to 212°F
- Resolution: 0.1°C; 0.1722°F
- Precision: ±1°C; ±2°F
- Shipping weight:approx.8 kg

Ordering information

81-PV0118

Rotational viscometer, standard version, supplied complete with stand, boss head, spindle protection, spindle rack and power supply cable. 100-240 V, 50-60 Hz, 1 ph.

81-PV0118/A

Rotational viscometer, high performance version, supplied complete with stand, boss head, spindle protection, spindle rack, calibration certificate, USB cable, Datalogger software and power supply cable. 100-240 V, 50-60 Hz, 1 ph.

Accessories

(for both versions)

81-PV0118/1

Temperature control unit, temperature range from 5 to 300° C. Complete with set of 4 spindles. 220-240 V, 50-60 Hz, 1 ph.

81-PV0118/1Z

Same as above but 110 V, 60 Hz, 1 ph.

Description

The control unit consists of a heating chamber that works in conjunction with rotary viscometers at high temperatures. According to the specifications of ASTM D4402, viscosity of solid road unfilled asphalts has to be measured at temperatures ranging from 34 to 260° C. The heater holds the container with the sample, into which a suitable spindle is immersed and driven by the rotary viscometer to measure viscosity. A digital microprocessor control unit assures that the required test temperature is maintained.

81-PV0118/A with 81-PV0118/1

Kinematic Viscosity

Standards ASTM D2170, AASHTO T201, EN 12595

Cannon-Fenske opaque viscometers

Used for the determination of kinematic viscosity of liquid asphalts (bitumen) and road oils at 60° C, and distillation residue of liquid asphalts and asphalt cements at 135°C. Cannon-Fenske Opaque models are suitable for opaque liquids. Supplied complete with calibration certificate.

Code 81-…	Approx. Constant cSt/S	Kinematic viscosity range cSt
B0116/1	0.035	7 to 35
B0116/2	0.1	20 to 100
B0116/3	0.25	50 to 250
B0116/4	0.5	100 to 500
B0116/5	1.2	240 to 1200
B0116/6	2.5	500 to 2500
B0116/7	8	1600 to 8000
B0116/8	20	4000 to 20,000

To determine the kinematic viscosity, all the above Cannon-Fenske viscometers must be placed into the 81-PV0116/A Viscometer bath using the holder 81-B0116/H1.
See accessories.

81-B0116/1 to 81-B0116/8

81-B0116/10 to 81-B0116/16

81-B0116/20 to 81-B0116/27

Zeitfuchs cross-arm viscometers

Used for the determination of kinematic viscosity of liquid asphalts (bitumen), road oil and distillation residues of liquid asphalts and asphalt cements at 135°C. Supplied complete with calibration certificate.

Code 81-…	Approx. Constant cSt/S	Kinematic viscosity range cSt
B0116/10	0.1	20 to 100
B0116/11	0.3	60 to 300
B0116/12	1.0	200 to 1000
B0116/13	3.0	600 to 3000
B0116/14	10.0	2000 to 10000
B0116/15	30.0	6000 to 30000
B0116/16	100.0	20000 to 100000

For determining the kinematic viscosity, all the above Zeitfuchs viscometers must be placed into the 81-PV0116/A Viscometer bath using the holder 81-B0116/H2.
See accessories.

BS U-Tube modified reverse flow viscometers

Used for the determination of kinematic viscosity of liquid asphalts (bitumen), road oil and distillation residues of liquid asphalts and asphalt cements at 135°C. Supplied complete with calibration certificate.

Code 81-…	Approx. Constant cSt/S	Kinematic viscosity range cSt
B0116/20	0.1	6 to 100
B0116/21	0.3	18 to 300
B0116/22	1.0	60 to 1000
B0116/23	3.0	180 to 3000
B0116/24	10	600 to 10000
B0116/25	30	1800 to 30000
B0116/26	100	6000 to 100000
B0116/27	300	18000 to 300000

For determining the kinematic viscosity, all the above BS U-Tube viscometers must be placed into the 81-PV0116/A Viscometer bath using the holder 81-B0116/H3.
See accessories.

Dynamic Viscosity

Standards ASTM D2171, EN 12595

Cannon-Manning vacuum viscometers

Used for determining the viscosity of bitumen at 60° C. Supplied complete with calibration certificate.

Code 81-...	Viscosity range
B0117/1	0.036 to 0.8
B0117/2	0.12 to 2.4
B0117/3	0.36 to 8
B0117/4	1.2 to 24
B0117/5	3.6 to 80
B0117/6	12 to 240
B0117/7	36 to 800
B0117/8	120 to 2400
B0117/9	360 to 8000
B0117/10	1200 to 24,000
B0117/11	3600 to 80,000

To determine the dynamic viscosity, the Cannon-Manning viscometers must be placed into the 81-B0116/A Viscometer bath using the holder 81-B0117/H1.
A pressure regulator and vacuum manifold is also required. See accessories

Asphalt Institute vacuum viscometers

Used for determining the viscosity of bitumen at 60° C. Supplied complete with calibration certificate.

Code 81-...	Viscosity range
B0117/15	42 to 800
B0117/16	180 to 8200
B0117/17	600 to 2800
B0117/18	2400 to 52,000
B0117/20	9600 to 1,400,000
B0117/21	38,000 to 5,800,000

To determine the dynamic viscosity, the Asphalt Institute viscometers must be introduced into the 81-B0116/A Viscometer bath using the holder 81-B0117/H2.A pressure regulator and vacuum manifold is also required. See accessories

Viscometer bath

Standards:

ASTM D2171, EN 2171

81-PV0116/F

Viscometer bath.

230 V, 50-60 Hz, 1 ph.

81-PV0116/FZ

Viscometer bath.

110 V, 60 Hz, 1 ph.

It is used in the determination of both the kinematic and dynamic viscosity. Used to maintain the capillary type viscometers at a uniform temperature. The bath consists of a cylindrical glass vessel with a stainless steel cover with 50.8 mm diameter holes, motor stirrer, refrigerating coil with water connections, heating system, contact thermometer, external protection and insulating base.

Thermometers and viscometers are not included.

- Temperature: room temp. +5°C to 150° C
- Power: 2000 W
- Temperature stability: +/-0.03°C
- Temperature sensor: PID
- Jar capacity: approx.20 litres
- 5 viscometer tubes
- Weight: approx.12 kg

Accessories

See 81-B0116/B Pressure regulator and 81-B0116/C Vacuum manifold

Accessories

Holders for using viscometers with 81-B0116/F Viscometer bath

81-B0116/H1

Holder for Cannon-Fenske viscometers

81-B0116/H2

Holder for Zeitfuchs Cross-Arm viscometers

81-B0116/H3

Holder for U-Tube viscometers

81-B0117/H1

Holder for Cannon-Manning viscometers

81-B0117/H2

Holder for Asphalt Institute viscometers

Pressure regulator and Vacuum manifold
(for Dynamic viscometers)

81-B0116/B

Viscometer pressure regulator. Used for precise pressure control. 230 V, 50-60 Hz, 1 ph.

81-B0116/C

Vacuum manifold. Used for applying a vacuum to the viscometers placed in the bath.

Kinematic and Dynamic viscosity thermometers

82-B0116/40

Kinematic viscosity thermometer, range 58.5 to 61.5°C, type ASTM 47C.

82-B0116/45

Kinematic viscosity thermometer, range 133

Notes

STANDARDS Index

AASHTO T307 46
AASHTO T321 ..... 27, 31, 47
AASHTO T322 50
AASHTO T322 (ex TP9) 50
AASHTO T324 ..... 52, 54, 55, 58, 59
AASHTO T342 49
AASHTO T342 (ex TP62) 49
AASHTO TP10 51
AASHTO TP31 42
AASHTO TP79 48
AS 2891.12.1 45
ASTM D2171 81
ASTM D4123 42
ASTM D7369 50
BS DD 226 45
EN 1097-8 ..... 64, 65, 74
EN 12697-22 ..... 16, 52, 54, 55, 58 59, 60, 61
EN 12697-22, ... 58, 59
EN 12697-24 ..... 27, 31, 43, 47
EN 12697-24 Annex A 47
EN 12697-24 Annex D 47
EN 12697-24 Annex E 43
EN 12697-25 ..... 44, 46
EN 12697-25 Method A 44
EN 12697-25 Method B 46
EN 12697-26 ..... 16, 27, 31, 42, 47
EN 12697-26 Annex A 47
EN 12697-26 Annex B 47
EN 12697-26 Annex C 42
EN 12697-46 51
EN 1341 ..... 64, 65
EN 1342 ..... 64, 65
EN 1343 65
EN 1427 74
EN 2171 81
NCHRP 9-19/9-29 ..... 45, 48

CODE Index

75-PV0005/2 11
75-PV0008 ..... 12, 13
75-PV0008/10 13
75-PV0008/12 13
75-PV0008/14 13
75-PV0008/2 13
75-PV0008/5 13
75-PV0008/Z 13
75-PV50A05 ..... 8, 9, 11
75-PV50A06 11
75-PV50C05 ..... 8, 10, 11
75-PV50C06 11
75-PV5X010 11
75-PV5X030 11
75-PV5X040 11
75-PV5X110 11
75-PV5X120 11
75-PV5X135 11
75-PV5X150 11
76-PV0077/B 16, 17
76-PV0077/BZ 17
76-PV0250/10 23
76-PV0250/2 23
76-PV0250/3 23
76-PV0250/4 23
76-PV0250/5 23
76-PV0250/6 23
76-PV0250/7 23
76-PV0250/7Y 23
76-PV0250/7Z 23
76-PV0251 ..... 18, 22, 23
76-PV0251 22
76-PV0251/15 ..... 22, 23
76-PV0251/E 22, 23
76-PV0251/E 22
76-PV0251/EZ 23
76-PV0251/Z 22, 23
76-PV0255 ..... 19, 21, 22, 24, 25
76-PV251/15Z 23
76-PV2520/14 21
76-PV2520/15 ..... 19, 20, 21
76-PV2520/15Z 21
76-PV2522 ..... 18, 19, 21
76-PV2522/E 18, 21
77-PV0077/B 16

CODE Index

77-PV3/001 59
77-PV3/002 59
77-PV3/003 59
77-PV31A05 58
77-PV31A06 58
77-PV32E05 58
77-PV32E06 58
77-PV33A05 58
77-PV33A06 58
77-PV33B05 59
77-PV33B06 59
77-PV33E05 58
77-PV33E06 58
77-PV3502 ..... 60, 61
77-PV3502/11 61
77-PV3502/L100 61
77-PV3502/L25 61
77-PV3502/L60 61
77-PV3504 61
77-PV3600/1 61
77-PV3UP10 59
77-PV40B05 ..... 26, 27, 29
77-PV40B06 29
77-PV42001 30
77-PV42002 30
77-PV42011 30
77-PV42A05 31
77-PV42A06 31
77-PV43001 30
77-PV43011 30
77-PV43012 30
77-PV43022 30
77-PV43024 30
77-PV43A05 31
77-PV43A06 31
77-PV44001 30
77-PV44002 30
77-PV44011 30
77-PV44A05 ..... 26, 31
77-PV44A06 31
77-PV45001 30
77-PV45002 30
77-PV45011 30
77-PV45A05 31
77-PV45A06 31
78-B7116 41
78-PV7015 ..... 37, 40, 41, 47
78-PV7030 ..... 36, 37, 38, 47, 48
78-PV7030/Z 38
78-PV7111 ..... 42, 43, 50
78-PV7112 ..... 45, 48
78-PV7113 45
78-PV7114 ..... 44, 45, 46
78-PV7115 42
78-PV7116 39
78-PV7118 44
78-PV7120 43
78-PV7122 43
78-PV7123 43
78-PV7130 ..... 36, 37, 38, 39, 48
78-PV7130/Z 38
78-PV7131 42
78-PV7132 42
78-PV7133 42
78-PV7134 42
78-PV7140 47
78-PV7141 47
78-PV7142 47
78-PV7145 49
78-PV7152 ..... 46, 49
78-PV7152/1 ..... 46, 49
78-PV7153 ..... 46, 49
78-PV7154 46
78-PV7160 46
78-PV7165 50
78-PV7171 47
78-PV7175 48
78-PV7176 48
78-PV7177 ..... 48, 49
78-PV7178 ..... 48, 49
78-PV7179 ..... 48, 49
78-PV7180 ..... 46, 49
78-PV7181 47
78-PV7181/A 47
78-PV7182 47
78-PV7185 51
78-PV7192 ..... 40, 41
78-PV7192/Z 41
78-PV7193 39
78-PV7193/HP 39, 51
78-PV7193/HPZ 39
78-PV7193/Z 39
78-PV7194 39
78-PV7194/HP 39, 51
78-PV7194/HPZ 39
78-PV7194/Z 39

80-PV0190 64
80-PV0190/1 64
80-PV0190/2 64
80-PV0190/4 65
80-PV0190/5 65
80-PV0190/6 64
80-PV0190/7 64
80-PV0190/A 64, 65
80-PV0190/E 64
80-PV0525/12 65
80-PV0525/13 65
80-PV0525/14 65
80-PV0525/15 65
80-PV5262 65
80-PV5263 65
80-PV5264 65
81-B0116/B 81
81-B0116/C 81
81-B0116/H1 ..... 80, 81
81-B0116/H2 ..... 80, 81
81-B0116/H3 ..... 80, 81
81-B0117/H1 81
81-B0117/H2 81
81-B0141 72
81-B0141/A 72
81-B0141/B 72
81-B0142 72
81-B0143/1 74
81-B0145/1 74
81-B0145/2 74
81-B0145/3 74
81-PV0116/F 81
81-PV0116/FZ 81
81-PV0118 ..... 78, 79
81-PV0118/1 79
81-PV0118/1Z 79
81-PV0118/A 78, 79
81-PV0143 74
81-PV0143/Z 74
81-PV0160/10 73
81-PV0161 73
81-PV0161/10 73
81-PV0161/11 73
81-PV0161/11Y 73
81-PV0161/11Z 73
81-PV0161/A 73
81-PV0161/Y 73
81-PV0161/Z 73
81-PV0260/1 75
81-PV0260/1Z 75
81-PV059/01 76
81-PV059/02 76
81-PV05902 76
81-PV05904 76
81-PV10010 72
81-PV1002 72
81-PV10020 ..... 71, 72
81-PV10030 69
81-PV1004 72
81-PV10A02 ..... 68, 69
81-PV10A04 69
81-PV10B02 ..... 68, 70, 71
81-PV10C02 ..... 68, 71
81-PV10C04 ..... 70, 71
81-PV2602 75
81-PV2604 75
81-PV6000/1 77
81-PV6002 77
82-B0116/40 81
82-B0116/45 81
82-P0172/1 74
86-D2015/A 40, 41
86-D2019 ..... 40, 41
86-D2019/Z 41

Notes

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