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CONTROLS S.p.A.
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Advanced Pavements testing systems

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This catalogue concerns an important part of our production line which includes other testing equipment for Concrete and Cement and Soil mechanics (Wykeham Farrance).

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Two great companies with compelling stories,

**IPC Global**, a pioneer and global leader for 25 years

in Dynamic Asphalt Testing Equipment and

**Controls**, a major player with 50 years’ experience

in Construction Materials Testing Equipment

have united to become

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- Create value for the customers by harnessing our combined traditional business culture and strengths
- Supply a total range of premium and exclusive products with high technological content
- Deliver first-class pre-sales and post-sales technical services

Our Corporate Conscience — a strong sense of responsibility allied to stringent business ethics — is deeply rooted in the Group’s history and will continue to guide our actions for many years to come.
Advanced Pavements testing systems

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Determination of Asphalt Mix composition
PAVELAB350
Automatic closed-system asphalt analyzer

BITUMAX
Asphalt binder analyzer by ignition method
DETERMINATION OF ASPHALT MIX COMPOSITION

Automatic closed-system asphalt analyzer

These tests methods are used for quantitative determinations of bitumen in hot-mixed paving mixtures and paving samples for specification acceptance, service evaluation, control and research. These methods prescribe the solvent or solvents that can be used for the binder extraction and recovery. The representative bitumen sample 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.

We are proposing several models of extraction system, including the Automatic Closed-system Asphalt Analyzer.

Operating Principle

The asphalt sample (maximum 3.5 kg) is placed in a washing drum lined with a sintered multilayer mesh 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 analyzer shall be connected to a suitable water cooling unit to feed the three different cooling coils of the apparatus (see Accessories).
Distinguishing features of the new generation

7” touch screen swinging panel displays the operating stage and recorded data. Machine software enable the test parameters set up.

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 available as option
- Extraction time reduced to approx. 55 minutes (including drying)
- No toxic fumes in the laboratory conforming to latest anti-pollution requirements

- Automatic sample drying after extraction
- Silent operation

Machine version incorporating balance also available (model 75-PV50A25). The sample can be weighted at the end of each stage and related data are recorded and used for automatic result calculation. All results, including those of previous tests, can be recalled for printout reports by the printer 82-P0172/B. See Accessories.

Note

The user can configure the machine for use with the following solvents:
- Perchloroethylene (tetrachloroethylene)
- Trichloroethylene
- Dichloromethane (methylene chloride)

The machine can also be used with asphalt samples containing rubber granules recycled from end of life tyres.

Level indicators are made of a high resistance material in order to be compatible with a extensive range of solvents.
The PAVELAB50 Automatic closed-system asphalt analyzer 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 three layer sintered, high resistance 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.

**Forced air circulation 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.

**Sampling device for Rotary evaporator**
A fast connection for the Rotary evaporator flask for bitumen solution collection is also available. See Accessories 75-PV5X100.

**7” Touchscreen control panel**
For controlling and operating the machine.

**Balance option**
For the accurate measurement of asphalt samples (model 75-PV5OA2S only).

**Water cooling system**
The machines have to be connected to a suitable water cooling system which is not included and have to be ordered separately. See Accessories.

**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 doors are locked when the test is running.

**Technical specifications**
- Maximum sample size: 3.5 kg
- Centrifuge rotation speed: 6000 rpm
- External cup nominal dimensions: 120 x 200 mm (diameter x height)
- Maximum filler capacity: approx. 300 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. 1400 x 750 x 1500 mm (w x d x h)
- Weight: approx. 240 kg
Ordering information
Two versions of the analyzer are proposed:
- models 75-PVS0A15
  and 75-PVS0A16
  without accessories.
- models 75-PVS0A25
  and 75-PVS0A26
  without accessories but supplied with integrated balance.

Standard version
75-PVS0A15
PAVELAB 50 Automatic Closed-System Asphalt Analyzer for separation and extraction of bitumen, filler and aggregates from asphalt samples by use of solvents. 380 V, 50-60 Hz, 3 ph.
75-PVS0A16
Same as above but 220 V, 60 Hz, 3 ph.

Accessories
Washing drums cup and closing lid
75-PVS0/KIT
Kit of accessories complete with:
75-PVS010
washing drum, 0.063 mm mesh
75-PVS040
closing lid for washing drums
75-PVS130
centrifuge cup, 120 mm diameter
75-PVS005/2
lining paper for centrifuge cup. Pack of 100.

Version incorporating balance
75-PVS0A25
PAVELAB 50 Automatic Closed-System Asphalt Analyzer for separation and extraction of bitumen, filler and aggregates from asphalt samples by use of solvents. Complete with integrated scale. 380 V, 50-60 Hz, 3 ph.
75-PVS0A26
Same as above but 220 V, 60 Hz, 3 ph.

Alternative washing drum
75-PVSX020
Washing drum, 0.075 mm mesh
75-PVSX030
Washing drum, 0.090 mm mesh
75-PVSX010/C
Washing drum, 0.063 mm mesh with traceable certificate of wire mesh opening
75-PVSX020/C
Washing drum, 0.075 mm mesh with traceable certificate of wire mesh opening
75-PVSX030/C
Washing drum, 0.090 mm mesh with traceable certificate of wire mesh opening

Solvent testing device
75-PVSX110
Testing device to verify the stability of recycled solvent from the pH value.
75-PVSX120
Solvent stabilizer. 1000 ml bottle. For stabilization of recycled solvent.

Solvent pump
75-PVSX200
Solvent pumping device for safe solvent filling

Water cooling system
75-PVSX135
Water cooling system providing water between 10 and 15°C, flow rate 5 litres/min, pressure 3 bar. 380 V, 60 Hz, 3 ph.
75-PVSX136
As above but 220 V, 60 Hz, 3 ph.
75-PVSX170
Upgrade with additional electrovalve when using cooling tap water
75-PVSX180
Fast connections for cooling pipes

Centrifuge cup
75-PVSX150
Centrifuge cup, 120 mm diameter.
75-PVS005/2
Lining paper for centrifuge cup. Pack of 100.

Connection
75-PVSX160
Device for the extraction of the centrifuge cup.

Printer
82-P0172/B
24 column serial printer. External battery charger and batteries included. 110-230 V, 50-60 Hz, 1 ph.
Asphalt binder analyzer by ignition method

**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.

**Standards**

EN 12697-39 | ASTM D6307 | AASHTO T308

The Asphalt binder analyzer is a high precision apparatus that combines an ignition oven with a continuous weighing system to monitor the loss of weight 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 Analyser is supplied complete with a double sample basket, safety cover, extraction fork and 3 metres of metal exhaust ducting.
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 thermo-regulation for both oven and afterburner
- 240 x 128 pixel large graphic display
- RS232 output for PC connection

Firmware
- Language selection
- Clock/calendar

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

Bi-directional real-time communication with the weighing system
- Test setting menu, complete with physical and descriptive sample parameters
- Calibration menu 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)

Ordering information

75-PV0008
BITUMAX Asphalt binder analyzer 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
As above but 220 V, 60 Hz, 3 ph.

75-PV0008/5
Metal stand for 75-B0008.

75-PV0008/10
Face shield

75-PV0008/12
Safety cover for sample basket.

75-PV0008/14
Additional double sample basket

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.

Example of printed report

Accessories

Metal stand 75-PV0008/5,
safety visor 75-PV0008/10 and exhaust ducting
(supplied with the machine)
Asphalt Sample Preparation and Compaction
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 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.
Detail of aggregate loading

The mixing cylinder is rotated by a motorized tilting system for easy unloading. The tilting angle is adjustable to 130° to speed up the unloading operation.

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
- Tilting angle up to 130°
- 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
77-PV0077/C
BITUMIX automatic laboratory mixer, 30 litres capacity.
380-400 V, 50 Hz, 3 ph.

77-PV0077/CZ
As above but 220 V, 60 Hz, 3 ph.
The PReSBOX provides the latest in asphalt specimen preparation and mix evaluation technology. PReSBOX produces high quality asphalt prisms from which beams and cylinders with excellent air voids distribution, homogeneity and particle orientation can be cut.

The unique shearing action of the PReSBOX closely replicates the conditions under which asphalt is placed in the field and produces specimens with excellent homogeneity and volumetric properties, giving a exceptional measure of workability.

The PReSBOX also provides an accurate measure of the workability (relative effort required for compaction) of Hot Mix Asphalt (HMA) needed in the field to achieve a target void content.

The PReSBOX Shearbox Compactor features a PC interface for user entry of compaction parameters, and provides a real-time graphic display of data, e.g. specimen height, vertical stress, shear stress and air voids per cycle. Controlling PReSBOX is IPC Global’s Multi-Axis Control System (IMACS). IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.

The PReSBOX features an ergonomic interaction of users with the testing machine

**Three simple steps**

PReSBOX has been designed to replicate the field properties of asphalt, in a simple and efficient manner.

**Charging the compaction mould with loose asphalt**

Using the distribution chute provided, pour HMA into the compaction mould. Slots in the distribution chute ensure the material is tipped uniformly into the PReSBOX. Discharge gates at the bottom allow the material to fall freely into the mould avoiding segregation.

**Commencing the test**

The mould is then pushed into the PReSBOX and automatically locked into place. Using IPC Global’s world renowned UTS Software the user can set the required compaction parameters. The PC controlled compaction process can then be commenced.

**Removing the Sample**

The compaction mould is then unlocked, pulled into the ejection position and the sample is elevated to a safe height to allow for removal and cooling.
Specifications
- Shearing motion: Electromechanically driven at 4°
- Vertical stress: Pneumatic user defined up to 2 MPa
- Specimen size: 450 mm x 150 mm x 120 – 185 mm (l x w x h)
- Integrated specimen extruder
- Specimen Loading: Easy loading with included accessory kit (includes: distribution chute, levelling tool & comb)
- Compaction Frequency: 3.7 cycle/min +/- 16 s/cycle
- Mould hardness: 50 Rockwell C (minimum)
- Platen Hardness: 50 Rockwell C (minimum)
- Mould Surface: finish smoother than 1.6 μm
- Loading Platen Size: 448 mm x 149 mm (l x w)
- Loading Platen Finish: smoother than 1.6 μm
- Number of cycles: user definable (unlimited)
- Air Supply: clean dry air supply at minimum 600 kPa
- Size (h x w x d):
  1540 mm x 1765 mm x 1050 mm
- Weight: 1100 kg

Ordering Information
77-PV46A02
PReSBOX, Asphalt Prism Shearbox Compactor.
220 - 240 V, 50 - 60 Hz, 1 ph.

Accessories
79-PV71102
Pneumatic filtration kit - wall mount, 12 bar
77-PV46202
Heater to pre-heat the box walls.
220 V, 50 - 60 Hz, 1 ph
77-PV46204
Heater to pre-heat the box walls.
110 V, 60 Hz, 1 ph

Perfectly Uniform Specimens
Asphalt prisms prepared in the PReSBOX compactor can be sawn using Universal Automated Asphalt Saw (Autosaw, see page 30) or cored using the Multi Core Drill (see page 26) to produce prismatic beams or cylindrical specimens suitable for testing in the Asphalt Mixture Performance Tester (AMPT), Four Point Bend Apparatus, Asphalt Standards Tester, TSRStplus or UTM Systems.
Specimens cut from PReSBOX prisms have identical properties with uniform air voids distribution and particle orientation ensuring consistent and repeatable test results.

Specimens cut from the PReSBOX
- Prismatic specimen produced by the PReSBOX
- Up to four 70mm wide prismatic specimens
- Up to six 50mm wide prismatic specimens
- Up to four 100mm diameter cylindrical specimens
- Many cylinder samples can be cored from the prismatic specimen using the Multi Core-Drill
- Up to two 150mm diameter cylindrical specimens for Texas Overlay Test specimens

PReSBOX mould heater
The Slab compactors can compact asphalt slabs to a target density applying specific loads corresponding to those of pavements rollers used in the highway construction. The slab produced can be used for:

- Wheel tracking test down to 38 mm thickness
- Cored to provide specimens for indirect tensile, static and dynamic creep tests
- Cut into beams for bending fatigue tests

The Slab compactors are proposed in two versions:

**Advanced model**

- 77-PV41C05
- 77-PV41C06

which also satisfy the compaction procedure of the brand new EN 12697-33 method 7.3, and include other important features as specified afterwards

**Standard model**

- 77-PV41A02
- 77-PV41A04

General description

(both models)

Electromechanical slab compactors feature a compacting system by roller segment head radius 535 mm. The roller segment freely moves by simple friction for better compaction uniformity. A brushless motor (Standard models), or stepper motor (advanced motors) moves vertically the roller segment under displacement control. The vertical load is applied orthogonally to the axis of the travel motion. The mould carriage moves back and forth by linear movement. The longitudinal (major) mould dimension correspond to the compaction direction so it is possible to obtain specimens of the proper length conforming to Standards. The lifting machine cover permit an easy access to the mould area. In the “rest” position, the mould is close to the operator for easy positioning while the roller segment is lifted and positioned at the back of the machine.
Multisize advanced model

Main Features

> Completely electromechanically operated
> Possibility to program user defined procedures as free combination of load and displacement (or combined) controlled cycles
> Completely electromechanically operated
> Conforming to EN 12697-33, 5.2 method and ASTM D8079
> 21” All-in-one touchscreen PC controlled, PC and software included
> Includes the compaction procedure defined in the brand new EN 12697-33 method 7.3, providing at the beginning a controlled displacement compaction which can grant a flat surface followed by a load compaction phase, which can replicate the real compaction on the road surface
> Base and foot adjustable heating system available as option
> Mould dimensions: 500 x 400, 500 x 300, 400 x 300, 300 x 300 and 320 x 260 mm, 195 mm height
> Compaction direction in the longest (major) mould dimension to obtain specimens of the proper length conforming to Standard
> Vertical balanced of sliding cover for easy access and complete three side view
> Maximum compaction load 30 kN
> User defined controlled linear speed up to 300 mm/sec and adjustable pause at the mould inversion point
> Ideal for producing test beams for 4-Point bending (EN 12697-24, EN 12697-26, AASHTO T321) and slabs down to 38 mm
> Vibrating roller option, adjustable from 10 to 50 Hz
> PRO-COMPACT™ closed loop control slabs (see next page)
> Customization of compacting cycle which can be saved and recalled from the data base

IMPORTANT NOTE
Performance of the energy controlled compaction procedure conforming to EN 12697-33 Annex 7.3.2

The combined load/displacement compaction procedure provides at the beginning of the test a controlled displacement compaction, which can grant a flat surface of the compacted slab, followed by a controlled load compaction phase, which can replicate the real compaction on the road surface.

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.
ASPHALT SAMPLE PREPARATION and COMPACTION

Multisize standard model

**main features**

- Completely electromechanically operated
- Conforming to EN 12697-33, 5.2 method and ASTM D8079
- 8" touchscreen controller
- Automatically compacts in displacement controlled mode up to target density/height or up to the (user selectable) load limit
- Mould dimensions: 500 x 400, 500 x 300, 400 x 300, 300 x 300 and 320 x 260 mm, 195 mm height
- Compaction direction in the longest (major) mould dimension to obtain specimens of the proper length conforming to Standard
- Vertical balanced of sliding cover for easy access and complete three side view
- Maximum compaction load 30 kN
- User defined controlled linear speed up to 300 mm/sec and adjustable pause at the mould inversion point
- Ideal for producing test beams for 4-Point bending (EN 12697-24, EN 12697-26, AASHO T321) and slabs down to 38 mm
- Adjustable heating control system of the sector heads available as option
- Vibrating roller option, adjustable from 10 to 50 Hz
- *PRO-COMPACT closed-loop control slab

*PRO-COMPACT closed-loop.

Pro-compact closed-loop is an innovative mechanical and electronic control that combines orthogonality of the load, pendulum motion of the head and sinusoidal non-friction forward-reverse carriage movement. This results in an optimally compacted sample that features Planarity, Regularity and hOmmogeneity (PRO).
### Technical specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Multisize Advanced model 77-PV41C05 / 77-PV41C06</th>
<th>Multisize Standard model 77-PV41A02 / 77-PV41A04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine control</strong></td>
<td>Vertical load and/or displacement control of the roller segment by stepper motor, measured directly by linear transducer to verify in real time the specimen thickness for more accuracy. Real time measurement and control with a closed loop logic of compaction load by two precision strain gauge load cells. This system permits to verify possible discrepancies of the compaction due to the wrong distribution of asphalt in the mould and to any other unexpected malfunctions, with warning to the operator. Machine fitted with sensors to confirm the mould in position and for the automatic set-up of the horizontal travel.</td>
<td>-Vertical displacement of the roller segment by brushless motor measured directly by encoder to verify in real time the specimen thickness. -Machine fitted with sensors to confirm the mould in position and for the automatic set-up of the horizontal travel.</td>
</tr>
<tr>
<td><strong>Firmware /Software</strong></td>
<td>Software</td>
<td>Firmware</td>
</tr>
<tr>
<td></td>
<td>-21” touchscreen integrated PC</td>
<td>Set up of compaction procedure with displacement control with load, density or thickness limit. -Selection, customization and storing of test parameters -Customization of the compacting procedure to be saved and recalled from the data base -Graphic display of roller vertical displacement vs. number of passes or load vs. displacement -Possibility to pre-set a load threshold to start compaction at the contact of the sector head with the specimen.</td>
</tr>
<tr>
<td><strong>Max. vertical force</strong></td>
<td>30 kN</td>
<td>30 kN</td>
</tr>
<tr>
<td><strong>Load measurement</strong></td>
<td>By two precision load cell</td>
<td>-</td>
</tr>
<tr>
<td><strong>Compacting device</strong></td>
<td>Roller segment, radius 535 mm</td>
<td>Roller segment, radius 535 mm</td>
</tr>
<tr>
<td><strong>Back and forth horizontal travel</strong></td>
<td>Adjustable: 300/320 mm</td>
<td>Adjustable: 300/320 mm</td>
</tr>
<tr>
<td></td>
<td>400 mm</td>
<td>400 mm</td>
</tr>
<tr>
<td></td>
<td>500 mm</td>
<td>500 mm</td>
</tr>
<tr>
<td></td>
<td>By software</td>
<td>By control panel</td>
</tr>
<tr>
<td><strong>Trolley speed</strong></td>
<td>Adjustable up to 300 mm/s</td>
<td>Adjustable up to 300 mm/s</td>
</tr>
<tr>
<td></td>
<td>Adjustable pause at inversion point</td>
<td>Adjustable pause at inversion point</td>
</tr>
<tr>
<td><strong>Mould dimensions</strong></td>
<td>320 x 260 x 195 mm</td>
<td>320 x 260 x 195 mm</td>
</tr>
<tr>
<td></td>
<td>300 x 300 x 195 mm</td>
<td>300 x 300 x 195 mm</td>
</tr>
<tr>
<td></td>
<td>400 x 300 x 195 mm</td>
<td>400 x 300 x 195 mm</td>
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<tr>
<td></td>
<td>500 x 300 x 195 mm</td>
<td>500 x 300 x 195 mm</td>
</tr>
<tr>
<td></td>
<td>500 x 400 x 195 mm</td>
<td>500 x 400 x 195 mm</td>
</tr>
<tr>
<td><strong>Roller vibration</strong></td>
<td>Yes, adjustable frequency from 10 to 50 Hz (optional)</td>
<td>Yes, adjustable frequency from 10 to 50 Hz (optional)</td>
</tr>
<tr>
<td><strong>Heated foot</strong></td>
<td>Yes (optional)</td>
<td>Yes (optional)</td>
</tr>
<tr>
<td><strong>Heated base</strong></td>
<td>Yes (optional)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Electrical supply</strong></td>
<td>380 V, 50 Hz, 3 ph, or 220 V, 60 Hz, 3 ph</td>
<td>220 V, 50 Hz, 1 ph, or 110 V, 60 Hz, 1 ph</td>
</tr>
<tr>
<td><strong>Power rating</strong></td>
<td>3000 W</td>
<td>3000 W</td>
</tr>
<tr>
<td><strong>Overall dimensions (lxwxh)</strong></td>
<td>1300 x 800 x 2040 mm</td>
<td>1300 x 800 x 2040 mm</td>
</tr>
<tr>
<td><strong>Weight approx.</strong></td>
<td>650 kg</td>
<td>650 kg</td>
</tr>
</tbody>
</table>

*To produce slabs down to 38 mm thickness. Maximum slab thickness varies with bitumen mixes composition.*
Ordering information

**77-PV41C05**
Advanced Multi-size electromechanical slab compactor. For compaction of moulds 500x400 mm, 500x300 mm, 400x300 mm, 300 x 300 mm and 320 x 260 mm, 195 mm high. Includes the compaction procedure defined in the brand new EN 12697-33 7.3 and the Pro-CoMPACT control feature. Controlled by all-in-one touch-screen integrated PC, load and deformation measurement, software controlled mould travel, performing user defined free combination of load/displacement controlled compaction sequences. Supplied without moulds and compaction sector heads (see accessories).
380V/50Hz/3ph+N

**77-PV41C06**
Advanced Multi-size electromechanical slab compactor. Same as above but 220 V, 60 Hz, 3 ph

**77-PV41A02**
Standard Multi-size electromechanical slab compactor. For compaction of moulds 500x400 mm, 500x300 mm, 400x300 mm, 300 x 300 mm and 320 x 260 mm, 195 mm high. Supplied without moulds and compaction sector heads (see accessories). 230 V, 50-60 Hz, 1 ph

**77-PV41A04**
Standard Multi-size electromechanical slab compactor. Same as above but 110 V, 60 Hz, 1 ph
Accessories (for all models)

Interchangeable sector heads

**77-PV42001**
Interchangeable sector head to produce slabs 320 mm long x 260 mm wide

**77-PV43001**
Interchangeable sector head to produce slabs 300 mm long x 300 mm wide

**77-PV44001**
Interchangeable sector head to produce slabs 400 mm long x 300 mm wide

**77-PV45001**
Interchangeable sector head to produce slabs 500 mm long x 300 mm wide

**77-PV46001**
Interchangeable sector head to produce slabs 500 mm long x 400 mm wide

Interchangeable sector heads complete with heating system
To be completed with 77-PV43012 temperature control system (see Upgrading options)

**77-PV42011**
Interchangeable sector head to produce slabs 320 mm long x 260 mm wide. Complete with heating system.

**77-PV43011**
Interchangeable sector head to produce slabs 300 mm long x 300 mm wide. Complete with heating system.

**77-PV44011**
Interchangeable sector head to produce slabs 400 mm long x 300 mm wide. Complete with heating system.

**77-PV45011**
Interchangeable sector head to produce slabs 500 mm long x 300 mm wide. Complete with heating system.

**77-PV46011**
Interchangeable sector head to produce slabs 500 mm long x 400 mm wide. Complete with heating system.

Moulds

**77-PV42102**
Steel mould 320x260 mm, 195 mm high, to be filled at 155 mm max

**77-PV43102**
Steel mould 300x300 mm, 195 mm high, to be filled at 155 mm max

**77-PV44102**
Steel mould 400x300 mm, 195 mm high, to be filled at 155 mm max

**77-PV45102**
Steel mould 500x300 mm, 195 mm high, to be filled at 155 mm max

**77-PV46102**
Steel mould 500x400 mm, 195 mm high, to be filled at 155 mm max

Upgrading options to be specified at the time of order

Heating control system of sector heads fitted with heating system

**77-PV43012**
Compaction sector heating system. Adjustable up to 140°C

Heated base option
only suitable for the Advanced models.

**77-PV41C00/UP**
Heating system incorporated in mould base support, to maintain test temperature. Adjustable up to 120°C.

Vibrating roller option
adjustable from 10 to 50 Hz

**77-PV43042**
Vibrating roller option. For 220 V, 50 - 60 Hz, 1 ph models

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

Heating system incorporated in mould base support
Specimen preparation and ultimately specimen quality are critical factors in material characterization. IPC Global’s Multi Core-Drill is a superior laboratory asphalt core drill whose robust and rigid design provides a precise coring of asphalt prisms, cylindrical and slab samples to the highest quality.

The Multi Core-Drill has been designed to be easy to use, flexible and adaptable providing users with precise drilling capabilities. This will enable users to have absolute confidence in the quality of their specimens and the reliability of their test results.

Designed, in particular, for coring samples 100 mm dia., 150 mm high for Dynamic Modulus (AMPT, AASHTO TP79) and 30 to 75 mm high for Indirect Tensile Tests (EN 12697-24 and 26) coming, as example, from Gyratory compactors.

Included as standard the Multi Core Drill comes with the support and clamping device that sits inside the stainless steel tray and ensures asphalt samples produced by IPC Global’s PReSBOX are held firm and in the correct position for drilling.

The translational movement (Bidirectional movement), combined with the sliding table, allows to make the largest number of cores from the same sample (in case of small cores – see images). See upgrading options.

Technical specifications
- Motor speeds*: 540, 1300, 1800 rpm (for 50 Hz use) and 560, 1300, 1850 rpm (for 50 Hz use)
- Cylindrical sample size:
  - up to 160 mm dia., max 400 mm high
- Prismatic samples size:
  - up to 450 x 180 x 150 mm
- Coring diameter: from 38 to 150 mm (see accessories)
- Dimensions: 1400 x 600 x 800 mm (h x w x d)
- Weight: 85 kg

---

Multi Core-Drill
Asphalt Core-Drill

76-PV75202 | 76-PV75204 series

Three (selectable) speed compact core drill motor specifically designed for high performance and long life.

Guided rail provides a smooth and precise track for the drill to travel while cutting the sample.

Heavy duty feed handle can be mounted either side of the carriage for ease of use.

Upgrade option allows for bidirectional adjustments of the drill and tray for parallel coring, thus increasing the number of cores available from a single sample.

Available with a wide range of diamond core bits for maximum versatility.

A unique sliding table and stainless sample tray provide easy sample alignment for precise cut positioning, catching debris, long life and easy cleaning.

Transparent protection/splash covers conform to CE standards for safety and ease of cleaning.

Asphalt Core-Drill

[Image of Multi Core-Drill]
Coring cylindrical asphalt samples

Applications

Transversal coring
The innovative transversal coring clamp system allows users to obtain cylindrical asphalt specimens in 38, 50 and 75 mm dia. This unique accessory (see accessories, model 76-PV75220) ensures that samples, both 100 and 150 mm dia., are securely clamped whilst drilling is commenced to provide perfect specimens every time.

Coring cylindrical asphalt samples
A unique, easy and intuitive cylindrical clamp accessory allows users to quickly and easily core asphalt specimens from cylindrical samples produced in gyratory compactors up to 150 mm dia.

See accessories 76-PV75210.

The same coring can also be done, as alternative, with the KorBit machine model 76-PV75302 standardly supplied complete with adjustable clamp. See page 28.

Included support and clamping device
Included as standard the Multi Core-Drill comes with the support and clamping device that sits inside the stainless steel tray and ensures asphalt samples produced by IPC Global’s PReSBOX are held firm and in the correct position for drilling. PReSBOX samples can also be placed in the stainless steel sample tray horizontally to allow for coring of specimens 150mm diameter.

Transversal bidirectional movement for parallel coring option
The Multi Core Drill can also be provided with an optional device which allows for up to 80 mm transversal movement of the drill for parallel coring. This device, in combination with the longitudinal movement of the carriage, ensures high cutting alignment and increases the number of cores obtained from the same prismatic sample.

Bidirectional coring is suitable for 38, 50 and 75 mm dia.

See upgrading options, 76-PV 75200/UP.
To be specified at time of order.
Multi Core-Drill

Ordering information

**76-PV75202**
Multi Core-Drill, laboratory asphalt core drilling machine with clamps for prisms up to 450 x 180 mm. Three speeds: 540, 1300, 1800 rpm. 2200 W, 10 A. 230 V, 50 - 60 Hz, 1 ph*

**76-PV75204**
Multi Core-Drill, laboratory asphalt core drilling machine with clamps for prisms up to 450 x 180 mm. Three speeds: 560, 1300, 1850 rpm. 2050 W, 16 A. 110 V, 60 Hz, 1 ph

*The 76-PV75202 model can also operate at 220V, 60 Hz. In this case the speeds are 560, 1330 and 1850 rpm.

Upgrading options

**76-PV75200/UP**
Upgrade with translation device for transversal movement of the drill (up to 80 mm translation) for parallel coring. Suitable for 38, 50 and 75 mm diameter cores.

Accessories

**76-PV75210**
Clamp system for overcoring on cylindrical specimens from 50 mm to 150 mm diameter

**76-PV75220**
Accessory for transversal coring on 100 or 150 mm dia. cylindrical samples, length up to 300 mm

**76-PV75230**
Spacer for vertical coring on samples thinner than 120 mm

Core bits

Thin wall diamond type, fixed standard coupling 1 ¼”W, 400 mm total length, for the best alignment, plus fast and easy fitting and disassembling.

83-C0323
Diamond core bit to take 150 mm dia. sample.

83-C0322
Diamond core bit to take 100 mm dia. sample.

83-C0321
Diamond core bit to take 75 mm dia. sample.

83-C0320
Diamond core bit to take 50 mm dia. sample.

83-C0319
Diamond core bit to take 38 mm dia. sample.

83-C0324

KOR-BIT machine

for coring cylindrical samples only

Coring cylindrical asphalt samples

Coring from cylindrical sample can also be performed, as alternative, using the KOR-BIT machine, model 76-PV75302, similar model with fixed base instead of the mobile longitudinal base which distinguish the Multi Core-Drill. KOR-BIT is supplied complete with adjustable clamp identical to the accessory 76-PV75210.

For more information visit our web site.
Asphalt saws

The cutting machines proposed in the market are normally standard saws for field use in the building industry, modified to clamp and to cut samples. They do not assure the rigidity and stability to obtain precisely specimens for laboratory use. For this reason we have realized and produced specifically designed Asphalt saws to fulfill the stringent requirements of the relevant Standards and, consequently, of the Research and Central laboratories.

**Applications**

- Cutting of prisms and slabs to be used in Four Point Beam Bending tests according to EN 12697-24D and 26B and AASHTO T321
- Cutting of trapezoidal specimens to be used in Two Point Beam Bending tests according to EN 12697-24A and 26A
- Cutting AMPT cylindrical specimens round cores
- Cutting TSRST specimens according to EN 12697-46 and AASHTO TP10
- Cutting and dressing of Wheel Tracking slabs or cores according to EN 12697-22 and AASHTO T324
- Cutting Prall test specimens according to EN 12697-16
- Cutting Overlay test specimens according to TX-248-F
- Cutting Semi-Circular Bend test specimens according to EN 12697-44 (except for the notch)
- Cutting concrete slabs and cylinders
- Cutting accurately 100, 150 and 200mm dia. cylindrical cores to different lengths.
- Cutting Prall test specimens according to EN 12697-16
- Cutting Overlay test specimens according to TX-248-F
- Cutting Semi-Circular Bend test specimens according to EN 12697-44 (except for the notch)
- Cutting concrete slabs and cylinders
- Cutting accurately 100, 150 and 200mm dia. cylindrical cores to different lengths.

**Models available**

The asphalt saw is proposed in two versions:

**AUTOSAW II**

Automated Asphalt Saw model 77-PV47105 and 77-PV47106, featuring high precision automated specimen clamping and sawing and protection cabinet which is essential in working environment not to be contaminated by powder, humidity and water spray.

**MULTISAW**

Asphalt Saw, model 77-PV47005 and 77-PV47006, performing, in manual mode, all the cutting operation of the Autosaw II automated model.
The Autosaw is an automated specimen clamping and sawing system for fast, accurate cutting of beams from asphalt prisms prepared in the PReSBOX or slab compactor and for trimming cylinders from GALILEO, GYROCOMP, SERVOPAC and other gyratory compactors. An easy-to-use spacer system sets the specimen position and allows beams or cores to be cut without the need for measurement. The saw blade advances and retracts to the home position automatically. The Autosaw includes the multislab jig. Completed with the suitable accessory, can be used to cut also asphalt cores at the desired length. It can be fitted with 650 mm dia. blade with a maximum cutting depth of 200 mm and prism length of 500 mm (extendable to 700 mm, on request). Cutting speed is operator selectable for optimum specimen finish and throughput. The asphalt saw allows an easy-to-use sawing system for fast, accurate cutting of beams for asphalt prisms to be used in the different tests. Complete with table and clamping device for slabs, water pump for cooling the blade and filtering system.

Cutting blade and accessories to cut asphalt cores are not included. See accessories. The machine include operator protection cabinet which is also essential in location not to be contaminated by powder, humidity and water spray.
AUTOSAW II

Designed with easy-to-use spacers and automatic controls that allow for perfect specimen dimensions for AASHTO, ASTM, EN, AS and other international Standards without the need for manual measurement.

Protection cabinet with several automatic locking access doors to ensure unparalleled safety and clean operation in laboratory environments.

Touch screen CPU control allows for easy set-up including carriage speed and retraction sequence. Separate carriage speeds can be set and adjusted during operation for cutting and retraction sequence.

Dynamic braking for rapid stopping when system is switched off.

Numerous interlocks to ensure operator safety and with rapid blade braking when the doors are opened.

Compressed air gun for cleaning specimens and sawing system.

Stainless steel water tray catches cooling water and debris for long life and easy cleaning.

Fixed positions and reference blocks allow users to easily obtain exact dimensions of the most common international standards. Additional dimensions can be obtained using the integrated ruler.

Intelligent system with adjustable limit switches allow for repetitive cuts with minimal carriage overtravel saving time.
AUTOSAW II

Technical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade diameter</td>
<td>650 mm</td>
</tr>
<tr>
<td>Max cutting depth</td>
<td>200 mm</td>
</tr>
<tr>
<td>Cores*</td>
<td>100, 150 or 200 mm dia.</td>
</tr>
<tr>
<td>Prism length*</td>
<td>Max 500 mm</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Length, perpendicularity and flatness +/- 1% max., according to Standards</td>
</tr>
<tr>
<td>Blade speed</td>
<td>1400-1680 rpm (50/60 Hz)</td>
</tr>
<tr>
<td>Blade traverse</td>
<td>0-200 mm/min (variable speed)</td>
</tr>
<tr>
<td>Blade retraction traverse</td>
<td>0-999 mm/min (variable speed)</td>
</tr>
<tr>
<td>Air supply for clamping</td>
<td>700 kPa min</td>
</tr>
<tr>
<td>Cutting advancement</td>
<td>Automatic speed control with variable stop and retract control sensors</td>
</tr>
<tr>
<td>Cooling</td>
<td>Water recirculation pump and stainless steel tank (included)</td>
</tr>
<tr>
<td>Power supply</td>
<td>5 kW</td>
</tr>
<tr>
<td>Voltage</td>
<td>400 V, 50 Hz, 3 ph or 220 V, 60 Hz, 3 ph</td>
</tr>
<tr>
<td>Dimensions (l x w x h)</td>
<td>2000 x 800 x 1700 mm</td>
</tr>
<tr>
<td>Weight approx.</td>
<td>650 kg</td>
</tr>
</tbody>
</table>

*Models suitable for cores 38 to 200 mm dia. and prism up to 700 mm, available on request

Ordering Information

77-PV47105
AUTOSAW II, Automated Asphalt Saw, complete with asphalt Multi-slab Jig. Blade not included.
400 V, 50 Hz, 3 ph.

77-PV47106
As above but 220 V, 60 Hz, 3 ph.

Accessories

Important note: All the following accessories are also suitable for the MULTISAW 77-PV47000 manual model, except for the 77-PV47011 Automatic core docking jig.

77-PV47011
Automatic core docking jig for round cores, 100 or 150 mm diam., to cut automatically samples from 10 to 200 mm length.

77-PV47013
Manual core docking jig for round cores, 100 to 150 mm diam., to cut samples with manual feeding, from 10 to 300 mm length.

77-PV47015
Manual core docking jig for round cores, 200 mm diam., to cut samples with manual feeding, from 10 to 300 mm length.

77-PV47020
Trapezoidal specimens jig to be used in Two Point Bending Test, according to EN 12697-24 and 26.

77-PV47025
Jig for Wheel Tracking cores according to AASHTO T324 and for Semi-Circular Bending Tests according to EN 12697-44 (except for the notch), and for Disk Shaped Compact Tension Sample according to ASTM D7313. Notch and holes not included. 77-PV47011 or PV47013 is also required.

77-PV47030
Jig for Texas Overlay Test according to TX-248-F. 77-PV47011 or PV47013 is required.

77-PV47000/1
Diamond blade 650 mm dia. for asphalt (also for MULTISAW)

77-PV47000/2
Sacrificial PVC tube for 100 mm dia. cores. (also for MULTISAW)
MULTISAW is a universal sawing system for fast, accurate cutting of beams from prisms and for trimming cylinders. An easy-to-use spacer system sets the specimen position and allows beams or cores to be cut without the need for measurement. The saw blade advances and retracts to the home position by a user-friendly hand wheel.

The MULTISAW includes the multislab jig, complete with table and manual clamping device for slabs, water pump for cooling the blade. Completed with the suitable accessory, it can be used to cut also cores at the desired length. It can be fitted with 650 mm dia. blade with a maximum cutting depth of 200 mm and prism length of 500 mm (extendable to 700 mm, on request).

Ordering information
77-PV47005
MULTISAW, asphalt saw, complete with multi-slab jig. Blade not included. 400V/50/3ph
77-PV47006
As above but 220 V, 60 Hz, 3 ph.

Accessories (see page 32)

77-PV47015
Manual core locking Jig for round cores, 200 mm diam., to cut samples with manual feeding, from 10 to 300 mm length.

77-PV47000/1
Diamond blade 650 mm dia. for asphalt

77-PV47000/1C
Diamond blade 650 mm dia. for concrete (only for MULTISAW)

77-PV47020
Trapezoidal specimens jig to be used in Two Point Bending Test, according to EN 12697–24 and 26.

77-PV47025
Jig for Wheel Tracking cores according to AASHTO T324 and for Semi-Circular Bending Tests according to EN 12697–44 (except for the notch), and for Disk Shaped Compact Tension Sample according to ASTM D7313. Notch and holes not included. 77-PV47011 or PV47013 is also required.

77-PV47030
Jig for Texas Overlay Test according to TX-248-F. 77-PV47011 or PV47013 is required.

Technical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade diameter</td>
<td>650 mm</td>
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<td>Max cutting depth</td>
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<td>Cores*</td>
<td>100 or 150 mm</td>
</tr>
<tr>
<td>Prism length*</td>
<td>Max 500 mm</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Length, perpendicularity and flatness +/-1% max. according to Standards</td>
</tr>
<tr>
<td>Blade speed</td>
<td>1400–1680 rpm (50/60 Hz)</td>
</tr>
<tr>
<td>Cooling</td>
<td>Water recirculation pump and tank (included)</td>
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</tr>
<tr>
<td>Dimensions (l x w x h)</td>
<td>2000 x 800 x 1700 mm</td>
</tr>
<tr>
<td>Weight approx.</td>
<td>450 kg</td>
</tr>
</tbody>
</table>

*Models suitable for cores 38 to 200 mm dia. and prism up to 700 mm, available on request.
Rheological properties of bituminous mixtures
The completely new Galileo range represent a true Copernican Revolution in the field of gyratory compaction. They incorporate innovations that will create a paradigm shift and completely change the established status quo.
GALILEO fully electromechanical Gyratory compactors

Models available in two versions:

78-PV20G02 GALILEO
78-PV20R02 GALILEO Research

Common features (see details on page 43)

A robust precision-engineered steel structure incorporating the EmS Electromechanical servo-actuation mechanism for vertical load application and “Orbital” proprietary gyration and mould rotation system (Patent pending) delivering highly accurate and repeatable test results, together with stiffness and angle stability values that fall comfortably within the limits defined in EN 12697-31. The large 7" user-friendly integrated colour touchscreen control panel shows the test graph in real time.

The on-board firmware includes nine languages and also offer the option to control the tests from a PC.

A traceable calibration certificate conforming ASTM & AASHTO Standards is also included.

GALILEO 78-PV20G02 version can be upgraded as option with motorized integrated extruder, shear measurement system and PC software

GALILEO Research 78-PV20R02 version includes the motorized integrated Extruder, the Shear measurement system, the Electromechanical Automatic EmS angle measurement system (set and displayed on the control panel) and PC software.

Common upgrading options
Both versions, GALILEO and GALILEO Research, can be upgraded with an integrated balance to weight and to calculate the density, and the traceable calibration certificate conforming EN Standard. See page 43.

Operating principle
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 static 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.
• High precision, robust load mechanism combined with an extremely rigid frame assures high accuracy and repeatability.

• Load cell fitted directly on the vertical actuator for accurate load measurement and feedback control.

• Quick and easy manual/mechanical adjustment of the gyratory angle shown on the display (Galileo only).

• User defined axial stress and speed of rotation.

• Sliding transparent door with safety interlock.

• Catch tray to collect expelled liquids using perforated moulds.

• Fresh concrete configuration available

• Easy control using the integrated 7” colour touchscreen control panel or connected PC.

• User friendly PC software for data analysis and test set up. Remote communication is available to receive immediate diagnostics.

• Automatic data saving on USB or on Windows PC.

• Lightweight yet robust moulds strictly comply with international standards.

• Safe and easy mould insertion and extraction with automatic lifting ensures low effort for the operator and higher productivity.

• Simultaneous extraction of last specimen while compacting the next specimen for higher productivity.

• Easy specimen extraction with the integrated extruder (optional).
In addition to the Galileo unique features, Galileo Research includes exclusive features here below.

> Perfect gyratory angle with real-time closed loop automatic angle adjustment recovering compliance and minor strains independently from the vertical load.

> Easy and accurate motorised regulation of the gyratory angle set and displayed from the control panel.

> Possibility to automatically set the zero angle at the end of the test.

> Real-time direct shear and torque resistance measurement. Automatic calculation of the compaction energy, an important parameter for Research (Optional for Galileo).

> Automatic weight acquisition and density calculation with the integrated balance (optional for both version).
Figure 1 shows a diagram of the ORBITAL system which is characterized by the rotation of the mould around its inclined axis and the micrometrical adjustment of the gyroratory angle from 0° to 3° by means of a mechanical device—in the Galileo version—or by the EmS electromechanical servo actuation technology—in the Galileo Research version (see next page).

The result of the load pressure on the specimen and the well known self balancing tendency of the gyroratory axis keep the mould against two roller bearings placed on 120° at the rear, leaving the front access and the entire front of the machine completely free.

The mould motion is generated by the rotation of the mould around its own axis. An external observer sees the mould rotating around its own inclined axis on the pre-set gyroratory angle, figure 2A. However, if the observer were positioned at the specimen centre, he would see the gyroratory motion of the specimen itself, as shown in fig. 2B.

An example of this is what we notice as we stand on the earth. We see the sun rotating around the earth, when in fact the opposite is true: the earth is rotating around itself (and around the sun). Hence Galileo’s famous exclamation: “And yet it moves”.

This is why we have named this system “ORBITAL,” the ingenious, patent-pending mechanism at the heart of the Galileo gyroratory compactors.
Galileo gyratory compactors benefit from IPC Global’s new EmS “Electromechanical Servoactuation” technology. EmS technology is environmentally friendly and clean to operate, requiring no compressed air or hydraulic oil. It offers excellent reliability, accurate testing and lower maintenance requirements. The intuitive design ensures it can be quickly and easily maintained.

The components of the EmS “Electromechanical Servoactuation” system are:

- Vertical load application system, including:
  - Loading by high performance motor, able to deliver 17kN
  - Direct load measurement by load cell
  - Horizontal recirculating ball linear guides for the upper carriage, enabling a high precision parallelism factor between upper and lower plates, far exceeding the limits of relevant standards

- Sophisticated PID closed-loop load control, ensuring load is reached fast, smoothly and accurately and then maintained with precision throughout the test within 2% of every gyration (far exceeding relevant standards). The load cell feedback allows high load accuracy from very low loads, making Galileo suitable for special applications, like fresh concrete compaction. This performance is not possible with traditional indirect measuring systems such as pressure transducers.

- Closed-loop angle setup and control system mean that the gyratory angle can be set at the start of the test and be maintained constant at a fixed angle (between 0° and 3°) throughout the test, with precision and accuracy unachievable by traditional systems, with open-loop mechanical adjustment of the angle. The electronic control allows the user to set the automatic mould return to 0° at the end of compaction, to obtain specimens with perfect perpendicularity between the parallel faces and the cylindrical surface.

The “ORBITAL” patent-pending, smart intelligent-easy mechanism is the heart of the new IPC Global-Controls Group gyratory compactor and we modestly believe it is worthy of the name of the famous scientist Galileo.
Galileo systems include a smart controller with a wide 7” 16:9 colour touch screen control panel. An intuitive and user-friendly graphical interface with clear, high contrast design pictograms allows for:

- User input of test parameters, choosing from preset pattern related to relevant Standards or user customizable patterns. The servo-controlled operation of the machine allows vertical stress, rate of gyration and gyroratory angle* to be quickly modified from the control panel or PC
- Displaying and plotting either:
  - height
  - load
  - density
  - shear stress
  - angle
  - compaction energy
against gyration cycles in real time. Test data may be stored and retrieved or transferred to other software analysis packages.

Shear stress and compaction energy versus cycles can address to a more complete estimate of bituminous mix with relation to the volumetric parameters of gyratory compaction.

- Calibrating of transducers with a highly accurate interpolation to assure the most precise data acquisition
- Diagnostic features to quickly check all the machine devices; moreover, the LAN/Ethernet communications port allows for direct remote connection via the intranet or internet for an immediate diagnostic analysis from manufacturer.

The software includes a wizard-guided mode to help and assist the operator throughout the compaction procedure steps.

*Research version only

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### Parameters menu

User selectable parameters, for standard and custom tests:

- 4 preset pattern related to EN 12697-31 and ASTM D6925 D7115 Standards and AASHTO T312
- 6 user customizable patterns:
  - Vertical load and Gyration rate
  - Number of gyration
  - Target density (or vertical height)
  - Angle (only for Galileo Research)

### Test menu:

Real time graphical representation of the transducers readings:

- Height
- Density
- Angle
- Shear stress (optional for Galileo)
- Compaction energy (optional for Galileo)

### Calibration menu

Accurate calibration of transducers with six (or more) interpolation points in order to achieve certification far exceeding requirements of the international Standards.

### Diagnostic menu

Quickly checks all electronic components and devices like:

- Load cell / Displacement transducers / Servodrive
### Technical specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Galileo 78-PV20G02</th>
<th>Galileo Research 78-PV20R02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consolidation pressure</strong></td>
<td>10 – 1000 kPa for 150 mm diam. / 25 – 2200 kPa for 100 mm diam.</td>
<td>10 – 1000 kPa for 150 mm diam. / 25 – 2200 kPa for 100 mm diam.</td>
</tr>
<tr>
<td><strong>Gyratory motion and Vertical load</strong></td>
<td>Electromechanical</td>
<td>Electromechanical</td>
</tr>
<tr>
<td><strong>Angle adjustment</strong></td>
<td>Manual</td>
<td>EmS Electromechanical Servoactuation</td>
</tr>
<tr>
<td><strong>Gyratory angle range</strong></td>
<td>0 - 3° ±0.01</td>
<td>0 - 3° ±0.005</td>
</tr>
<tr>
<td><strong>Gyratory angle measurement</strong></td>
<td>Angle measured and displayed during test</td>
<td>Angle measured and displayed during test plus closed loop control</td>
</tr>
<tr>
<td><strong>Zero angle at the end of the test</strong></td>
<td>No</td>
<td>Yes (automatic procedure, user selectable)</td>
</tr>
<tr>
<td><strong>Speed of gyration</strong></td>
<td>5 – 60 rpm (120 on request)</td>
<td>5 – 60 rpm (120 on request)</td>
</tr>
<tr>
<td><strong>Number of gyrations</strong></td>
<td>0 - 9999</td>
<td>0 - 9999</td>
</tr>
<tr>
<td><strong>Integrated Shear measurement</strong></td>
<td>Yes (optional)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Compaction energy</strong></td>
<td>Yes (optional)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Moulds dimensions</strong></td>
<td>100 and 150 mm diam., 250 mm height.</td>
<td>100 and 150 mm diam., 250 mm height.</td>
</tr>
<tr>
<td><strong>User interface</strong></td>
<td>7” 16:9 Touch screen color display (PC for data analysis)</td>
<td>7” 16:9 Touch screen color display (PC for data analysis)</td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td>LAN – Ethernet</td>
<td>LAN – Ethernet</td>
</tr>
<tr>
<td><strong>PC Software</strong></td>
<td>Available as option</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Extruder</strong></td>
<td>Available as option (electromechanical)</td>
<td>Included (electromechanical)</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>Available as option with an accuracy of 1 g</td>
<td>Available as option with an accuracy of 1 g</td>
</tr>
<tr>
<td><strong>Minimum specimen height</strong></td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td><strong>Maximum specimen height</strong></td>
<td>Up to 200 mm depending on mix type</td>
<td>Up to 200 mm depending on mix type</td>
</tr>
<tr>
<td><strong>Height accuracy</strong></td>
<td>Better than 0.1 mm</td>
<td>Better than 0.1 mm</td>
</tr>
<tr>
<td><strong>Suitable for water pouring test</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Suitable for concrete/cement testing</strong></td>
<td>Yes (on request)</td>
<td>Yes (on request)</td>
</tr>
<tr>
<td><strong>Dimensions (w x d x h)</strong></td>
<td>480 x 900 x 2150 mm</td>
<td>480 x 900 x 2150 mm</td>
</tr>
<tr>
<td><strong>Weight approx.</strong></td>
<td>400 kg</td>
<td>420 kg</td>
</tr>
</tbody>
</table>

### Standard requirements

Listed below are the most critical parameters specified in the main International Standards and performance available from Galileo compactors.

<table>
<thead>
<tr>
<th>Standard requirement</th>
<th>EN 12697-31</th>
<th>ASTM D6925 D7115 AASHTO T1312</th>
<th>Galileo performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal angle</strong></td>
<td>0.82±0.02°</td>
<td>1.16±0.02°</td>
<td>EN 0.82±0.01°</td>
</tr>
<tr>
<td>(stability factor)</td>
<td></td>
<td></td>
<td>ASTM–AASHTO 1.16±0.01°</td>
</tr>
<tr>
<td><strong>Parallelism factor</strong></td>
<td>&lt;0.10°</td>
<td>Not req.</td>
<td>&lt;0.04°</td>
</tr>
<tr>
<td>δTB = ITA-IBA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Full rotation factor</strong></td>
<td>&lt;0.05°</td>
<td>Not req.</td>
<td>&lt;0.01°</td>
</tr>
<tr>
<td>(6 max-min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deflection factor</strong></td>
<td>&lt;0.10°</td>
<td>Not req.</td>
<td>&lt;0.070°</td>
</tr>
<tr>
<td>(δ ≡ IA240-IEA425)</td>
<td></td>
<td></td>
<td>Research &lt;0.060°</td>
</tr>
<tr>
<td><strong>Vertical pressure</strong></td>
<td>±250N (Ann.A)</td>
<td>600±18 kPa (B.C)</td>
<td>600±18 kPa (B.C)</td>
</tr>
<tr>
<td>or force precision</td>
<td></td>
<td></td>
<td>&lt; 2% target load</td>
</tr>
</tbody>
</table>

### Ordering information

**78-PV20G02**

Galileo fully Electromechanical Gyratory Compactor. 230 V, 50/60 Hz, 1ph.

**78-PV20G04**

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

**78-PV20R02**

Galileo Research, fully Electromechanical Gyratory Compactor, including integrated extruder, shear measurement, EmS motorized regulation of the gyratory angle and displayed on the control panel, PC software for data analysis. 230 V, 50/60 Hz, 1ph.

**78-PV20R04**

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

### Options

**78-PV20UP1**

Shear measurement system. (To be specified at time of order).

**78-PV20UP2**

Integrated electromechanical extruder. (To be specified at time of order)

**78-PV20/SoF**

PC software for GALILEO

**78-PV20UP3**

Electronic balance, 30 kg. cap., 1 g resolution. To weight the sample and to calculate the density.

**78-PV20UP4**

Traceable verification certificate conforming to EN 12697-31 Ann. C.

For accessories common with Gyrocomp, please refer to page 44.
GALILEO GYROCOMP

Accessories

Cylinder moulds and distance plates.
(Suitable for all our gyratory compactors: GALILEO, GALILEO research and GYROCOMP).

Made from special alloy steel, hardened to 53-55 HRC, internally ground, Ra less than 1 μm, fully conforming to EN 12697-31 and exceeding ASTM D6925 and AASHTO T312.

78-PV0250/2
Cylinder mould, 150 mm diameter. Complete with top and bottom plates.

78-PV0250/5
Cylinder mould, 100 mm diameter. Complete with top and bottom plates.

78-PV0250/10
Cylinder mould, 150 mm diameter, with holes for cold mix compaction. Complete with top and bottom plates.

78-PV0250/8
Cylinder mould, 100 mm diameter, with holes for cold mix compaction. Complete with bottom plates.

78-PV0250/3
Distance plate, 150 mm diameter, 50 mm high, for preparing short samples.

78-PV0250/6
Distance plate, 100 mm diameter, 38 mm high, for preparing short samples.

78-PV0250/4
Accessories for compacting 100 mm diameter specimens, including 100 mm height calibration device.

78-PV0255 complete set
Internal angle measurement apparatus
78-PV0255
ILS Internal angle measurement apparatus
(For detailed information see page 45)
Internal angle measurement apparatus

Main features

- Accurate calibration of internal angle of gyratory compactors and verification of frame stability, to international standards
- Quick and accurate measurement of the internal gyratory angle: less than 30 minutes
- No hot mix required: when placed into the mould, the device reproduces the internal shearing forces generated by the hot mix during compaction
- The variation of the gyratory angle (e.g. 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

Standards

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

The importance of a precise gyratory angle has been widely noted. The measurement of the internal angle represents, in practice, the most accurate method of calibration. This method comprises two individual values:
- Angle between cylinder and top plate
- Angle between cylinder and bottom plate

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

The 78-PV0255 ILS device fully satisfies the verifications requirements to measure the internal angle conforming to EN 12697-31 Annex C. It can also be used on any other makes of gyratory compactors.

Operating principle and description

The ILS apparatus is an electro-mechanical device of cylindrical shape, which will fit perfectly into any 150 mm dia. gyratory mould. One short run (10 cycles) is performed for measuring the internal compaction angle of the upper plate. The ILS is read, and the same is repeated for the bottom plate. The total gyratory angle is determined from these two values. During the measurements the ILS is generating an accurate mechanical load simulating the presence of mixture, at a correct height for a real mix. By using different generated load levels the angle response of the compaction machine can also be measured. The ILS apparatus is supplied complete with Excel Macro for data acquisition and processing.

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

The apparatus consists of a steel cylinder housing a mobile structure incorporating a high precision digital gauge.
- Battery operated
- Reproducibility is in 0.01° Class, fitting to all standards
- Overall dimensions: 150 mm dia., 115 mm high
- Weight approx.: 5.6 kg

All our Gyratory compactors are verified and calibrated with 78-PV0255 ILS apparatus.

Ordering information

78-PV0255
ILS Internal angle measurement apparatus

78-PV0255 complete set

Accessories

78-PV0255/1
Calibrator blocks for ILS, set of two different angles, supplied with factory certificate

Calibration certificate obtained with the 78-PV0255 ILS apparatus, using the Macro
The ideal solution for on-site laboratories for production control. Light and portable, can be easily installed in mobile laboratories. Very attractive price/quality ratio. Thousands of units operating successfully all over the world.

**Main features**

- High productivity, design for continuous and heavy use
- High rigidity thus light weight due to the proprietary ORBITAL system
- Also ideal for mobile laboratories
- Very reliable and accurate
- Certified to EN and AASHTO
- Approved as Superpave™ Gyratory Compactor in U.S.A.
- Integrated touch-screen control panel with large display
- Sliding transparent door
- Full safety and ergonomic design
- Integrated electromechanical extruder option
- 2 years full warranty

**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, sample compaction.

**High stiffness frame**

The very rigid but lightweight frame is due to the exclusive body design, resulting in high rigidity 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 78-PV0255 (see page 45). This apparatus is verified with traceable (ACCREDIA) calibration instruments.

Robust yet light and with high stiffness steel monocoque structure, incorporating a pneumatic cylinder for vertical load application and propriety electromechanical gyratory and mould rotation system, delivers highly accurate and repeatable test results, together with stiffness and angle stability that fall comfortably within the limits defined in EN 12697-31. The large user-friendly integrated touch-screen control panel, shows the test graph in real time. The on-board firmware includes twelve languages making the interface suitable for local user needs and also offers the option to control the tests from a PC.

The machine can be fit with the electromechanical extruder.

See accessories.

The machine is supplied complete with height calibration tool, PC software, air hose, operating instructions and calibration certificate. Available in two versions.

**78-PV2522**

conforming to AASHTO/ASTM Standards and

**78-PV2522/E**

conforming to EN standards

Models preset to ASTM/AASHTO are supplied complete with Accredia traceable certificate of load, displacement and internal angle. Models preset to EN are supplied complete with Accredia traceable certificate of load, displacement and internal angle, including all the parameters required in EN 12697-31 Annex C (“stability factor”, “parallelism factor”, “full rotation factor”).

Cylinder moulds, distance plates and air compressor not included. See accessories.
Technical specifications
- Compacted specimen size: 150 and 100 mm dia.
- Sample height: 80 to 200 mm (150 mm)-50 to 125 mm (100 mm)
- Consolidation pressure: 80 to 800 kPa (150 mm) - 160 to 1400 kPa (100 mm)
- Internal angle of gyration: Adjustable from 0.70 to 1.40 °.
- Preset to 1.16° internal angle (78-PV2522, ASTM/AASHTO models)
- Preset to 0.82° internal angle (78-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: RS 232 connections
- Internal memory: thousands of tests
- Power rating: 1000 W
- Dimensions (including extruder bench, wxdxh): 502x753x1940 mm
- Dimensions (wxdh): 469x615x1130 mm

Gyrocomp installed inside a van as a road mobile laboratory

Integrated touchscreen control panel
Transparent sliding cover
Compact and lightweight
Completely safe and ergonomic design
Optional integrated electromechanical extruder
High productivity

Ordering information
78-PV2522
GYROCOMP gyratory compactor, internal angle of gyration preset to 1.16° to AASHTO T312/ASTM D6925. 230-110 V, 50-60 Hz, 1 ph

78-PV2522/E
GYROCOMP gyratory compactor, internal angle of gyration preset to 0.82° to EN 12697-31 Annex C. 230-110 V, 50-60 Hz, 1 ph

Note: All models nominally comply to EN 12697-10, EN 12697-31, ASTM D6925, AASHTO T312 and SHRP M-002. The only difference between the 78-PV2522 and the 78-PV2522/E versions, is the angle of gyration, factory set to ASTM/AASHTO or to EN standards. This means that it is possible, with our intervention, to upgrade from one version to the other the angle of gyration.

Integrated worktop with extruder
78-PV2520/15
Integrated worktop with electromechanical specimen extruder. 230 V, 50-60 Hz, 1 ph

78-PV2520/15Z
Integrated worktop with electromechanical specimen extruder. 110 V, 60 Hz, 1 ph

The bench top with extruder fits the GYROCOMP perfectly resulting in an ergonomic solution that aids the operator. The Electromechanical 550 W motor with speed reducer produces a maximum load that is also suitable for cold mix specimens.
- Dimensions: 502x753x808(h) mm
- Weight approx.: 45 kg

Accessories
Cylinder moulds and distance plates
Suitable for all our Gyrocompactors. For detailed information see page 44

Internal angle measurement apparatus
78-PV2055
ILS Internal angle measurement apparatus (For detailed information see page 45)
Servopac

Advanced Research Gyratory Compactor

Standards

AASHTO TP4 | AASHTO T312 | ASTM D6923 | EN 12697-10 | EN 12697-31 | AS 2891.2.2.

The research specification Servopac is a fully automated, servo-controlled gyratory compactor designed to compact asphalt mixes. Compaction is achieved by the simultaneous action of static compression and the shearing action resulting from the mould being gyrated through an angle about its longitudinal axis.

The Servopac allows you to set the required axial stress, gyratory angle and speed of rotation therefore enabling it to meet all the international gyratory compaction Standards.

IPC Global’s Servopac surpasses the requirements of AASHTO, ASTM, EN and AS Standards

Control
Closed loop control of variable gyration angle from 0 to 3°
Closed loop control of variable vertical force from 0 to 20 kN
Closed loop control of variable rate of gyration from 3 to 60 gyrations per minute

Reliability
Designed for superior stability during compaction
Renowned for its robust design and long service life
Load and displacement feedback control ensures accurate force, angle and rate of gyration

Value
Produces 100 mm or 150 mm cylindrical specimens
Designed and engineered for minimal maintenance
Includes specimen extruder as standard

Technical specifications
Vertical force: 0 to 20 kN +/-100 N (with 1000 kPa air supply)
Gyratory angle: 0° to 3° +/− 0.02°
Gyrations/min rate: 3 to 60 +/− 0.1 gyrations
Number of gyrations: 0 to 999
Specimen height: 50 mm − 170 mm
Air supply: clean dry air, 5 litres/second, minimum
Operating pressure: 800 to 1000 kPa
Size and dimensions:
Size (HxOxW): 1970 x 776 x 450 mm
Weight: 250 kg

Ordering information
78-PV20A02 Servopac, IPC Global advanced Research Gyratory compactor. 110 - 230 V, 50-60 Hz, 1 ph

INTELLIGENT DESIGN

Servopac has been designed and engineered for ease of use and operator safety with minimal manual exertion whilst handling hot and heavy asphalt-filled moulds. The mould may be slid from a bench directly into the compaction chamber. Then following compaction, slide to the pneumatically operated specimen extractor, eliminating heavy lifting. The compaction chamber is completely enclosed and fitted with safety glass to allow the operator to view the compaction process. The door opens and closes automatically and a safety interlock prevents the machine from operating unless it is closed. An emergency stop button is also fitted.

78-PV20A02 Servopac, electro-pneumatic, gyratory compactor, incorporating specimen extractor

User defined setting of axial stress, gyratory angle and speed of rotation
Measure the shear stress during every gyratory cycle
Users can set the desired compaction parameters from either the optional hand-held control pendant or a Windows PC
Four column loading frame design provides superior stability
Designed for easy specimen insertion, extraction, and user safety with the integrated specimen extruder
Robust and reliable to withstand any laboratory environment
Produces large cylindrical specimen with diameters of 100mm or 150mm and heights of 50mm−170mm
Only requires air and power to operate
ALL PNEUMATIC GYRATORY ACTION

Three vertical closed loop servo controlled pneumatic actuators operate together in a sequential motion to apply a longitudinal gyration action to the specimen and mould. A simultaneous axial stress is gradually applied from above via a servo-controlled pneumatic actuator to compact the asphalt mix. After compaction the mould is slid into the extruder bay where a pneumatic ram slowly extracts the specimen from the mould.

Axial load is applied using a digital servo-controlled pneumatic actuator. The built-in load cell and displacement transducer provide precise force and displacement control.

Lower and raise the mould at a touch of a button, with the easy access buttons allowing for quick test set up and specimen removal.

Four column frame provides superior stability.

Emergency stop button immediately stops machine operation for user safety.

Hand held control pendant with an integrated key-pad and liquid crystal display for easy operation.

Safety glass door with built-in interlocks completely enclose the compaction chamber for complete user safety and easy viewing.

Initiate sample extraction with the easily accessible extraction button.

Included as standard the Servopac stand allows for operation at an optimal height.

Accessories

78-P8000/PC
Personal computer with IPC global UTS test software loaded

78-PV20001
Control pendant

78-PV20002
Servopac 100 mm mould assembly

78-PV20003
Servopac 150 mm mould assembly

78-PV20004
Servopac angle verification kit including dial gauge

78-PV20005
30 kN Steel proving ring

78-PV20006
Servopac calibration spacers kit including spacer 200 mm, spacer 50 mm, spacer 116.7 mm, three angle calibration spacers and three angle calibration gauges

78-PV20007
Technical labour for ILS Calibration Test

78-PV20008
100 mm Compaction Mould Wearing Plate

78-PV20009
150 mm Compaction Mould Wearing Plate

79-PV71102
Pneumatic filtration kit – Wall mount 12 bar
Double Wheel Trackers

**Standards**  AASTHO T324, EN 12697-22 (small size device)

**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 "small size device" are practically identical except for:

- Test environment: Dry and wet for EN; wet for AASHTO
- Wheel material and size: rubber wheel, 203 x 50 mm (diameter x width) for EN; steel wheel, 203 x 47 mm (diameter x width) for AASHTO

**Main features**

- Meets and exceeds AASHTO and EN Standards and many DOT methods
- Fully automatic test performance on two specimens or one specimen. Variable wheel speed from 20 to 30 cycles/min
- Fixed table, mobile wheel 230 mm travel
- Wheel load of 700/705 N or adjustable from 700 to 1500 N (universal models 78-PV33D05-06 only)
- Temperature range from ambient to 80°C (± 0.5°C)
- Accurate temperature control (±0.5°C) for both in water and air test
- Rut depth transducers feature 25 mm travel, 0.01 mm accuracy
- Direct rut depth measurement system, with transducers axially mounted in alignment with the wheel’s centre
- Motorized wheel-assembly lifting system for easy removal of slabs
- Free access to the wide testing area
- Optional independent lifting system for double or single wheel testing
- Slab mould size of 400 x 300 mm, 360 x 300 mm (for 320 x 260 mm slabs), double 150 mm gyratory compactor cylinders, 200 mm/8"/10" diameter cores
- 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
- Automatic water filling and leveling system, no need to adjust or control the water level above the specimen during the test (not included in model 78-PV31A16/5)
- Laptop PC control with dedicated software including results performance, test database management and multiple test elaboration

**CUSTOMER’S VALUE DRIVES THE INNOVATION**
Machine body
Sheet steel, powder coated. Transparent sliding cover.

Loaded wheel system
The wheel load is 700/705 N or adjustable in 100 N steps from 700 to 1500 N in the Universal AASHTO/EN version models 78-PV33D05-06 only. The system includes a motorized lifting system for raising the wheel assembly at the end of the test.

Wheel tracking carriage
The wheel is moved 230 mm backwards and forwards on the top of the slab, which is fixed. The speed is adjustable via the PC from 20 to 30 cycles per minute (40 to 60 passes). 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.

Temperature controlled cabinet
The Universal AASHTO/EN version models 78-PV33D05-06 feature an inbuilt temperature controlled cabinet for testing in air or in water, designed to avoid condensation problem (in water testing) and prevent overtemperature which may damage the mechanical parts or alter the transducer accuracy. Furthermore the system ensure thermal stability and provide rapid test start by fast initial temperature increase, and automatic test start when the conditioned temperature has been reached.

Impression measurement system
Each wheel is fitted with RUT DEPTH transducers for measuring deformations from 0 to 40 mm ±0.01mm.
Testing software features
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.

The software allows the user to select different temperature probes to monitor the two sample temperatures and/or the water or air temperature.

The user can select the deformation sampling frequency and the deformation length (0 ÷ 230 mm) used to calculate the mean deformation.
# Available versions

ControLS offer three versions which satisfy all Standards requirements.

## Common specifications

- Displacement motion: the arm is moving and the carriage is fixed.
- Wheel travel: 230 mm.
- Wheel speed: variable 20 to 30 cycles/min.
- Wheel load: 700/705 N by weights (78-PV33B05-06 models), adjustable from 700 to 1500 N in 100 N steps (78-PV33D05-06 models).
- Temperature range: ambient to 80°C, +/- 0.5°C.
- Rut depth transducer range: 40 mm, 0.01 mm accuracy.
- Moulds: not included, to be ordered separately.
- Slab thickness: adjustable from 40 to 100 mm in 10 mm steps.
- Overall dimensions (wxdxh): 1540 x 1020 x 1600 mm.
- Weight approx.: 600 kg.
- PC and Software: included.

## Standards

<table>
<thead>
<tr>
<th></th>
<th><strong>AASHTO T324</strong></th>
<th><strong>EN 12697-22</strong></th>
<th><strong>AASHTO T324 / EN 12697-22</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Testing mode</strong></td>
<td>in water</td>
<td>in air</td>
<td>in air and water</td>
</tr>
<tr>
<td><strong>Models 78</strong></td>
<td>PV31A16*</td>
<td>PV31A26</td>
<td>PV32E05</td>
</tr>
<tr>
<td></td>
<td>PV31A15*</td>
<td>PV31A25</td>
<td>PV33E05</td>
</tr>
<tr>
<td><strong>Models PV33</strong></td>
<td>PV33B05</td>
<td>PV33D05 (1500 N)</td>
<td>PV33B06</td>
</tr>
<tr>
<td></td>
<td>PV33D06 (1500 N)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Descriptions

- **PV31A26**: DWT Hamburg type double wheel tracker, wet conditioning version.
- **PV31A25**: DWT double wheel tracker, dry conditioning version.
- **PV32E05**: DWT double wheel tracker, wet and dry conditioning version.
- **PV33B05**: DWT, Hamburg and EN type, double wheel tracker, interchangeable wheels (steel for AASHTO and rubber for EN), wet and dry conditioning.
- **PV33D05**: DWT double wheel tracker, wet and dry conditioning version.
- **PV33D06**: DWT double wheel tracker, wet and dry conditioning version.

## Material and dimensions (diameter x width) of the two loaded wheels

- **Stainless steel**: 203 x 47 mm.
- **Rubber tyre**: 203 x 50 mm.
- **Stainless steel**: 203 x 47 mm and 203 x 50 mm.
- **Rubber tyre**: 203 x 50 mm.

## Temperature control method (accuracy ±0.5°C for both water and air)

- **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.

## Power rating

- **5500 W**.
- **4600 W**.
- **5500 W**.
- **5500 W**.

*Model 78-PV31A26 and 78-PV31A25 only  **Protection sliding cover not included.*
**DWT Double Wheel Tracker** Hamburg type

**Standards**  
AASHTO T324

**Water conditioning series**  
Stainless steel wheels 203 x 50 mm (diameter x width)
Proposed in two configurations:  
Standard (78-PV31A16) and complete with clear transparent sliding door (78-PV31A26)

78-PV31A16  
DWT double wheel tracker (Hamburg type). Conforming to AASHTO T324, in-water specimen conditioning. Complete with laptop PC and software. Set of moulds to be ordered separately (see accessories).  
220V, 60Hz, 3Ph.  
78-PV31A15  
As above but 380V, 50 Hz, 3 ph.

78-PV31A26  
Water conditioning specimens version with transparent sliding door  
DWT double wheel tracker (Hamburg type). Conforming to AASHTO T324, in-water specimen conditioning. Complete with laptop PC and software and clear transparent sliding door. Set of moulds to be ordered separately (see accessories).  
220V, 60Hz, 3Ph.  
78-PV31A25  
As above but 380V, 50 Hz, 3 ph.

**EN 12697-22 (Small Size Device)**

**Dry conditioning series**  
78-PV32E05  
DWT Dry double wheel tracker. Conforming to EN 12697-22 (Small Size Device). Complete with PC, software and clear transparent sliding doors. Set of moulds to be ordered separately (see accessories).  
380V, 50Hz, 3Ph.

**Wet and Dry standard conditioning series**  
78-PV33E05  
DWT Wet and Dry double wheel tracker. Conforming to EN 12697-22 (Small Size Device). Complete with PC, software and clear transparent sliding doors. Set of moulds to be ordered separately (see accessories).  
380V, 50Hz, 3Ph.

**Standards**  
EN 12697-22 (Small Size Device)

**DWT Double Wheel Tracker**  
Rubber tyre wheels 203 x 50 mm (diameter x width)
Proposed in two configurations:  
Dry conditioning series (78-PV33E05) and Wet and Dry conditioning series (78-PV33E05)
**DWT Double Wheel Tracker**

**Universal Hamburg type and EN 12697-22**

Including 1500 N wheel load versions

**Standards**

AASHTO T324 and EN 12697-22 (Small Size Device)

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

---

**Water and air conditioning series**

**78-PV33B05**

DWT Wet and Dry Universal double wheel tracker.

Conforming to Hamburg type AASHTO T324 and EN 12697-22 Small Size Device, in-air and in-water conditioning. Complete with both stainless steel and rubber wheels, laptop PC, software and clear transparent sliding doors. Set of moulds to be ordered separately (see accessories). 380V/50Hz/3ph+N

78-PV33B06

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

**78-PV33D05**

DWT Wet and Dry Universal double wheel tracker.

Wheel load adjustable up to 1500N (by 100N steps). Conforming to Hamburg type AASHTO T324 and EN 12697-22 Small Size Device, in-air and in-water conditioning. Complete with both stainless steel and rubber wheels, laptop PC, software and clear transparent sliding doors. Set of moulds to be ordered separately (see accessories). 380V/50Hz/3ph+N

78-PV33D06

Same as above but 220V, 60 Hz, 3 ph

---

**Upgrading Options**

**78-PV3UP10**

System for the independent lifting of the loading wheel at the rut target, continuing the test, without interruption with the other wheel.

To be specified at time of order

**Additional Temperature Probes**

**78-PV3UP20**

Additional two temperatures probes to monitor the two sample temperatures.

To be specified at time of order

**Water Tank cover**

**78-PV3UP30**

Water tank covers. (Only for 78-PV31A06/5 models)

---

**Accessories**

(common for all versions)

Some guidelines on how you can complete the actual DWT range in different configurations:

**78-PV3/001**

Set of two moulds for 400x300mm samples, thickness from 40 to 100mm, recommended for test according to EN 12697-22 in water or in air.

**78-PV3/002**

Set of two moulds 360 x 300 mm (also suitable for 320 x 260 mm samples by using 20 mm thick plaster spacers), thickness variable from 40 to 100 mm. For tests conforming to AASHTO T324 in water

**78-PV3/003**

Set of two mould adaptors for double 150mm dia core (total 4 adaptors made of special self lubricating acetal copolymer), thickness 60 mm, fitted in 77-PV3/002 360 x 300 mm moulds (not included). For test conforming to AASHTO T324 in water

---

**Spare moulds for all models**

Moulds for Universal AASHTO/EN models (78-PV33D05, 78-PV33D06)

**78-PV3/011**

Set of two moulds 400x300 mm, 38 to 120 mm height

**78-PV3/012**

Set of two moulds 360 x 300 mm (suitable for 320x260 mm slabs), 38 to 120 mm height

---

**Note:** Other models are available on order
Advanced Dynamic Testing
UTM 16P
Universal Testing Machine, 16 kN
Servo-Pneumatic

UTM 30
Universal Testing Machine, 30 kN

UTM 130
Universal Testing Machine, 130 kN

UTM 250
Universal Testing Machine, 250 kN

IMACS
Digital Controller
and Data Acquisition system

AMPT PRO
Asphalt Mixture Performance tester

DYNAQUBE
Electromechanically Operated Asphalt Mixture Performance tester

ASPHALTQUBE
Modular Electro-mechanical Servoactuation Asphalt tester

AST PRO
Modular Servo-hydraulic Asphalt tester

TSRST PLUS
Thermal Asphalt Multi-test system

4PB
Pneumatic Four Point Bend apparatus
This section covers the IPC Global’s unique range of Advanced Dynamic Testing Systems. Developed over more than 25 years of continuous innovation, our dynamic range provides solutions to meet all customer needs; from leading research to quality control laboratories.

**Universal Testing Machines (UTM)**

**UTM 16P**
IPC Global UTM-16P, Servo-pneumatic universal testing system 16 kN capacity, including Dual Axis Control & Data Acquisition System IMACS, 16 kN Servo-pneumatic actuator assembly, with High-performance servo-valve and built-in LVDT (±15 mm) w/ In-Line Conditioner (ILC), loading frame, pneumatic reservoir assembly, load cell (± 20 kN) w/ ILC. Available in two versions: Standard and with motorized crosshead.

See page 64

**UTM 30**
IPC Global UTM-30, Servo-hydraulic Universal Testing Machine 30 kN cap., two versions: with tie-rod sealed actuator or advanced labyrinth actuator, both including Dual Axis Control & Data Acquisition System IMACS, with high-performance servo-valve and built-in LVDT (+/-50mm) with/ In-Line Conditioner (ILC), load frame with motorized crosshead positioning & hydraulic crosshead clamping, hydraulic power supply, load cell (+/-30kN) with/ ILC.

See page 66

**UTM 130**
IPC Global UTM-130, Servo-hydraulic Universal Testing Machine 130 kN cap., two versions: Standard and Extra Large with increased dimensions of testing chamber, both including Dual Axis Control & Data Acquisition System IMACS, 130kN Servo-hydraulic actuator, with high-performance servo-valve and built-in LVDT (+/-50mm) with/ In-Line Conditioner (ILC), load frame with/ hydraulic crosshead positioning & clamping, hydraulic power supply, load cell with/ ILC.

See page 68
Available on request is IPC Global’s UTM 250 Servo-Hydraulic Universal testing machine. Precision engineered for extremely high force loading with the ultimate precision to accomplish your toughest research challenges.

For more information contact IPC Global or your local distributor.

ASPHALT Testers with upper environmental chamber

UTM 250

Available on request is IPC Global’s UTM 250 Servo-Hydraulic Universal testing machine. Precision engineered for extremely high force loading with the ultimate precision to accomplish your toughest research challenges.

For more information contact IPC Global or your local distributor.

ASPHALTQUBE

Electromechanical Servoactuation (EmS) operated Asphalt tester complete with 10kN static / 15kN dynamic EmS actuator, frequency range 0.01 to 70 Hz sinusoidal loading, 20kN load cell, Actuator Stroke 30mm (+/-15mm stroke)

Actuator Type EmS electro-mechanical actuator CEMA1

30mm actuator LVDT and IMACS.

*Available with:
- standard 0°C + 60°C temperature controlled cabinet
- extended range -10°C + 60°C temperature controlled cabinet, granting full conformity to NCHRP 9-29 specifications (all temperatures including 4°C are restored in less then 5’ after sample setup).

See page 92

ASTPRO

Modular Servo-Hydraulic Asphalt Tester complete with 19kN static / 17kN dynamic labyrinth actuator, frequency range 0.01 to 70 Hz sinusoidal loading, 20kN load cell, 30mm actuator LVDT, computer control integrated all-in-one PC (optional) and IMACS.

*Available with:
- standard 0°C + 60°C temperature controlled cabinet
- extended range -10°C + 60°C temperature controlled cabinet, granting full conformity to NCHRP 9-29 specifications (all temperatures including 4°C are restored in less then 5’ after sample setup).

See page 94
Advanced Dynamic Testing Machines

AMPT Pro - Asphalt Mixture Performance Tester, complete with 19kN static / 17kN dynamic actuator with labyrinth bearing, frequency range 0.01 to 70 Hz sinusoidal loading, automatic confinement cell with integrated temperature control, -5°C to +70°C range, (granting full conformity to NCHRP 9-29 specifications -down to 4°C in less then 5 minutes), 20kN load cell, 30mm actuator LVDT, 225kPa pressure transducer, -25° +80°C temperature transducer, Hydraulic power supply and IMACS.

Servo-Electro-mechanically operated Asphalt Mixture Performance Tester for QC/QA tests, complete with 10kN static / 15kN dynamic EmS actuator, frequency range 0.01 to 70 Hz sinusoidal loading, automatic confinement cell with integrated temperature control, 4°C to +60°C range, 20kN load cell, 30mm actuator LVDT, 300kPa pressure transducer, -25° +80°C temperature transducer and IMACS.

TSRST Plus - Thermal Asphalt Multi-Test System with one, two or three test stations, Load Capacity 22.5kN, actuator stroke 30mm (+/-15 mm), pneumatic actuator, fully integrated : with IMACS digital control and data acquisition system.

See page 84

See page 86

See page 100
As the recognised technological and market leader in advanced asphalt testing, we are proud and excited to once again break new ground with a **radically new approach to meeting our customers’ needs** and requests. Unique, innovative Servo-Electromechanical technologies have been developed and are now being employed in a number of our newest product releases — DynaQube, AsphaltQube.

**NEW! Unique ground breaking technologies**

**EmS TECH**

As the recognised technological and market leader in advanced asphalt testing, we are proud and excited to once again break new ground with a **radically new approach to meeting our customers’ needs** and requests. Unique, innovative Servo-Electromechanical technologies have been developed and are now being employed in a number of our newest product releases — DynaQube, AsphaltQube.

**Servo-Pneumatic 4P3**

Servo-Pneumatic Four Point Bend Apparatus including IMACS digital control and data acquisition system, sinusoidal or haversine controlled strain or controlled stress loading, controlled force, motorised specimen clamping. See page 98

**IMACS**

IPC Global’s Integrated Multi-Axis Control System (IMACS) delivers leading edge performance, unparalleled real-time computer control and flexible data acquisition. With up to 8 expandable control axes and 32 data acquisition channels, you can have total confidence in your testing results. Three versions available: for Servo-Hydraulic, Servo-Pneumatic and Servo-electromechanical systems. See page 71

The main benefits of the EmS technology are:

- Improved dynamic performance over servo-pneumatics
- Stand-alone with no need for compressed air supply
- Lower maintenance
- Robust and durable giving a more resilient solution
- Compact design requiring, in general, a smaller footprint
- More cost effective (better than pneumatic systems in terms of economy)
- Easy to use
IPC Global’s range of Servo-Hydraulic and Servo-Pneumatic Universal Testing Machines (UTM) are flexible, accurate, reliable and affordable. IPC Global has the largest customer user-base of servo-controlled UTM systems in the asphalt and pavement materials testing industry.

- **New and Improved Technology**
  IPC Global’s range of new and improved UTM systems has received a significant advancement on our previous UTM systems.

- **World Leading Control**
  Paired with IPC Global’s world leading IMACS Digital Controller you are guaranteed unparalleled real-time control and data acquisition.

- **Tried and Tested**
  IPC Global’s UTM technology has been tried and tested by leading research institutes and government organizations around the world for over 25 years.

- **Precision Engineered**
  IPC Global is renowned for its easy to use, reliable and high quality materials testing technology.

- **Clarity of results and analytical power**
  IPC Global’s test and control software (UTS) is appreciated and trusted by leading research organizations worldwide.

- **Complete Turnkey Solution**
  IPC Global offers a wide range of high quality test fixtures, transducers and environmental chambers to complement its range of UTM systems and extend their capabilities.

- **Full conformity**
  to AASHTO, ASTM, EN, BS, AS, NCHRP etc.

Over the last 25 years we have been working closely with Government Highway Authorities, Universities, Asphalt Producers, Road Construction Industry and Research Organisations to pioneer the world’s best and most innovative range of advanced asphalt testing systems.
IPC Global’s UTM Servo-Pneumatic testing systems are precision engineered to accomplish your toughest research challenges. Designed and built to IPC Global’s highest standards for Civil Engineering laboratories, IPC Global’s UTM Systems deliver superior reliability and accuracy with proficient performance of tension, compression and dynamic loading analysis on all types of materials. Available in two versions: one Standard and one with motorized crosshead (PC operated or by simple pressing the incorporated buttons).

Harnessing the precision of IPC Global’s renowned IMACS Digital Controller and Data Acquisition System, and the powerful user-friendly, UTS software you’ll have absolute confidence in your material analysis. The system has to be completed by the accessories conforming to the test to be performed. See accessories. The temperature controlled environmental chamber is offered separately. See accessories.

**main features**

- Robust, high-strength and compact 2-column load frame
- Precision engineered for high stiffness and alignment
- Digital Servo-Pneumatic control
- Easy and quick crosshead positioning
- Fully customisable to suit a large range of testing applications
- 2 axis control and 8 channel data acquisition as standard, upgradeable up to 8 axes control and 32 channel acquisition
- Available in two versions: Standard and with motorized crosshead for quickly and easy test set-up

**UTM 16P**

Servo Pneumatic Machine

![UTM 16P](image)

UTM-16 P motorized cross-head PC operated or by simple pressing the incorporated buttons. Indirect tensile jig
Technical specifications
- High stiffness frame, 16 kN cap., 650 mm vertical space, 339 mm space between columns.
- Double effect servo-pneumatic actuator, 30 mm stroke.
- Actuator with 30 mm built-in displacement transducer.
- Load cell ± 20 kN cap.
- Max. frequency 30 Hz.
- Dimensions (WxDxH): 480 x 300 x 1200 mm.
- Weight approx.: 95 kg.

Servo-pneumatic actuator assembly, with high-performance servo-valve and built-in LVDT (±15 mm) w/ In-Line Conditioner (ILC), loading frame, pneumatic reservoir assembly, load cell (± 20 kN) w/ ILC.
- 230V/50Hz/1ph.
- 220V/60Hz/1ph.
- 110V/60Hz/1ph.

79-PV70A12
IPC Global UTM-16P, Servo-pneumatic universal testing system 16 kN capacity, complete with motorized crosshead. Including Dual Axis Control & Data Acquisition System IMACS, 16kN.

Ordering information:
79-PV70A02
IPC Global UTM-16P, Servo-pneumatic universal testing system 16 kN capacity, including Dual Axis Control & Data Acquisition System IMACS, 16kN.

Motorized cross-head position controls, PC operated or by simple pressing the incorporated buttons.

UTS Software
UTS Software has numerous purpose-written applications to make it easy for testing asphalt, unbound granular, and other construction material to international Standards. For more information see page 72.

Environmental chamber
IPC Global research specification environmental chambers have been designed specifically to fully conform with ALL the main ASTM, AASHTO, EN and AS reference Standards for determining the mechanical performance of asphalt mixtures.

Ordering information:
79-PV70E02
Environmental chamber for servo-pneumatic testing machines, -25°C to +60°C, 110-230V/50-60Hz/1ph.
This unit is required to perform all type of tests (not required for AASHTO TP 124).

Temperature measurement kit
To monitor the test temperature inside the chamber.
79-PV70116
Temperature measurement kit (-50°C to + 100°C) including two probes.

Testing modules
(Test accessories)
See page 76.
Hydraulic Power supply

IPC Global’s Hydraulic Power Supply (HPS), part of the machine, has been designed with integrated VDF inverter technology assuring energy saving and noise reduction.

HPS features return line filtration, remote starting and control via virtual pendant, air cooling and indication for low oil, over temperature and dirty filter. The system provides electronically adjustable oil pressure allowing greater control and safety. Oil accumulators further improve accuracy while the high performance filters ensure long life system protection and reduced maintenance costs.

Models available

The UTM-30 is available in two versions:
- **Standard** (Model 79-PV70B02) with tie-rod actuator
- **High performance**, fitted with Servo-Hydraulic Labyrinth bearing actuator* (Model 79-PV70B12)

**ADVANTAGES**
- Excellent through zero waveform fidelity.
- i.e. for tests such as the Uniaxial fatigue SVECD the UTM-30 achieve the precise through zero sinusoidal wave shape required.
- Lower oil flow and therefore lower power consumption compared to sealless cylinders.
- Wave shape fidelity guaranteed even at highest frequencies
- Longer life compared to standard tie-rod cylinders
- Improved side load resistance for tests such as Two-Point Bend

*Labirynth bearing actuator
Technical specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Advanced</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Capacity:</td>
<td>+/− 30 kn Dynamic</td>
<td>+/− 25 kn Dynamic</td>
</tr>
<tr>
<td></td>
<td>+/− 30 kn Static</td>
<td>+/− 30 kn Static</td>
</tr>
<tr>
<td>Frequency:</td>
<td>Up to 70 Hz</td>
<td>Up to 70 Hz</td>
</tr>
<tr>
<td>Load cell:</td>
<td>Low profile, Pancake type</td>
<td>Low profile, Pancake type</td>
</tr>
<tr>
<td>Actuator type (double acting)</td>
<td>Labyrinth Bearing sealed</td>
<td>Tie-rod sealed</td>
</tr>
<tr>
<td>Stroke</td>
<td>50 mm (+/− 25 mm)</td>
<td>50 mm (+/− 25 mm)</td>
</tr>
<tr>
<td>Inbuilt displacement transducer</td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>Adjustable crosshead</td>
<td>Motorized</td>
<td>Motorized</td>
</tr>
<tr>
<td>Crosshead clamping</td>
<td>Hydraulic</td>
<td>Hydraulic</td>
</tr>
<tr>
<td>Maximum vertical daylight</td>
<td>795 mm</td>
<td>795 mm</td>
</tr>
<tr>
<td>Space between columns</td>
<td>450 mm</td>
<td>450 mm</td>
</tr>
<tr>
<td>Max. working pressure</td>
<td>210 bar</td>
<td>210 bar</td>
</tr>
<tr>
<td>HYDRAULIC POWER PACK</td>
<td>Low pressure adjustable</td>
<td>50 to 210 bar</td>
</tr>
<tr>
<td></td>
<td>Max flow rate</td>
<td>5 l/min</td>
</tr>
<tr>
<td></td>
<td>Mains power</td>
<td>2.2 kW</td>
</tr>
<tr>
<td></td>
<td>Cooling system</td>
<td>Air cooling</td>
</tr>
<tr>
<td></td>
<td>Oil tank cap. -Complete with pre-filtered oil</td>
<td>30 l</td>
</tr>
<tr>
<td>DIMENSIONS AND WEIGHTS</td>
<td>Frame (hxwxd) mm</td>
<td>1900x680x600</td>
</tr>
<tr>
<td></td>
<td>Hydraulic power pack (hxwxd) mm</td>
<td>1000x470x765</td>
</tr>
<tr>
<td></td>
<td>Approximate total weight</td>
<td>195 kg</td>
</tr>
</tbody>
</table>

Ordering information

High performance model

**79-PV70B12**

IPC Global UTM-30, Servo-hydraulic Universal Testing Machine 30 kN cap., including Dual Axis Control & Data Acquisition System IMACS, 30kN Servo-hydraulic labyrinth bearing actuator, with high-performance servo-valve and built-in LVDT (+/−50mm) with/ In-Line Conditioner (ILC), load frame with motorized crosshead positioning & hydraulic crosshead clamping, hydraulic power supply, load cell (+/−30kN) with/ ILC. 230V/50-60Hz/1ph

Standard model

All dynamic and static tests conforming to international Standards, can also be performed with the following models.

**79-PV70B02**

IPC Global UTM-30, Servo-hydraulic Universal Testing Machine 30 kN cap., including Dual Axis Control & Data Acquisition System IMACS, 30kN Servo-hydraulic actuator, with high-performance servo-valve and built-in LVDT (+/−50mm) with/ In-Line Conditioner (ILC), load frame with motorized crosshead positioning & hydraulic crosshead clamping, hydraulic power supply, load cell (+/−30kN) w/ ILC. 230V/50-60Hz/1ph

Environmental chambers

IPC Global’s environmental chambers use a high quality mechanical refrigeration system to enable users to analyze materials’ properties at real-life working temperatures for extended periods.

Two version available:

**79-PV70E12**

working temperatures from -25 to +70°C, for UTM-30

**79-PV70E22**

working temperatures from -50 to +80°C, for UTM-30
Servo-Hydraulic Testing Machines

Ordering information

**79-PV70C05**
IPC Global UTM-130, Servo-hydraulic Universal Testing Machine 130 kN cap., including Dual Axis Control & Data Acquisition System IMACS, 130kN Servo-hydraulic actuator, with high-performance servo-valve and built-in LVDT (+/-50mm) with/In-Line Conditioner (ILC), load frame with/hydraulic crosshead positioning & clamping, hydraulic power supply, load cell with/ILC. 380V, 50Hz, 3ph

**79-PV70C15**
IPC Global UTM-130XL, Servo-hydraulic Universal Testing Machine 130 kN cap., Extra Large version, including Dual Axis Control & Data Acquisition System IMACS, 130kN Servo-hydraulic actuator, with high-performance servo-valve and built-in LVDT (+/-50mm) with/In-Line Conditioner (ILC), load frame with/hydraulic crosshead positioning & clamping, hydraulic power supply, load cell with/ILC. 480V, 50Hz, 3ph

**79-PV70C06**
Same as above but 220 V, 60 Hz, 3 ph.

**79-PV70C16**
Same as above but 220 V, 60 Hz, 3 ph.

The UTM-130XL has been designed and engineered specifically to accommodate the Extra Large Four Point Bend Rig and Extra Large UTM 130 Environmental Chamber.

Based on our world renowned UTM-130, the UTM-130XL allows you to perform the four point bend test on asphalt specimens, up to 160X200 mm (hxw) and a minimum length of 790 mm, at non-ambient temperatures. UTM-130XL delivers superior reliability and accuracy with proficient performance of tension, compression and dynamic loading analysis on all types of materials.

This unique testing system can be used with our full range of test accessories.
Hydraulic Power Supply

IPC Global’s hydraulic Power supply (hPS) has been designed based on variable displacement piston pump technology assuring improved performance, longer life, lower power consumption and noise reduction. hPS features remote starting and control via virtual pendant, water cooling (air cooling optional available on request) and indication for low oil, over temperature and dirty filter. The system provides electronically adjustable oil pressure allowing for greater control and safety. Oil accumulators further improve control accuracy while the high performance filters ensure long-life system protection and reduced maintenance costs.

Environmental chambers

IPC Global’s environmental chambers use a high quality mechanical refrigeration to enable users to analyze materials’ properties at real-life working temperatures for extended periods.

Different versions available:

**79-PV70E32**
Working temperatures from -50 to +100°C, for UTM-130

**79-PV70E42**
Working temperatures from -25 to +60°C, for UTM-130

**79-PV70E52**
Extra large version, working temperatures from -50 to +100°C, for UTM-130XL

For detailed information see page 70.

### Technical specifications

#### **FRAME**

<table>
<thead>
<tr>
<th>Models</th>
<th>79-PV70C05 / 79-PV70C06 / 79-PV70C15 / 79-PV70C16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load capacity</strong></td>
<td>+/- 100 kN dynamic / +/- 130 kN static</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>Up to 70 Hz</td>
</tr>
<tr>
<td><strong>Actuator type</strong></td>
<td>Tie rod sealed / Optional labyrinth bearing</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>100 mm (+/- 50 mm)</td>
</tr>
<tr>
<td><strong>Inbuilt displacement transducer</strong></td>
<td>100 mm</td>
</tr>
<tr>
<td><strong>Adjustable cross-head</strong></td>
<td>Hydraulic</td>
</tr>
<tr>
<td><strong>Crosshead clamping</strong></td>
<td>Hydraulic</td>
</tr>
<tr>
<td><strong>Maximum vertical daylight</strong></td>
<td>1015 mm</td>
</tr>
<tr>
<td><strong>Space between columns</strong></td>
<td>600 mm (Models 79-PV70C05, C06) / 770 mm (Models 79-PV70C15, C16)</td>
</tr>
</tbody>
</table>

#### **HYDRAULIC POWER PACK**

<table>
<thead>
<tr>
<th>Models</th>
<th>79-PV70C05 / 79-PV70C06 / 79-PV70C15 / 79-PV70C16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Remote starting</strong></td>
<td>Available</td>
</tr>
<tr>
<td><strong>High pressure</strong></td>
<td>210 bar</td>
</tr>
<tr>
<td><strong>Low pressure</strong></td>
<td>100 bar</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>18 l/min</td>
</tr>
<tr>
<td><strong>Mains power</strong></td>
<td>7.5 kW 3 phase, 208V 60 Hz / 380-415 V 50 Hz</td>
</tr>
<tr>
<td><strong>Cooling system</strong></td>
<td>Water/oil heat exchanger / Optional water chiller / Optional air-cooling</td>
</tr>
<tr>
<td><strong>Oil tank capacity</strong></td>
<td>220 l</td>
</tr>
<tr>
<td><strong>Size (hxwxd)</strong></td>
<td>1220x730x1260 mm</td>
</tr>
<tr>
<td><strong>Weight approx.</strong></td>
<td>630 kg (with oil)</td>
</tr>
<tr>
<td><strong>Frame dimensions, (wxhxd)</strong></td>
<td>1100 (W)x1000x3000 mm (Models 79-PV70C05, C06) / 1250x1000x3000 mm (Models 79-PV70C15, C16)</td>
</tr>
<tr>
<td><strong>Approximate total weight</strong></td>
<td>775 kg (Models 79-PV70C05, C06) / 920 kg (Models 79-PV70C15, C16)</td>
</tr>
</tbody>
</table>
Environmental Chambers for UTM Servo-Hydraulic Testing Machines

IPC Global’s environmental chambers use a high quality mechanical refrigeration system and superior insulation technologies to enable users to analyze materials’ properties at real-life working temperatures.

Two range of environmental chambers are available:

- **Standard models** allowing to control fixed temperature setpoint in the range -25° to +60/70°C
- **Extended range models** allowing to control fixed temperature setpoint in the range -50° to +80/100°C (see beside for details) for extended period without the need for LN2. Additionally, high accuracy and total control over temperature ramps and dwells are achieved using the Programmable Digital Controller enabling users to easily perform complex tests e.g. Thermal Stress Restrained Specimen Test (TSRST).

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### Technical specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Models</th>
<th>Models</th>
<th>Models</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-PV70E32 Extended range</td>
<td>79-PV70E42 Standard</td>
<td>79-PV70E52 Extended range</td>
<td>79-PV70E12 Standard</td>
<td>79-PV70E22 Extended range</td>
</tr>
<tr>
<td></td>
<td>79-PV70E02 Standard</td>
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<td>79-PV70E22 Extended range</td>
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</tr>
<tr>
<td></td>
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<td>79-PV70B12</td>
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<tr>
<td><strong>Compatible UTMs</strong></td>
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<td>UTM-130 XL</td>
<td>UTM-30</td>
<td>UTM-30</td>
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<td>79-PV70C06</td>
<td>79-PV70B12</td>
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<td>79-PV70B02</td>
<td></td>
<td>79-PV70B12</td>
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<tr>
<td><strong>Temperature range</strong></td>
<td>-50 to +100°C</td>
<td>-25 to +60°C</td>
<td>-25 to +70°C</td>
<td>-50 to +80°C</td>
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<td></td>
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<tr>
<td><strong>Temperature gradient</strong></td>
<td>-20°C/hour</td>
<td>-20°C/hour</td>
<td>-20°C/hour</td>
<td>-20°C/hour</td>
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<tr>
<td></td>
<td>with ramp control</td>
<td>with ramp control</td>
<td>with ramp control</td>
<td>with ramp control</td>
</tr>
<tr>
<td><strong>Mounted on wheels</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td><strong>Power rating W</strong></td>
<td>4000</td>
<td>4000</td>
<td>1700</td>
<td>1700</td>
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<tr>
<td></td>
<td>4000</td>
<td>1700</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td><strong>Dimensions (wxdxh)mm</strong></td>
<td>580x1150x1750</td>
<td>580x1150x1750</td>
<td>960x1700x1800</td>
<td>920x805x1850</td>
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<tr>
<td></td>
<td>1750</td>
<td>1750</td>
<td>1800</td>
<td>2085</td>
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<tr>
<td><strong>Approximate weight Kg</strong></td>
<td>250</td>
<td>210</td>
<td>300</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
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### Main features

- Closed-loop PID temperature controller
- Four access ports (models for UTM-130), two access ports (models for UTM-30)
- Stainless steel AISI 304, 18/10 heavy duty construction
- Triple glazed, argon filled, Lo glass door
- Defrost system and interior lighting
- Fan forced ventilation
- Ergonomic design provides easy access to chamber

Additional features for extended range models only:

- Programmable Digital Controller – PID tuning, temperature ramps and dwells, auto-tuning, selectable sample time
- Extended range maximum cooling rate > -50°C/hour*
- Extended range programmable temperature gradient of -20°C/hour with ramp control
- Fully adjustable temperature probe for greater accuracy

*Dependent on thermal mass within chamber
Digital Controller and Data Acquisition System

IPC Global’s Integrated Multi-Axis Control System (IMACS) delivers leading edge performance, unparalleled real-time computer control and flexible data acquisition. IPC Global’s world leading IMACS digital controller and data acquisition system is at the heart of all our servo-controlled testing systems. The IMACS provides excellent waveform fidelity from integrated channel acquisition and control functions, at speeds of up to 5 kHz simultaneously on all channels.

The IMACS utilizes flash-based firmware which allows updates of all modules onsite. Analogue inputs auto-calibrate on power-up giving confidence in readings. With up to 8 expandable control axes and 32 data acquisition channels, you can have total confidence in your testing results.

Three versions available:
- Servo-Hydraulic
- Servo-Pneumatic
- Servo-Electromechanical systems

Technical specifications
- Fully integrated configuration
- Real Time Digital Computer Control: 32bit Processing
- Acquisition Speeds: 5kHz (simultaneously on all channels)
- Data Over-Sampling: 4x
- Data Resolution: Up to 20 bit effective auto-ranging data acquisition
- Communication: USB 2.0: 12Mb/s
- Ethernet: 10/100Mb/s
- Firmware: Update Flash based
- Analogue inputs: Auto-calibrate on power up
- Control: Up to 8 axis control
- Acquisition: Up to 32 channels of data acquisition
- Size (wxdxh): 460x350x270 mm
- Weight: 11kg
- Mains power: 220-240V 50Hz, or 110-120V 60Hz

main features
- Low data noise performance with over-sampled data
- Excellent waveform fidelity from the integrated acquisition and control functions
- Flash based firmware allows onsite updates of all modules
- Total confidence in measurements from analogue inputs that auto-calibrate on power-up
- Acquisition and control
  Up to 8 axis of control and up to 32 channels of data-acquisition
- Real-time digital computer control with 32bit processing
- Exceptional data resolution & control with up to 20 bit effective auto-ranging data acquisition

Temperature Measurement Kit
79-PV70116
Temperature measurement kit consists of two temperature transducers with an asphalt specimen

IMACS for Servo-hydraulic and Servo-Electromechanical test equipment

IMACS for Servo-pneumatic test equipment
IPC Global’s powerful and professional UTS Software draws upon over 30 years of advanced materials testing experience. IPC Global’s test and control software is known for its simplicity in use, clarity of results and analytical power. UTS Software is developed from expert knowledge of applications to run automated test routines and therefore speeds up testing. UTS Software is written in powerful, professional Delphi.

IPC Global’s UTS Software features real-time graphs for monitoring the specimen under test; portable binary data files for sharing, reviewing and analysis; and ‘live’ transducer levels display.

The purpose-built UTS applications have dialogue help boxes for automated test routines and easy-to-read graphic screens for test set-up and reviewing.
Powerful professional Delphi software
Save time analysing your materials using UTS software’s clear, precise, rich, user friendly tab-based interface with multiple real time graphical displays.

The ultimate in clean accurate data
IMACS integrated control and data acquisition with 4x oversampling technology, auto-ranging and effective 20-bit data resolution gives unparalleled control and waveform fidelity.

All test data saved in portable binary files
A powerful feature unique to UTS software. When the test is finished UTS saves in a binary file not only the data points but also all the test setup and calibration parameters. This means that at any time in the future the test can be reviewed as if it has just been performed complete with all test control, PID, specimen settings and results.

Purpose-written test applications
Benefit from more than 25 years of IPC Global’s expert software application development. With UTS test applications written around international standards you can concentrate on analysing your materials; not on programming your testing machine.

Test templates
Test settings can be entered and saved by the Chief Engineer or Laboratory Manager for easy recall and testing by Technicians. No need to configure the machine each time you want to perform a specific test.

User programmable tests
When you are developing a new test method or want to run a novel test UTS User-programmable test allows you to take full control and determine all the test, control and analysis parameters.
Dynamic Tests on Asphalt Mixtures and other Pavement Materials

**LIST OF STANDARDS**

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The recommendations are our interpretation on the equipment required to satisfactorily undertake the test. However, each laboratory Manager may have their own preference because the selection of the most appropriate test machine is material, temperature and frequency dependent.

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The recommendations are our interpretation on the equipment required to satisfactorily undertake the test. However, each Laboratory Manager may have their own preference because the selection of the most appropriate test machine is material, temperature and frequency dependent.
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## Universal Triaxial Cell

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Universal Triaxial Cell (UTC) – Standard for specimens up to 150 mm dia. x 300 mm high
- Low friction linear bushing on loading shaft
- Limited acrylic (see through) area and pressure relief valve for greater safety.
- Facilitates three internal transducers with Lemo “feed-through” connectors as standard
- Facilitates internal temperature measurement.

### Automatic Triaxial Cell

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Automatic Triaxial Cell
- Automatic pneumatically operated lift cylinders that raise and lower the cell wall
- Low friction loading shaft
- Provision for pressure and temperature transducers
- Provision for up to 3 (internal) on specimen transducer
- Cell pressure up to 275kPa

### Proving ring

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Multi-Purpose Dynamic Modulus and Uniaxial Fatigue Proving Ring
- EN 12697-25B Triaxial Cyclic Compression Test on hot mix asphalt
## Indirect Tensile

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* Other transducer configurations

## Disk-Shaped Compact Tension

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* Not fully compliant
## Overlay Test

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<td>Determining the Susceptibility of Asphalt Mixtures to Cracking using the Overlay Tester</td>
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<td>Note: suitable test to prevent reflective cracks when hot mix asphalt overlays are placed on joint or cracks in existing pavements.</td>
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- Advanced design for high stiffness and extremely low compliance
- High precision linear guides to ensure perfect axial loading alignment and no lateral rotation
- Available with on-jig and on-specimen transducers
- Specimen preparation kit allows for quick and easy gluing and set up

### Cyclic & Permanent Deformation Compression

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- Easy to set-up and use
- Integrated LVDT holders
- Constructed using stainless and nitrite hardened steel

### Dynamic Modulus

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<td><strong>79-PV70640</strong></td>
<td><strong>AASHTO TP10</strong></td>
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<td>TSRST kit</td>
<td>Thermal Stress Restrained Specimen Tensile Strength (TSRST)</td>
<td>UTM-130</td>
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<td><strong>EN 12697-46</strong></td>
<td>Low temperature Cracking and Properties by Uniaxial tension tests</td>
<td>UTM-30 UTM-130</td>
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<td>Uniaxial Thermal Strain and Stress Test (UTSST)</td>
<td>UTM-130</td>
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</tbody>
</table>

* Not fully compliant
## Trapezoidal Two Point Bend

**Accessory**

**79-PV70200**

Trapezoidal Two Point Bend Jig for UTM Systems
- Engineered from high strength aluminum for high stiffness and light weight performance
- On-specimen precision LVDT displacement transducer for strain measurements
- Comes standard with precision +/-2.5kN load cell for improved clarity and accuracy in your results

**Standard**

EN 12697-24A
Resistance to Fatigue by Two-Point Bending Test on Trapezoidal Shaped Specimens

**For use with**

UTM-16P*
UTM-30

---

## Four Point Bend

**Accessory**

**79-PV70400**

Four Point Bend Jig (for use with UTM-30)

**79-PV70402**

Four Point Bend Jig (for use with UTM-16P)
- Optional fixed point strain measurement referring from outer pivots
- "Floating straight-edge" on specimen transducer displacement measurement
- Backlash free rotation and translation on all load and reaction points
- Controlled force, motorised specimen clamping
- Non-linear regression data fitting ensures reliable determination of phase and modulus

**Standard**

AASHTO T321
Fatigue Life of Compacted Hot-Mix Asphalt subjected to Repeated Flexural Bending

ASTM D7460
Standard Test Method for Determining Fatigue Failure of Compacted Asphalt Concrete Subjected to Repeated Flexural Bending

AG:PT/T233
Characterisation of Stiffness and Fatigue Performance of Bituminous Mixes

AG:PT/T274
Characterisation of Flexural Stiffness and Fatigue Performance of Bituminous Mixes

AS 03:2000
Fatigue Life of Compacted Bituminous Mixes subject to Repeated Flexural Bending

EN 12697-24D
Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped Specimens

**For use with**

UTM-16P
UTM-30

---

**79-PV70440**

Extra Large Four Point Bend Jig
- Suitable for asphalt specimens up to 160x200mm (HxW) and with a minimum length of 790mm
- Specimen rollers with pneumatic lift and lowering for easy loading of specimen
- Automated self-aligning specimen yokes for easy specimen insertion

**Standard**

EN 12697-24D
Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped Specimens

**For use with**

UTM-130XL

---

**79-PV70442**

Extra Large Four Point Bend Jig
- Suitable for asphalt specimens up to 160x200mm (HxW) and with a minimum length of 790mm
- Specimen rollers with pneumatic lift and lowering for easy loading of specimen
- Automated self-aligning specimen yokes for easy specimen insertion

**Standard**

EN 12697-24D
Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped Specimens

**For use with**

UTM-130XL
IPC Global’s original Asphalt Mixture Performance Tester (AMPT) was the culmination of two National Cooperative Highway Research Program (NCHRP) projects. IPC Global have been involved in these projects from the beginning with development work done on IPC Global equipment. IPC Global’s AMPT has been evaluated successfully by NCHRP.

AMPT Pro and DynaQube have been developed to perform Dynamic SuperPave Performance tests with ease, including the three asphalt tests of NCHRP Projects 9-19 and 9-29 — Dynamic Modulus, Flow Number and Flow Time. The AMPT PRO has been designed with the latest technologies and product developments to ensure that it outperforms any other product on the market. DynaQube is a Quality Control Testing System utilizing IPC Global’s unique and innovative EmS technology. This radical new approach democratises SuperPave mix performance tests that were previously only available to high-end research laboratories.
Over the last 25 years we have been working closely with Government Highway Authorities, Universities, Asphalt Producers, Road Construction Industry and Research Organisations to pioneer the world’s best and most innovative range of advanced asphalt testing systems.

As the recognized technological and market leader in Advanced Asphalt Testing, we are proud and excited to once again break new ground with a radically new approach to meeting our customers’ needs and requests.

DynaQube utilising IPC Global’s unique and innovative EmS technology has been developed to democratize important dynamic SuperPave performance tests that were previously only available to high-end research laboratories.

### Standards for both models

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tr>
<td>NCHRP 9-29</td>
<td>SPT Equipment Specification</td>
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<td>Dynamic Modulus and Flow Number for Hot Mix Asphalt</td>
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<td>AASHTO TP 107</td>
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<td>AASHTO TP 116</td>
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<td>AASHTO TP 124 (Illinois SCB)</td>
<td>Fracture Potential of Asphalt Mixtures using the Flexibility Index Test (FIT)</td>
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<td>AASHTO T 342/TP 62</td>
<td>Dynamic Modulus of Hot-Mix Asphalt Concrete Mixtures</td>
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<td>ASTM D 7369</td>
<td>Resilient Modulus of Bituminous Mixtures by Indirect Tensile Test</td>
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<tr>
<td>ASTM D 8044 (LSU SCB)</td>
<td>Cracking Resistance using Semi-circular Bend Test at Intermediate Temperatures</td>
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<tr>
<td>ASTM WK 26816</td>
<td>Cracking Using the Overlay Tester</td>
</tr>
</tbody>
</table>

**Tex 248-F Overlay Test**
Reflective Cracking or Fatigue

**SCDUF**
Simplified Continuum Damage Uniaxial Fatigue

DynaQube utilising IPC Global’s unique and innovative EmS technology has been developed to democratize important dynamic SuperPave performance tests that were previously only available to high-end research laboratories.
AMPT PRO®
Next Generation Asphalt Mixture Performance Tester

Lower Temperatures
Significantly improved ECU performance and innovative cell design allow the AMPT Pro to rapidly reach sub zero temperatures previously not possible.

Granting NCHRP 9-29 specs
The high performances of the new ECU allow strict conformity to NCHRP 9-29 specifications (all temperatures, including 4° C, reached within 5’).

All-in-One Computer Control
AMPT Pro is ready to work straight out of the box with the latest All-in-One touchscreen PC technology at your finger tips (optional).

Clarity in Results
Controlling AMPT Pro is IPC Global’s Integrated Multi-Axis Control System (IMACS). The tried and tested IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.

Rapid Cooling
Experience increased productivity with AMPT Pro’s rapid cooling functionality. AMPT Pro can cool from an ambient temperature of +23°C down to +4°C in under 30 minutes and reaches temperatures down to -5°C.

Testing Efficiency
AMPT Pro has been designed as an easy-to-use and ergonomic testing system that greatly increases the efficiency of asphalt testing.

Easy and Versatile
AMPT PRO features interchangeable transducers and load cells with “plug and play” signal conditioners allowing for quick and easy transition of test set-ups.

High Performance
labyrinth actuator
At the heart of the AMPT Pro is an all new Hydraulic Power Supply utilising inverter technology coupled with a high performance labyrinth bearing actuator to deliver 19kN of force, greater reliability and longer service life.

Fully Integrated
(Optional Air Compressor)
Fully integrated and compact in design the AMPT Pro is the perfect solution for both static and mobile testing facilities. An optional integrated air compressor eliminates the need for an external air compressor with the whole system only requiring power to operate.
IPC Global, the researcher’s choice for Advanced Asphalt Testing equipment has again set the benchmark for innovation and performance with the new AMPT Pro. AMPT Pro has been designed with the latest technologies and product developments to ensure that it surpasses any other product on the market. AMPT Pro fully complies with AASHTO T378/TP 79 and can perform the three asphalt tests of NCHRP Projects 9-19 and 9-29 – Dynamic Modulus, Flow Number and Flow Time with ease. In addition AMPT Pro can also perform Uniaxial Fatigue/SVECD, Overlay Test, Semi-Circular Bend, Indirect Tensile Dynamic Modulus, IRLPD and Small Diameter Dynamic Modulus and SVECD tests with the addition of optional hardware accessories.

Ordering information

**79-PV71A12**

AMPT Pro - Asphalt Mixture Performance Tester, complete with 19kN static / 17kN dynamic actuator with labyrinth bearing, automatic confinement cell with integrated temperature control, -5 to +70°C range, 20kN load cell, 30mm actuator LVD, 225kPa pressure transducer, -25° +80°C temperature transducer, Hydraulic power supply and IMACS. Includes the following testing modules:
- Dynamic Modulus E*
- Flow Number
- Flow time
- 208-230V/50-60Hz/1Ph.

Specifications

- Load Capacity Static: 19kN / Dynamic: 17kN
- Frequency Range 0.01 to 70Hz sinusoidal loading
- Actuator Stroke 30mm (+/-15mm stroke)
- Actuator Type Labyrinth Bearing
- Specimen Size 100 x 150mm (Dia. x h) nominally 50 x 135mm (Dia. x h) 38/50 x 110mm (Dia. x h)
- Temperature Range -5°C to +70°C* (1)
- Cooling Rate Typically cools to +4°C in under 30 minutes(2)
- Temperature Accuracy +/-0.2°C(2)
- Cell Dimensions 270 x 390mm (Dia. x h)
- Confining Pressure 0 to 225kPa
- Noise Level Less than 70db at 2m
- Computer Control Integrated all-in-one touchscreen PC (optional)

*Granting full conformity to NCHRP 9-29 specifications (down to 4° C in less then 5 minutes).

- Air Compressor and Dryer Low noise, integrated, automated operate-on-demand (optional)
- Easily interchangeable load cells test
- Supplied complete with high quality pre-filtered oil for longer life

Transducers

- Load Cell Low profile pancake type
- Built-in Actuator LVD 30mm Stroke
- Pressure 0kPa – 225kPa
- On-Specimen Displacement 3 clip on +/-0.5mm LVD’s Compatible with up to 4 (Various optional loose-core, strain gauge transducers available)
- Temperature Probe Range -25°C to +80°C
- Plug-and-Play Up to 4 interchangeable on-specimen displacement transducers, plus easily interchangeable load cells

Services

- Power (without air compressor) 220V – 240V, 50Hz, single phase, 17A 208V, 60Hz, single phase, 20A
- Power (with air compressor) 220V – 240V, 50Hz, single phase, 22A 208V, 60Hz, single phase, 25A
- Air Clean dry air at 450-800kPa, 2 L/sec (Optional integrated air compressor available)
- Hydraulic Oil Pre-filled with high specification pre-filtered, ISO 46 Premium Mineral Oil
- Dimensions 1359 x 1350 x 739 mm (H x W x D)
- Weight 275 kg

Standard outfit and machine accessories

Control & Data Acquisition

**IMACS**

For info see pag. 71
Electro-mechanically operated Asphalt Mixture Performance Tester for QC/QA tests.

**Brand New High Performance Technology**
DynaQube includes a range of new technologies, including the revolutionary EmS electromechanical Servoactuation delivering 15kN of force with no need for a hydraulic power supply.

**Thermoelectric Temperature Control**
High performance thermoelectric temperature control and innovative cell design allow DynaQube to rapidly reach testing temperatures between +4°C and +60°C.

**Rapid Cooling**
Automatic dual fan speed control provides increased performance for both cooling and heating. At the press of a button DynaQube can switch into Boost mode increasing the rate of cooling and heating.

**Easy and Versatile**
DynaQube features interchangeable transducers and load cells with “plug and play” signal conditioners allowing for quick and easy transition of test set-ups.

**Fully Integrated**
Fully integrated and compact in design the DynaQube is the perfect solution for both static and mobile testing facilities. An optional integrated air compressor eliminates the need for an external air supply. The super-silent compressor is oil free and comes equipped with in-built multi-phase filtration to protect your investment.

**All-in-One Computer Control**
DynaQube is ready to work straight out of the box with the latest All-in-One touchscreen PC technology at your finger tips (optional).

**Clarity in Results**
Controlling DynaQube is IPC Global’s Integrated Multi-Axis Control System (IMACS). The tried and tested IMACS coupled with UTS application software delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.

**Testing Efficiency**
DynaQube has been designed as an easy-to-use and ergonomic testing system that greatly increases the efficiency of asphalt testing.

**Quick and Easy**
IPC Global has increased the range of Asphalt Mixture Performance Testers with the new DynaQube, based on the revolutionary EmS electromechanical servoactuation technology, suitable for QC/QA tests. DynaQube grants a level of testing accuracy, quality, performance and range normally only achievable you could get from complex and expensive machines only.

DynaQube has been designed to allow every laboratory to perform in a fast and reliable way a range of tests including the three asphalt tests of Dynamic Modulus, Flow Number and Flow Time with ease. In addition DynaQube can also perform Uniaxial Fatigue/SVECD, Overlay Test, Semi-Circular Bend, Indirect Tensile Dynamic Modulus, iRLPD, Small Diameter Dynamic Modulus, tests with the addition of optional hardware accessories.

**Ordering information**

**79-PV71Q02**
- DynaQube, complete with 10kN static / 15kN dynamic EmS actuator, automatic confinement cell with integrated temperature control, 4 +60°C range, 20kN load cell, 30mm actuator LVDT, 300kPa pressure transducer, -25°+80°C temperature transduce and IMACS - 208-230V/50-60Hz/1Ph.

**79-PV71Q04**
- Same as above but 110V, 60 Hz, 1 ph.

**Specifications**
- **Load Capacity:**
  - Static 10kN / Dynamic 15kN
  - Frequency Range 0.01 to 70 Hz sinusoidal loading
  - Actuator Stroke 30mm (+/-15mm stroke)
  - Actuator Type EmS electro-mechanical servoactuation
  - Specimen Size 100 x 150mm (Dia. x H) nominally 50 x 135mm (Dia. x H) 38/50 x 110mm (Dia. x H)
  - Temperature Range 4+60°C (1)
  - Temperature Accuracy +/-0.5°C (2)
  - Cell Dimensions 305 x 584mm (Dia. x H)
  - Confining Pressure 0 to 225kPa
  - Noise Level Less than 70db at 2m
  - Computer Control Integrated all-in-one touchscreen PC (optional)
  - Air Compressor and Dryer Low noise, integrated, automated operate-on-demand (optional)

- **Dimensions**: 1525 x 832 x 739 mm, (HxWxD)
- **Weight**: 200 Kg
(1) At ambient temperature of 23°C
(2) At temperature probe positioned close to the specimen

**Transducers**
- Load Cell Low profile pancake type
- Built-in Actuator LVDT 30mm Stroke
- Pressure 0kPa–225kPa
- On-Specimen Displacement 3 clip on +/-0.5mm LVDTs Compatible with up to 4 (Various optional loose-core, strain gauge transducers available)
- Temperature Probe Range -25°C to +80°C
- Plug-and-Play Up to 4 interchangeable on-specimen displacement transducers, plus easily interchangeable load cells

**Services**
- Power (without air compressor) 220V–240V, 50Hz, single phase, 9A 208V, 60Hz, single phase, 11A
- Power (with air compressor) 220V–240V, 50Hz, single phase, 13A 208V, 60Hz, single phase, 16A
- Air Clean dry air at 450-800kPa, 2 L/sec (Optional integrated air compressor available)

**Standard outfit and machine accessories**

Control & Data Acquisition

IMACS

For info see pag. 71
AMPT Pro includes, as standard, the following testing Modules (compression platens) which, must be supported with Transducer kits as specified below.

**DYNAMIC MODULUS E***
AASHTO T378/TP 79
A performance-related property, for asphalt mixture evaluation and characterising the stiffness of HMA. It is an important input parameter for AASHTO Mechanistic-Empirical Pavement Design Guide

- Create master curves for structural design
- Assess modified binders and local materials
- Forensic analysis of pavement failure

**FLOW TIME**
AASHTO T378/TP 79
Flow time is a quick and simple measurement of the resistance of HMA to permanent deformation:

- Static creep test
- Measure permanent deformation for rutting evaluation

**FLOW NUMBER**
NCHRP 9-29
Flow number is related to the resistance of HMA to permanent deformation:

- Repeated load creep tests
- Evaluate rutting
- Accurate simulation of actual loading

**Transducer and mounting kit for the above Testing Modules Including:**

- **79-PV71010**
  AMPT Pro On-Specimen LVDT Assembly — IPC guided Spring Core Black. Includes ILC Pod and LVDT Target Clamps x2

- **79-PV71011**
  AMPT Pro On-Specimen LVDT Assembly — IPC guided Spring Core Blue. Includes ILC Pod and LVDT Target Clamps x2

- **79-PV71012**
  AMPT Pro On-Specimen LVDT Assembly — IPC guided Spring Core Green. Includes ILC Pod and LVDT Target Clamps x2

- **79-PV70524**
  AMPT Pro Gauge Point Fixing Jig Assembly — NO gauge point Heads. Includes membrane stretcher

- **79-PV71031**
  AMPT Pro Gauge Point Fixing Jig — Setting Head Kit Hex — set of 3

- **79-PV70507**
  AMPT consumable kit

**Note**
The beside items are needed to complete the Test Modules supplied with the machine (Standard outfit). Loose — Core and Epsilon transducers are available as alternative on request.

**Machine accessories (Optional)**

- **79-PV71000**
  AMPT Pro—All-in-One Touch Screen PC Assembly

- **79-PV70502**
  Proving Ring Assembly TP79/T342/TP62/TP107 SVECD/AMPT. Includes:
  - 6x AMPT Proving Ring HEX gauge points
  - 6x Socket Head Cap Screw M2.5 x 16 SS gauge Screws

- **79-PV70101**
  AMPT Pro — Air Compressor assembly, Max air flow 137 l/min, 8 Bar cap., 5 litres tank, with air dryer with molecular seve for machines supplied at 60 Hz, 1 ph.

- **79-PV70507**
  AMPT consumable kit

- **79-PV71002**
  AMPT Pro — Air Compressor assembly, Max air flow 137 l/min, 8 Bar cap., 5 litres tank, with air dryer with molecular seve for machines supplied at 60 Hz, 1 ph.

- **79-PV70507**
  AMPT consumable kit

**AMPT Pro Dynamic Modulus E* small diameter specimen kit (38 & 50 mm dia.)**

- **79-PV71210**
  AMPT 38 mm Specimen Platen Kit (top 6 bottom platens set)

- **79-PV71211**
  AMPT 50 mm Specimen Platen Kit (top 6 bottom platens set)

- **79-PV71212**
  AMPT LVDT Gauge Point Fixing Jig 38 mm Specimen Upgrade Kit

- **79-PV71213**
  AMPT LVDT Gauge Point Fixing Jig 50 mm Specimen Upgrade Kit

**AMPT Pro Uniaxial Fatigue small diameter specimen kit (50 mm dia.)**

- **79-PV70617**
  Uniaxial Fatigue Glue Jig — 50 mm Specimen Retro-fit Kit

- **79-PV70618**
  AMPT 50 mm Specimen Plates

- **79-PV71213**
  AMPT LVDT Gauge Point Fixing Jig 50 mm Specimen Upgrade Kit

- **79-PV70619**
  AMPT SVECD — Top & Bottom Spacer Kit, for testing 50 mm diameter x 110 mm specimens
Here below is described only the specific accessory to perform a test. The accessory must be supported with various additional items (e.g., transducers, mounting kit, consumables, etc.) to create a complete testing module. For full information request our Buyer’s Guide. Each testing module includes the relevant UTS Software.

**Small Diameter (38 & 50mm) Dynamic Modulus $E^*$ Test**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
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</thead>
<tbody>
<tr>
<td><strong>79-PV71210</strong></td>
<td>AASHTO T378/TP 79 (NCHRP 9-29) Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt Using the Asphalt Mixture Performance Tester (AMPT)</td>
</tr>
<tr>
<td><strong>79-PV71211</strong></td>
<td>AASHTO T378/TP 79 (NCHRP 9-29) Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt Using the Asphalt Mixture Performance Tester (AMPT)</td>
</tr>
</tbody>
</table>

38 & 50mm specimen Platen kit

The Small Diameter Specimen Dynamic Modulus Kit allows researchers to perform dynamic modulus tests on 38mm & 50mm diameter specimens. Small diameter specimens are more easily obtainable from cores and allow dynamic modulus and flow number tests to be conducted for forensic analysis.

**Uniaxial Fatigue (S-VECD) Test**

<table>
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<th>Standard</th>
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<tbody>
<tr>
<td><strong>79-PV70610</strong></td>
<td>AASHTO TP107 / S-VECD Determining the Damage Characteristic Curve of Asphalt Mixtures from Direct Tension Cyclic Fatigue Test</td>
</tr>
</tbody>
</table>

Tension kit

The Uniaxial Fatigue Kit allows to perform tension tests (plus through zero push-pull fatigue), including Dr. Richard Kim’s Simplified Viscoelastic Continuum Damage test (S-VECD) AASHTO TP 107 and the Simplified Continuum Damage Uniaxial Fatigue (SCDUF) test.

**Small Diameter (75 & 50mm) Uniaxial Fatigue (S-VECD) Test**

<table>
<thead>
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<th>Accessory</th>
<th>Standard</th>
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<tbody>
<tr>
<td><strong>79-PV70619</strong></td>
<td>AASHTO TP107 / S-VECD Determining the Damage Characteristic Curve of Asphalt Mixtures from Direct Tension Cyclic Fatigue Test</td>
</tr>
</tbody>
</table>

38, 50 and 75 mm dia. Tension kit

The Small Diameter Specimen Uniaxial Fatigue Kit allows researchers to perform S-VECD tests on 38, 50 and 75 mm diameter specimens. Small diameter specimens are more easily obtainable from cores and allow uniaxial fatigue tests to be conducted for forensic analysis.

*The standard outfit of these testers includes the accessories to perform Dynamic Modulus $E^*$ (AASHTO T378/TP 79-NCHRP 9-29), Flow Number (NCHRP 9-29-AASHTO TP00) and Flow Time (NCHRP 9-29) excluding LVDTs, etc.*
### Semi-Circular Bend (SCB) Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
</table>
| **79-PV70131** | ASTM D8044  
Semi-Circular Bend (SCB) Jig Base for ASTM Standards  
Specifically designed to determine the critical strain energy of asphalt specimens to compare the fracture properties of asphalt mixtures with different binder types  
AASHTO TP124  
Determining the Fracture potential of Asphalt Mixtures Using the Flexibility Index Test (FIT) Determining the Fracture |
| **79-PV70139** | |  
Semi-Circular (SCB) Bend Jig for AASHTO TP124 |

### Indirect Tensile Test

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<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
</table>
| **79-PV71400** | ASTM D7369  
Indirect tensile test jig  
The Multi-Indirect tensile Kit is specifically designed for analysis of Modulus of bituminous mixtures by repeated load indirect tensile testing. The modulus tests are used to characterise asphalt mixtures for performance based road pavement design.  |
| |  
Determining the Resilient Modulus of Bituminous Mixtures by Indirect Tension |

### Overlay Test

<table>
<thead>
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<th>Accessory</th>
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</table>
| **79-PV70680** | Tex-248-F / ASTM WK26816  
Overlay test jig  
The advanced design provides high stiffness and extremely low compliance. This kit enables to conduct the Overlay Test for fatigue cracking which can be incorporated into Mechanistic-Empirical design system for flexible pavements  |
| |  
Determining the Susceptibility of Asphalt Mixtures to Cracking using the Overlayester |
### Gauge Point Fixing Jig

**Accessory Standard**

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<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
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<tbody>
<tr>
<td><strong>79-PV70524</strong></td>
<td></td>
</tr>
<tr>
<td>Gauge point fixing jig with “built-in” vacuum generator and membrane stretcher</td>
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</tr>
</tbody>
</table>

The Gauge Point Fixing Jig makes it quick and easy to accurately fix gauge points for on-specimen transducers with just the flick of a switch. This eliminates potential errors and saves time. The fixing jig comes with ‘built-in’ vacuum generator and handy membrane stretcher. Quad Arm gauge point fixing jig allows to quickly change between two, three or four gauge points at 180°, 120° or 90°.

### Specimen preparation

**Accessory Standard**

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<th>Standard</th>
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<tbody>
<tr>
<td><strong>79-PV70611</strong></td>
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<tr>
<td>Tension platen fixing jig</td>
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</tbody>
</table>

Improve the accuracy, repeatability and efficiency of your specimen preparation with the Tension Platen Fixing Jig. The jig ensures accurate perpendicularity of specimens and parallel placement of platens.

### Proving ring

**Proving ring**

<table>
<thead>
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<tr>
<td><strong>79-PV70502</strong></td>
<td>AASHTO T378/TP79</td>
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<tr>
<td>Multi-Purpose Dynamic Modulus and Uniaxial Fatigue Proving Ring</td>
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<tr>
<td></td>
<td>AASHTO T342/TP 62</td>
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<tr>
<td></td>
<td>AASHTO TP 107/SVEC</td>
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</tbody>
</table>

|              | UTM-16P |
|              | UTM-30  |
|              | UTM-130 |
AsphaltQube is a fully integrated asphalt standards testing system based on the revolutionary EmS Electromechanical Servoactuation technology, suitable for QC/QA tests. Now you can perform all the most common asphalt test standards in one compact, modular, easy to use machine.

The flexible system allows you to perform all the test compatible with DynaQube (Permanent deformation, cyclic compression, indirect tensile stiffness, indirect tensile fatigue, crack propagation, direct tension-compression, dynamic/complex modulus) plus triaxial compression, four-point and two-point stiffness and fatigue flexural tests.

**Key Features and Benefits:**

**Brand New Technology**
AsphaltQube includes a range of new technologies, including the revolutionary EmS Electromechanical Servoactuation delivering 15kN of force with low noise level, avoiding the need of HPS to operate the machine, and thermo electric Peltier cooling technology.

**Easy and Versatile**
The small footprint of the AsphaltQube belies the power and versatility of this fully integrated modular system. The innovative modular design includes a 15kN capacity EmS actuator, granting long life and accurate control of load and wave-shape, a fully integrated reaction frame with triaxial confining cell option.

**Fully Integrated (Optional Air Compressor)**
Fully integrated and very compact in design the AsphaltQube is the perfect solution for both static and mobile testing facilities. An optional integrated air compressor eliminates the need for an external air supply with the whole system only requiring power to operate. AsphaltQube can be connected to an external air compressor if available.

**Enhanced environmental cabinet**
A range of new environmental cabinets, based on the new ECU Peltier technology, is available. The Standard model allows to control the temperature in the range 0°C to 60°C, while the Extended Range model provides a range between -10°C and 60°C with fast and accurate temperature control, granting the full conformity to NCHRP 9-29 specifications (all temperatures including 4°C are restored in less than 5’ after sample setup).

All models feature a stainless steel construction with triple glazed door/window, allowing excellent visibility for observing specimen under test. The two-side double door allows a complete access to the test area when open.

**All-in-One Computer Control**
AsphaltQube is ready to work straight out of the box with the latest All-in-One touchscreen PC technology at your finger tips (optional).

**Testing Efficiency**
AsphaltQube has been designed as an easy-to-use and ergonomic testing system that greatly increases the efficiency of asphalt testing.

**Clarity in Results**
Controlling AsphaltQube is IPC Global’s Integrated Multi-Axis Control System (IMACS). The tried and tested IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.
Standards

AASHTO T378/TP 79
Dynamic Modulus and Flow Number for Hot Mix Asphalt

AASHTO TP 107
Damage Characteristic Curve from Direct Tension Cyclic Fatigue Tests on Asphalt Mixtures (SVECD)

AASHTO TP 116
Rutting Resistance Using IRLPD (Incremental Repeated Load Pavement Deformation) with minimum strain rates

AASHTO TP 124 (Illinois SCB)
Fracture Potential of Asphalt Mixtures Using the Flexibility Index Test (FIT)

AASHTO T 342/TP 62
Dynamic Modulus of Hot-Mix Asphalt Concrete Mixtures (limited temperature and force range)

ASTM D 7369
Resilient Modulus of Bituminous Mixtures by Indirect Tensile Test

ASTM D8044 (LSU SCB)
Cracking Resistance using Semi-circular Bend Test at Intermediate Temperatures

ASTM WK 26816
Cracking Using the Overlay Tester

Tex 248-F
Overlay Test Reflective Cracking or Fatigue

SCDUF
Simplified Continuum Damage Uniaxial Fatigue

Note: Increase of crack initiation and propagation due to use of recycled bituminous pavement (rAP) can be assessed.

Plus
EN 12697-24A, 12697-26A
Resistance to Fatigue and Stiffness by Two-Point Bending Test on Trapezoidal Shaped Specimens.

Stiffness and resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped specimens.

EN 12697-25B
Triaxial Cyclic Compression on hot Mix Asphalt

Specifications

- Load Capacity: Static 10kn / Dynamic 15kn
- Actuator Stroke: 30mm (+/-15mm stroke)
- Actuator Type: Electromechanical Servoactuation
- Frequency Range: 0.01 to 70 Hz sinusoidal loading
- Specimen Size: 100 x 150mm (Dia. x H) nominally 50 x 135mm (Dia. x H) 38/50 x 110mm (Dia. x H)
- Temperature Range: 0°C to +60°C (1)
- Temperature Accuracy: ±0.5°C (2)
- Noise Level: Less than 70db at 2m
- Computer Control: Integrated all-in-one touchscreen PC (optional)
- Air Compressor and Dryer: Low noise, integrated, automatic operate-on-demand (optional)
- Air Compressor: 137 l/min, 8 Bar cap, 5 litres tank, with air dryer with molecular sewer for machines supplied at 50 Hz, 1 ph
- AMPT Pro – Air Compressor assembly, Max air flow 137 l/min, 8 Bar cap, 5 litres tank, with air dryer with molecular sewer for machines supplied at 60 Hz, 1 ph.

Ordering information

79-PV72Q02
AsphaltQube, complete with 10kn static / 15kn dynamic Electromechanical Servoactuation, 20kn load cell, 30mm actuator LVDT and IMACS - 208-230V/50-60Hz/1ph

79-PV72Q04
Same as above but 110V, 60Hz, 1ph.

79-PV72E20/1
Water cooling unit for AsphaltQube/AST Pro Extended Range Environmental chamber. 230V/50-60Hz/1ph.

79-PV72E20/1Z
Same as above but 110V, 60Hz, 1ph.

79-PV72E20
Water cooling unit for AsphaltQube/AST Pro Extended Range Environmental chamber. 230V/50-60Hz/1ph.

Test accessories
See complete list and information on page 96.
The AST Pro belies the power and versatility of this fully integrated modular system. AST Pro is based on the tried and tested technology of IPC Global’s world leading and renowned AMPT Pro and its high performance servo-hydraulic labyrinth bearing actuator.

Now you can perform all the most common asphalt test standards in one high performance, compact, modular, easy to use machine.

AST Pro allows to perform a wide range of test, including the ones compatible with AMPT Pro (Permanent deformation, cyclic compression, indirect tensile stiffness, indirect tensile fatigue, crack propagation, direct tension-compression, dynamic/complex modulus) plus triaxial compression, four-point and two-point stiffness and fatigue flexural tests.

Key Features and Benefits:

**High Performance**
At the heart of the AST Pro is an all new Hydraulic Power Supply utilising inverter technology coupled with a bottom loading high performance labyrinth bearing actuator to deliver 19kN of force, with long life, accurate control of loading and wave-shape fidelity.

**Fully Integrated (Optional Air Compressor)**
Fully integrated and very compact in design the AST Pro is the perfect solution for both static and mobile testing facilities. An optional integrated air compressor eliminates the need for an external air compressor with the whole system only requiring power to operate. AST Pro includes a Hydraulic Power Supply, fully integrated and with air cooling.

**Enhanced environmental cabinet**
A range of new environmental cabinets, based on the new ECU Peltier technology, is available. The Standard model allows to control the temperature in the range 0°C to 60°C, while the Extended range model provides a range between -10°C and 60°C with fast and accurate temperature control granting the full conformity to NCHRP 9-29 specifications (all temperatures including 4°C are restored in less than 5 after sample setup).

**All-in-One Computer Control**
AsphaltQube is ready to work straight out of the box with the latest All-in-One touchscreen PC technology at your fingertips (optional).

**Testing Efficiency**
AsphaltQube has been designed as an easy-to-use and ergonomic testing system that greatly increases the efficiency of asphalt testing.

**Clarity in Results**
Controlling AST Pro is IPC Global’s Integrated Multi-Axis Control System (IMACS). The tried and tested IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.

**Specifications**
- Load Capacity Static: 19kN / Dynamic: 17kN
- Frequency Range: 0.01 to 70Hz
- Air Compressor: 160 l/min
- Actuator Stroke: 30mm (asymmetric)
- Actuator Type: Labyrinth Bearing
- Specimen Size: 100 x 150mm (Dia. x H) nominally 50 x 135mm (Dia. x H) 38/50 x 110mm (Dia. x H)
Standards

AASHTO T378/TP 79
Dynamic Modulus and Flow Number for Hot Mix Asphalt

AASHTO TP 107
Damage Characteristic Curve from Direct Tension Cyclic Fatigue Tests on Asphalt Mixtures (SVECD)

AASHTO TP 116
Rutting Resistance Using IRLPD (incremental Repeated Load Pavement Deformation) with minimum strain rates

AASHTO TP 124 (Illinois SCB)
Fracture Potential of Asphalt Mixtures Using the Flexibility Index Test (FIT)

AASHTO T 342/TP 62
Dynamic Modulus of Hot-Mix Asphalt Concrete Mixtures (Limited temperature and force range)

ASTM D 7369
Resilient Modulus of Bituminous Mixtures by Indirect Tensile Test

ASTM D8044 (LSU SCB)
Cracking Resistance using Semi-circular Bend Test at Intermediate Temperatures

ASTM WK 26816
Cracking Using the Overlay Tester

Tex 248-F
Overlay test Reflective Cracking or Fatigue

SCUF
Simplified Continuum Damage Uniaxial Fatigue
Note: Increase of crack initiation and propagation due to use of recycled bituminous pavement (RAP) can be assessed.

Plus

EN 12697-24A, 12697-26A
Resistance to Fatigue and Stiffness by Two-Point Bending Test on Trapezoidal Shaped Specimens.

Stiffness and Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped specimens.

EN 12697-25B
Triaxial Cyclic Compression on Hot Mix Asphalt

- Noise Level: Less than 70db at 2m
- Computer Control: Integrated all-in-one touchscreen PC (optional)
- Dimensions: 1630 x 1350 x 830 mm (h x W x D) with environmental chamber
- Weight: 325 kg (including oil)
- easily interchangeable load cells

Transducers
- Load Cell Low profile pancake type
- Built-in Actuator LVDT 30mm Stroke
- Plug-and-Play Up to 8 channels

Services
- Power (without air compressor)
  220V–240V, 50Hz, single phase, 9A
  208V, 60Hz, single phase, 11A
- Power (with air compressor)
  220V–240V, 50Hz, single phase, 13A
  208V, 60Hz, single phase, 16A
- Air Clean dry air at 450-800kPa, 2 L/sec (Optional integrated air compressor available)
- Hydraulic Oil Pre-filled with high specification pre-filtered, ISO 46 Premium Mineral Oil

Ordering information

79-PV72A12
AST Pro, modular servo hydraulic asphalt tester, complete with 19kN static / 17kN dynamic labyrinth actuator, 20kN load cell, 30mm actuator LVDT and IMACS - 208-230V/50-60Hz/1Ph.

System accessories

Environmental chambers

79-PV72E12
AsphaltQube/AST Pro Standard Environmental chamber, 0°C to +60°C, 230V, 50-60Hz, 1Ph
- Temperature Range: 0°C to +60°C (1)
- Temperature Accuracy: ±0.5°C (2)
- Dimensions: (h x W x D) 690 x 830 x 720 mm

79-PV72E22
AsphaltQube/AST Pro Extended Range Environmental chamber, -10°C to +60°C, 110-230V, 50-60Hz, 1Ph
- Temperature Range: -10°C to +60°C (1)
- Temperature Accuracy: ±0.5°C (2)
- Dimensions: (h x W x D) 690 x 830 x 720 mm
- Granting full conformity to NCHRP 9-29 specifications (all temperatures including +4°C are reached within 5 minutes)
- Requiring the connection to a suitable water cooling unit (see below)

79-PV72E20/1
Water cooling unit for AsphaltQube/AST Pro Extended Range Environmental chamber. 230V/50-60Hz/1Ph.
79-PV72E20/1Z
Same as above but 110V, 60Hz, 1ph.
- Cooling power: 700W

(1) At an ambient temperature of +23°C
(2) With temperature probe positioned close to the specimen

Reaction frame

79-PV72001
AsphaltQube reaction frame kit

79-PV71000
All-in-One Touch Screen PC Assembly

79-PV71001
Integrated compressor assembly, Max air flow 137/min, 8 Bar cap, 5 litres tank, with air dryer with molecular seve.
220V, 50Hz, 1 ph

Test accessories
See complete list and information on page 96
Here below is described only the specific accessory to perform the test. The accessory must be supported with various additional items (e.g. transducers, mounting kit, consumables, etc.) to create a complete testing module. For full information request our Buyer’s Guide. Each testing module includes the relevant UTS Software.

The following first set of test accessories are in common with those proposed for the AMPT Pro and Dyna Qube Testers and are illustrated at the pages specified between brackets.

### Indirect Tensile Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
</table>
| **79-PV70110** | Indirect Tensile Jig Base and Platen assembly for 100 & 150 mm dia. samples  
- Precision engineered  
- Easy to set-up and use  
- Adaptable to 100mm and 150mm specimen sizes  
- Constructed using stainless and nitrite hardened steel |
| | AASHTO TP31  
Resilient Modulus of Bituminous Mixtures by Indirect Tension  
AS 2891.13.1  
Stiffness by Indirect Tension to Cylindrical Specimens  
ASTM D4123  
Indirect Tension Test for Resilient Modulus of Bituminous Mixtures  
BS DD213  
Indirect Tensile Stiffness Modulus  
EN 12697-26C  
Indirect Tensile Stiffness Modulus  
AASHTO T322/TP9  
Creep Compliance and Strength of Hot Mix Asphalt using the Indirect Tensile Test Device  
ASTM D7369  
Determining the Resilient Modulus of Bituminous Mixtures by Indirect Tension  
EN 12697-24E  
Resistance to Fatigue by Indirect Tensile Test on Cylindrical Specimens |

### Triaxial Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
</table>
| **79-PV72301** | Triaxial cell for 100 mm tall specimens  
- High quality light weight acrylic cell wall for easy of placement and excellent visibility  
- Top plate and base precision engineered of solid steel for high stiffness and exceptional alignment  
- Quickly and easily installed or removed  
- Triaxial Cell includes ports for confining pressure, specimen pressure release, on specimen transducers and temperature |
| | EN 12697-25B  
Triaxial cyclic compression test on hot mix asphalt |
### Dynamic Modulus E*, Flow Time and Flow Number Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>79-PV72500</strong></td>
<td><strong>AASHTO T378/TP79 (NCHRP 9-29)</strong></td>
</tr>
<tr>
<td>Testing kit for Dynamic Modulus E*</td>
<td>Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt Using the Asphalt Mixture Performance Tester (AMPT)</td>
</tr>
<tr>
<td>- Input parameter for AASHTO &quot;Mechanistic-Empirical Pavement Design Guide&quot;</td>
<td></td>
</tr>
<tr>
<td>- Property to create master curves for structural design</td>
<td></td>
</tr>
</tbody>
</table>

### Trapezoidal Two Point Bend Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>79-PV72201</strong></td>
<td><strong>EN 12697-24A</strong></td>
</tr>
<tr>
<td>Trapezoidal Two Point Bend Jig</td>
<td>Resistance to Fatigue by Two-Point Bending Test on Trapezoidal Shaped Specimens</td>
</tr>
<tr>
<td>- Engineered from high strength aluminium for high stiffness and light weight performance</td>
<td></td>
</tr>
<tr>
<td>- On-specimen precision LVDT displacement transducer for strain measurements</td>
<td></td>
</tr>
</tbody>
</table>

### Four-Point Bend Test

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>79-PV72101</strong></td>
<td><strong>AASHTO T321</strong></td>
</tr>
<tr>
<td>Four-Point Bend Jig for 355.5 mm and 420 mm (outer span centres) x 50/70 mm x 50/50 mm specimens.</td>
<td>Fatigue Life of Compacted Hot-Mix Asphalt subjected to Repeated Flexural Bending</td>
</tr>
<tr>
<td>- Designed to subject an asphalt specimen to four point bending with backlash free rotation and horizontal translation of all load and reaction points.</td>
<td></td>
</tr>
<tr>
<td>- Loading frequency up to 60 Hz</td>
<td></td>
</tr>
<tr>
<td>- Complete with yoke alignment tool</td>
<td></td>
</tr>
</tbody>
</table>

### Other Standards
- **EN 12697-24A**: Stiffness by Two-Point Bending Test on Trapezoidal Shaped Specimens
- **EN 12697-26A**: Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped Specimens
- **AASHTO T378/TP79 (NCHRP 9-29)**: Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt Using the Asphalt Mixture Performance Tester (AMPT)
Servo-Pneumatic Four Point Bend Apparatus

**main features**

- Digital servo-controlled pneumatic actuator provides accurate control of loading waveshape
- Innovative “floating straight-edge” on-specified transducer eliminates errors due to frame compliance
- Backlash free rotation and translation on all load and reaction points
- Sinusoidal or haversine controlled strain or controlled stress loading
- Controlled force, motorised specimen clamping
- Non-linear regression data fitting ensures reliable determination of phase and modulus
- Optional fixed reference point retrofit kit (AASHTO T321)

IPC Global’s Servo-Pneumatic Four Point Bend Apparatus features a pneumatic actuator which is digitally controlled by a pneumatic servo-valve to provide accurate loading in both stress and strain control modes. In addition, the Servo-Pneumatic Four Point Bend Apparatus features a beam cradle which has been designed to subject an asphalt beam specimen to four point bending with backlash free rotation and horizontal translation of all load reaction points. New optional fixed reference point retrofit kit enables strain to be measured from gauge point on the neutral axis reference from the outer pivot points.

Controlling the Four Point Bend Apparatus is IPC Global’s Integrated Multi-Axis Controls and Data Acquisition System (IMACS).

For further details see page 71

**Standards**


IPC Global’s Servo-Pneumatic Four Point Bend Apparatus features a pneumatic actuator which is digitally controlled by a pneumatic servo-valve to provide accurate loading in both stress and strain control modes. In addition, the Servo-Pneumatic Four Point Bend Apparatus features a beam cradle which has been designed to subject an asphalt beam specimen to four point bending with backlash free rotation and horizontal translation of all load reaction points. New optional fixed reference point retrofit kit enables strain to be measured from gauge point on the neutral axis reference from the outer pivot points.

Controlling the Four Point Bend Apparatus is IPC Global’s Integrated Multi-Axis Controls and Data Acquisition System (IMACS).

For further details see page 71

**Specifications**

- Loading frequency: up to 60 Hz (Load limitations apply at higher frequencies)
- Load capacity: up to 5 kN dynamic
- Actuator stroke: 10 mm
- Specimen size: 70 max (H) x 80 max (W) x 380 min (L) mm
- Yoke alignment tool for specimens:
  - 50 (H) x 50 (W) x 355.5 (outer span centers) mm
  - 70 (H) x 70 (W) x 420 (outer span centers) mm
- Air supply: Clean, dry air at 800-900 kPa, 5 l/s min.
- Dimensions/Weight apparatus:
  - (L x W x H): 460 x 230 x 600 mm / 35 kg
  - IMACS-(L x W x H):
    - 450 x 360 x 270 mm / 11 kg

![Digital Controller and Data Acquisition System](image-url)
Ordering information

79-PV74A02
IPC Global Servo-Pneumatic Four Point Bend Apparatus including IMACS digital control and data acquisition system. 230 V, 50-60 Hz, 1 ph

79-PV74002
IPC Global Servo-Pneumatic Four Point Bend apparatus without IMACS.

Environmental chamber
79-PV70E02
Environmental chamber for servo-pneumatic testing machine, -25°C to +60°C. 110-230 V, 50-60 Hz, 1 ph

Upgrade kit
79-PV70410
Fixed reference point retrofit upgrade kit.

Details of the Servo-Pneumatic Four Point Bend Apparatus
Thermal Asphalt Multi-Test System

**Main Features**

- Save time: with three stations for simultaneous tests on multiple specimens
- Save money: with the Servo-pneumatic actuators and mechanical refrigeration
- Easy expansion: with the option of starting with one test station expandable to three
- Less variability: by testing three specimens simultaneously under exactly the same conditions
- Increased productivity
- Fully integrated: with IPC Global’s digital control and data acquisition system (IMACS)

**Standards**

EN 12697-46 | AASHTO TP10-93  
(TSRST-Thermal Stress Restrained Specimen Test, UTST-Uniaxial Tension Stress Test, TCT-Tensile Creep Test and RT-Relaxation Test)

To perform:

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

**Control and Data Acquisition**

Controlling TSRSTplus is IPC Global’s Integrated Multi-Axis Control and Data Acquisition System (IMACS). IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition. For more information see page 71.

**Transducers**

Load Cells: Pancake type, high performance, fatigue rated (1 per station)  
Displacement Transducers Range: ± 0.5mm LVDTs, Resolution: <1μm, Accuracy: ± 0.1% full scale

**Environmental Chamber**

Mechanical Refrigeration Range: -40°C to +60°C*  
Liquid Nitrogen Temperature Range: -50°C to +60°C  
Temperature Ramp: -10°C per hour down to -30°C with mechanical refrigeration, -10°C per hour down to -50°C with liquid nitrogen (LN2) assistance  
Temperature Stability: ± 0.5°C

*Minimum achievable temperature (without LN2) below ambient is 60°C (i.e. for ambient of 20°C), minimum achievable is -40°C
Specifications
- Load Capacity: 22.5kN*
- Actuator Stroke: 30mm (±15mm)
- Actuator Type: Custom Dual Pneumatic Actuator
- Approximate weight: 600kg approx.
- External Dimensions (HxDxW): 2260 x 760 x 1100mm
*Air pressure of 1,000kPa is required. Optional pressure intensifier available if required.

Ordering Information
79-PV75A02
IPC Global TSrSTplus Thermal Asphalt Multi-Test System with one, two or three test stations.
208-240 V, 50-60 Hz, 1 ph

Accessories
79-PV75000
Reaction frame kit, including IMACS Dual Axis expansion module assembly, TSrSTplus reaction frame, servo-pneumatic actuator assembly, pneumatic servo valve, actuator built-in LVDT (± 15 mm) with ILC, load cell (± 22.5 kN) with ILC, two rod ends, two clevis yokes and pins, two platens, four LVDTS hadders and two 300 mm invar rods.
Note: one to three reaction frame kits can be supplied.

79-PV75001
TSrST Temp transducers (± 60°C) w/ In-line conditioner (ILC) & shim

79-PV70641
LVDT (± 0.5 mm) w/ In-line conditioner (ILC) for AASHO TP10

Note:
- 79-PV75002: LVDT (± 2.5 mm) with In-line conditioner (ILC), for EN 12697-46
- 79-PV70115: LVDT (± 0.06 mm) with In-line conditioner (optional)
- 79-PV75003: TSrSTplus Cryogenic kit
- 79-PV70642: TSrST Gluing jig assembly
- 79-PV70643: Additional TSrST platens

World-Class Software
Application Powerful professional Delphi software

> Save time analysing your materials using UTS software’s clear, precise, rich, user friendly tab-based interface with multiple real time graphical displays. For more information see page 72
Bitumen testing apparatus
PIVOT
Fully Automatic Penetrometer

DUCTIMETER
Ductility machine

RTFOT
Rolling thin-film oven

PAV
Pressure Ageing Vessel

VDO
Vacuum Degassing Oven

BBR
Bending Beam Rheometer

DSR
Dynamic Shear Rheometer

Rotational Viscometers
PIVOT Fully Automatic Penetrometer

**Main Features**
- Fully automatic operation. The entire test cycle (rapid approach, starting point determination, penetration and return to the initial position) is automatically performed by simply pressing the start button on the touch screen display.
- Rapid approach and automatic starting point determination to eliminate any operator inaccuracy during needle positioning.
- Penetration measurement via contactless displacement transducer, with 0.01 mm resolution.
- Real time display of penetration/time curve.
- 6” color touch screen display, easy to use thanks to the user friendly software.
- Saves time and grants first class results.

**Specifications**
- Integrated automatic approach and positioning functions.
- Intuitive and easy-to-use touch screen display.
- Eight programmable reference positions for the holder assembly.
- High precision vertical movement by stepper motor.
- Programmable penetration time between 0 and 9999 sec.
- Programmable delay time between 0 and 999 sec.
- Range: 0 to 50mm (penetration 500dmm).
- Penetration resolution: 0.01mm.
- Possibility to recall the vertical position for repeated tests.
- Penetration measurement by contactless displacement transducer.
- Possibility to display and average up to 6 tests.
- Anodized base plate with spirit level.
- Connections: USB port for test database and LAN port for PC connection.
- Adjustable leveling feet & led lamp included.
- Overall dimensions (wxdxh): 360x410x680 mm.
- Weight approx.: 21 kg.

**Ordering Information**
81-PV0103
Automatic Penetrometer, microprocessor controlled

- Fully automatic test cycle including rapid approach and zero point determination.
- Penetration range: 0-50 mm with 0.01 resolution, measured with contactless displacement transducer.
- Intuitive and easy to use touch screen display (640 x 480 px).
- Real time display of penetration/time curve.
- USB Port for test database and LAN port for PC connection.
- Supplied with USB flash drive and outfit for penetration of bituminous materials: needle, needle holder, 50 g weight, 150 g additional weight and 6 containers.
- 110-230V, 50-60 Hz, 1ph.

**Standards**
EN 1426 | EN13380-2 | ASTM D5 | ASTM D127 | AASHTO T49 | AFNOR T66-004 | DIN 52210 | IP 49 | JIS K 2207

A compact instrument, microprocessor controlled, using the latest technologies and programming tools. It includes a 6” lateral touch screen display, intuitive and easy to use, which shows the penetration/time curve and can display and average up to 6 tests.

The instrument reaches the test start point automatically and is supplied with an integrated led lamp.

The vertical movement is performed by a high precision stepper motor and measured by a contactless displacement transducer. The device also has the possibility to recall the vertical position for repeated tests.

The test should be performed placing the penetration cup in thermostatically controlled water, using a suitable device as the 81-B0102/D Digital circulation water bath with conditioning vessel. See accessories.

**Standard Outfit**
The apparatus is supplied complete with outfit for penetration of bituminous materials (needle, needle holder, 50 g weight, 150 g additional weight and 6 containers), centering guide, anodized aluminium base plate with spirit level and adjustable leveling feet. USB flash drive for saving data and test reports included.
Accessories

Penetrometer needles

81-B0113
Penetrometer needle, 2.5 ± 0.05 g. fully hardened, tempered and polished stainless steel. Conforming to ASTM D5 and EN 1426. Supplied complete with conformity certificate.

81-B0113/A
Penetrometer needles, 2.5 ± 0.05 g. fully hardened, tempered and polished stainless steel. Conforming to ASTM D5 and EN 1426. Supplied complete with conformity certificate. Set of 3 pieces.

81-B0113/1
Verified penetrometer needle 2.5 ± 0.5 g. fully hardened, tempered and polished stainless steel. Conforming to ASTM D5 and EN 1426. Supplied complete with official UKAS Verification Certificate.

Sample cups

81-B0110/A
Sample cup, dia. 55x35 mm. set of 6 pieces.

81-B0110/B
Sample cup, dia. 70x45 mm. set of 6 pieces.

Glass transfer dish

81-B0109
Glass transfer dish with support, 100 mm dia. x 100 mm high.

Thermometers

81-PV0113/AM
Magnetic penetrometer needle, 2.5 ± 0.05 g. Set of 3 pieces.

81-B0115
Standard penetration cone conforming to ASTM D217 and EN 13880-2.

82-B0100/6
IP 38 C Thermometer, range from +23 to +26 °C, 0.1 °C graduation.

82-B0125/2
EN thermometer, range from +19 to +27 °C, 0.1 °C graduation, type ASTM 17C.

82-B0122/4
EN thermometer, range from -8 to +32 °C, 0.1 °C graduation, type ASTM 63C.

Digital circulation water bath with cooling unit

81-B0102/D
Water temperature controller for penetration test, complete with heating and cooling controller, external temperature probe, internal support with locking elements for 55 mm dia. and 70 mm dia. sample cups. 230V, 50-60Hz, 1ph.

81-B0102/DZ
As above but 110V, 60Hz, 1ph.

Software

Graphical real time display of the tests

Alternative manual adjustment of the needle position

Calibration of the contactless displacement transducer

MANUAL COMMANDS

EDIT START EDIT

CH1: 30250
CH1: 025.00
CH2: 00218
CH2: 000.52

Software

SAVE PROFILE 22/10/2015 16:25

NAME BITUMEN CUSTOMER SMITH OPERATOR SMITH NOTES NOT SO BAD
Automatic ring and ball apparatus

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

Physical specifications
- Power: 750 W
- Overall dimensions: 530 x 300 x 280 mm (w x d x h)
- Weight: approx. 16 kg

Standards
EN 1427 | ASTM D36 | AASHTO T53

Ordering information
81-PV0143
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-PV0145/1
Brass ring
81-PV0145/2
Steel ball
81-PV0145/3
Ball centering guide
81-PV0143/1
600 ml beaker
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
81-PV10B02 High performance version
81-PV10C12 Research version

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.

High performance version also satisfy EN 13589 and EN 13703 which require the test to be performed from 4° to 30°C ± 0.2°C at a testing speed adjustable up to 100 mm/min, and the determination of the tensile properties of modified bitumen.

Research version exceeds all the above mentioned Standards requirements, and it is fully dedicated to research (see page 535).
**Ductility testing machine**

Determination of ductility

**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

**Standards**

ASTM D113 | ASTM D6084 | AASHTO T51 | EN 13398 | EN 13589 | EN 13703

**81-PV10A02**

Standard version

This model fully satisfies and exceeds ASTM D113, ASTM D6084, AASHTO 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-PV1002) 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**

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 111
Main features

- 4 tension lines (briquette capacity) × 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 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 4 to 30 ± 0.2°C
- Elongation measurement system by encoder
- Real-time load and displacement graphics via PC

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 4 to 30°C ± 0.2°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 an encoder and of the test load of the four testing lines with load cells (not included).

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.

Ordering information

81-PV10B02
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 ensuring temperature uniformity without water turbulence inside the bath. All parts in contact with water are made of stainless steel.

Typical screenshot of the machine software
Includes a system for measuring forces up to 2000 N (4x500 N) with load cells (see accessories)

Additional main features
- Includes a system for measuring forces up to 2000 N (4x500 N) with load cells (see accessories)
- Temperature range from -10 to 60 ±0.2°C
- Speed range adjustable from 1 to 200 mm/min
- Extensive use of stainless steel for frame, cover and tank

81-PV10C12
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 111

As the high performance version 81-PV10B02, this research model is PC controlled using dedicated software.

Ordering information

81-PV10C12
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 -10° to 60° ±0.2°C, force measurement facility up to 500 N per line: 230V, 50-60 Hz, 1 ph.
81-PV10C14
As above but 110V, 60 Hz, 1 ph.

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

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

Details of 81-PV10B02 and PV10C12 with four 81-PV10020 load cells and briquette moulds.

Typical screenshot of the machine software.

Standards
EN 13589 | EN 13703

81-PV10C12
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 111

As the high performance version 81-PV10B02, this research model is PC controlled using dedicated software.

Ordering information

81-PV10C12
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 -10° to 60° ±0.2°C, force measurement facility up to 500 N per line: 230V, 50-60 Hz, 1 ph.
81-PV10C14
As above but 110V, 60 Hz, 1 ph.

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

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

Details of 81-PV10B02 and PV10C12 with four 81-PV10020 load cells and briquette moulds.

Typical screenshot of the machine software.

Standards
EN 13589 | EN 13703

81-PV10C12
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 111

As the high performance version 81-PV10B02, this research model is PC controlled using dedicated software.

Ordering information

81-PV10C12
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 -10° to 60° ±0.2°C, force measurement facility up to 500 N per line: 230V, 50-60 Hz, 1 ph.
81-PV10C14
As above but 110V, 60 Hz, 1 ph.

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

Technical Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>81-PV10A02</th>
<th>81-PV10A04</th>
<th>81-PV10B02</th>
<th>81-PV10B04</th>
<th>81-PV10C12</th>
<th>81-PV10C14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conforms to Standards</td>
<td>EN 13398</td>
<td>ASTM D113</td>
<td>ASTM D6084</td>
<td>AASHTO T51</td>
<td>EN 13398</td>
<td>ASTM D113, ASTM D6084, AASHTO T51, AASHTO T300</td>
</tr>
<tr>
<td>Machine control by</td>
<td>Digital display panel</td>
<td>PC with dedicated Software (PC not included)</td>
<td>PC with dedicated Software (PC not included)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thermostatically controlled water bath temperature:</td>
<td>at 25±0.2°C</td>
<td>at 25±0.2°C and from 4 to 30±0.2°C with water chiller (see accessories)</td>
<td>from -10 to 60 ±0.2°C with water chiller (see accessories). PID closed-loop control.</td>
<td></td>
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</tr>
<tr>
<td>Temperature control system</td>
<td>Heater and cooling coil for connection to cold water or water chiller</td>
<td>Heater and cooling coil for connection to cold water or water chiller</td>
<td>Heater and cooling coil for connection to cold water or water chiller</td>
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<td></td>
<td></td>
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<tr>
<td>Structure</td>
<td>Stainless steel tank</td>
<td>Stainless steel tank</td>
<td>Extensive use of stainless steel for frame, tank, cooling coil and cover</td>
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<tr>
<td>Briquette capacity</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Max carriage travel</td>
<td>1500 mm</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Testing speed</td>
<td>Adjustable from 5 to 100 mm/min</td>
<td>Adjustable from 5 to 100 mm/min</td>
<td>Adjustable from 1 to 200 mm/min</td>
<td></td>
<td></td>
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<tr>
<td>Elongation measurement by</td>
<td>Encoder (Linear scale)</td>
<td>Encoder (Optical system)</td>
<td>Optical system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. load and tension load measurement</td>
<td>--</td>
<td>1200 N (4 x 300 N) by load cells (500N capacity.) (Cells not included. See accessories.)</td>
<td>4 x 500 N by load cells (2000 N in total). (Cells not included. See accessories.)</td>
<td></td>
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</tr>
<tr>
<td>Tension load/elongation graph</td>
<td>--</td>
<td>Real-time graphs by PC</td>
<td>Real-time graphs by PC</td>
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<td></td>
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<tr>
<td>Carriage return speed</td>
<td>500 mm/min</td>
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<td></td>
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<tr>
<td>Power rating (approx.)</td>
<td>1200 W</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Transparent cover</td>
<td>not included</td>
<td>included</td>
<td>included</td>
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</tr>
<tr>
<td>Overall dimensions</td>
<td>(l x d x h) 2434 x 412 x 385 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weight (approx.)</td>
<td>100 Kg</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Accessories

Ductility briquette moulds

81-B0141/B
Briquette mould conforming to ASTM D113 and AASHTO T51

81-B0142
Ductility mould plate

Water chillers
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
(for 81-PV10802 + 81-PV10A02)
Water chiller, flow rate 6 litres/min, -20°C minimum temperature. 3000 W, 230 V, 50-60 Hz, 1 ph.
81-PV1004
(for 81-PV10804 + 81-PV10A04)
Water chiller, same as above but 300 W, 110 V, 60 Hz, 1 ph.

81-PV1012
(for 81-PV10C12)
Fluid chiller, flow rate 6 litres/min, -20°C minimum temperature. 3000 W, 230 V, 50-60 Hz, 1 ph.
81-PV1014
(for 81-PV10C14)
Same as above but 3000 W, 110 V, 60 Hz, 1 ph.

Load cells
(for use with 81-PV10B02, 81-PV10B04, 81-PV10C12 and 81-PV10C14 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
Dimensions (l x d x h): 2370 x 600 x 670 mm
Weight: approx. 50 kg
**RTFOT** Rolling thin-film oven

**Determination of the resistance to hardening under the influence of heat and air**

---

**Main features**

- Touch-screen display with 4.5” color control panel, including timer function, visual warnings and digital air flow indicator.
- Full conformity to temperature specifications (time to reach target temperature after switch on, target temperature adjustment after samples insertion) from the Standards.
- Carousel rotation with closed-loop controlled speed.
- Safety features: Automatic over-temperature switch, door switch, pilot lamp and alarm for door open with fan still running; magnetothermic switch.
- High quality stainless steel structure, internal and external.
- Door with double-glazed window.
- Door locking system allowing easy opening also with busy hands.

---

**Standards**

ASTM D2872 | AASHTO T240 | EN 12607-1

**Bitumen ovens for rolling thin-film oven test (RTFOT)**

Two versions are available:

- **81-PV1612**
  - conforming to ASTM/AASHTO standards
- **81-PV1622**
  - conforming to EN standard

The only difference between the two models is the inside dimension of the testing chamber.

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 digital 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-PV0161/12 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:** 750 x 750 x 900 mm (w x d x h)
- **Weight:** approx. 50 kg

---

**Ordering information**

**ASTM/AASHTO versions:**

- **81-PV1612**
  - RTFOT, Bitumen oven for rolling thin film oven test. ASTM version. 230V, 50 Hz, 1 ph.
- **81-PV1613**
  - As above but 220V, 60 Hz, 1 ph.
- **81-PV1614**
  - As above but 110V, 60 Hz, 1 ph.

**EN version:**

- **81-PV1622**
  - RTFOT, Bitumen oven for rolling thin film oven test. EN version. 230V, 50 Hz, 1 ph.

---

**Accessories**

- **Diaphragm pump**
  - 81-PV0161/12 Diaphragm pump 6 litres/min at 2.4 bar. 230V, 50 Hz, 1 ph.

**Description**

- Free air displacement 6 litres/min, maximum pressure 2.4 bar (when used as an air compressor).
- **Power:** 65 W
- **Weight:** approx. 1.9 kg

- **81-PV0161/13**
  - Scraper for RTFOT bottle
- **81-PV0161/14**
  - Metal rack for holding/cooling RTFOT bottles
- **81-PV0161/15**
  - RTFOT bottle tong

---

**Spares**

- **81-PV0161/10**
  - Spare glass container
- **82-PV0160/10**
  - ASTM 13C Thermometer, +155 to +170°C, 0.5°C divisions.
The advanced proprietary technology that characterizes the IPC global-Controls Group Testing Systems for bituminous mixes has been successfully extended to some of the most important equipment and apparatus for bitumen testing. The important advantages for Research and Central Laboratories equipped with IPC global-Controls Group apparatus are the common performing philosophy resulting in a better and easy management of all testing results. Within these new apparatus, an important role is played by the equipment for Long Term Ageing of Asphalt Binders.

**Pav**

81-PV2600 Pressure Ageing Vessel, featuring freely selectable test temperature, Programmable pre-heating functions, User friendly software, Network ready for remote monitoring, etc.

**Vdo**

81-PV2610 Vacuum Degassing Oven which is the essential accessory to perform the tests conforming the Standards

**Standards**

ASTM D6521 | AASHTO R28 | EN14769
For long term ageing conditioning of asphalt binder

Operating Principle

The Pressure Ageing Vessel (PAV) has been developed to simulate in-service ageing of asphalt binder after 5 to 10 years. The binder is exposed to high pressure and temperature for 20 or 65 hours (selectable up to 99) to simulate the effect of long-term oxidative ageing.

The ageing of asphalt binders during service is affected by ambient temperature and by mixture-associated variables, such as component proportions in the mix, aggregate properties and many more. This conditioning process is intended to provide an evaluation of the relative resistance of asphalt binders to oxidative ageing at selected elevate temperatures and pressures. It is normally performed after an initial conditioning using a Rolling Thin Film Oven (RTFOT), see page 112.

Residue from this conditioning practice may be used to estimate the physical and chemical properties of asphalt binders after several years of in-service ageing in the field, and to compare these properties to pre-conditioning test results of the same binders.

General Description

The apparatus consists of a stainless steel (AISI 304 with ASME and CE certifications) pressure vessel with encased band heaters and integral pressure and temperature controls. Data logs of both temperature and pressure are saved on USB stick or transferred to PC at the end of the test.

The user friendly software allows the operator to view the vessel temperature and pressure in real time, both as set targets and actual values, with a high rate of refresh. It is also possible to view, in real time, the temperature and pressure graphs.

The instrument features PID temperature control and highly efficient heaters that allow heating rate and temperature control, exceeding the Standards’ specifications.

Pre-heating of the instrument can be programmed (maximum 60°C for safety reasons) to allow the operator to find the PAV ready for the next test at any time. An acoustic alarm advises the operator when the test is finished.

To recover the sample after the Pressure Ageing (PAV) test and to make it suitable for any following tests (e.g. BBR, DSR, penetration, softening point, ductility etc.), a Vacuum Degassing Oven (VDO) shall be used.

The source of compressed air (at least 2.1 MPa), necessary to perform the test, can be obtained using a compressed air tank or a suitable air compressor, which shall be user provided.
Safety features:
- Electrically locked top cover, to avoid direct exposure of the pressure vessel during the test
- Forced ventilation cooling system allowing quick cooling of sample rack and to avoid accidental burns
- 60°C pre-heating limit for operator safety during sample rack positioning
- Over temperature limit switch
- Over pressure relief valve
Pressure Ageing Vessel
For long term ageing conditioning of asphalt binder

Ordering information
81-PV2600
Pressure Ageing Vessel (PAV) conforming to ASTM D6521, AASHTO R28, EN 14769. 230 V, 50-60 Hz, 1 ph
81-PV2600/Z
As above but 100V, 60 Hz, 1 ph

Accessories and spares
81-PV2610
Vacuum Degassing Oven (VDO). 110-230 V, 50-60 Hz, 1 ph (see complete description page 117)
81-PV2600/1
Spare sample container (TFOT pan) for PAV
81-PV2600/2
Spare sample rack for PAV

Specifications
- Working temperature range: ambient to 200°C
- Temperature measurement: Platinum RTD with ±0.1°C resolution
- Pressure measurement: pressure transducer with ± 1 kPa resolution
- Power: 600 W
- Dimensions (l x w x h): 430x660x480 mm
- Weight approx.: 60 kg
Most Standards make a degassing oven of the PAV-aged asphalt samples mandatory. The Vacuum Degassing Oven (VDO) is designed to remove air bubbles created during accelerated oxidative ageing of asphalt binder by the PAV. This final conditioning makes the aged binder suitable for further tests such as BBR, DSR, penetration, ductility, softening point and many more.

The apparatus consists of a stainless steel vacuum vessel with encased band heaters and integral vacuum and temperature controls. A platinum RTD measures internal test temperature to ±0.1°C. Selectable test temperatures (from ambient to 200°C) are controlled to ±4.0°C.

Vacuum is provided by an integrated vacuum system monitored by a pressure transducer and controlled to achieve 15 kPa absolute pressure. Temperature and vacuum are indicated both as set points and as actual values on the 6” digital color touch screen display. Temperature and vacuum calibration can be site executed. Data logs of both temperature and vacuum are saved on USB stick or transferred to PC at the end of the test.

The vacuum chamber can accept either eight 55x35 mm or four 70x45 mm (available as accessories) sample containers.

The instrument is supplied complete with temperature traceable calibration certificate, 8 aluminium 55x35 mm sample containers, a double face sample holder and operator’s manual.
Determination of flexural creep stiffness

**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
- PC and software included

### Standards

- ASTM D6648 | AASHTO T313 | EN14771

### 81-PV5902

**Bending Beam Rheometer (BBR)**

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 is supplied complete with PC and testing software.

#### Ordering information

**81-PV5902**

Bending Beam Rheometer (BBR), 230V, 50-60 Hz, 1 ph.

**81-PV5904**

As above but 115V, 50-60 Hz, 1 ph.

**Spares**

- **81-PV059/1**
  Extra aluminium beam mould.

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

#### Technical specifications

- Load frame: integral stainless steel frictionless construction
- Loading shaft: in-line stainless steel with blunt point
- Load cell: 500 g (temperature-compensated)
- Mechanical overload protection: standard
- Test cycle times: cycle times for pre-load, recovery and test load are completely operator-adjustable
- 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
- 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

#### Test load

- Variable test range from 0 to 200 g standard
- System maintains required test load to within ±0.5 g throughout the test cycle

#### Testing software

- 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

**Shipping weight**: 115 kg approx.
Rheological properties of asphalt binders

**81-PV6000**

**Dynamic Shear Rheometer**

**Standards**  AASHTO T315 | ASTM D7175 | ASTM D7405 | EN14770

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

An integrated, compact unit designed specifically for ease of use and robustness in high throughput asphalt binder test environments. Air bearing and mechanical bearing options provide a robust and cost-effective measurement platform 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.

**Technical 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.
- 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-PV6000
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

81-PV6000/2
Two silicone rubber moulds for DSR
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.

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: 100-13,000,000 cP
- Rotational speed range: 0.3-100 rpm
- Selectable speeds: 18
- Precision: ±1% of full scale
- Repeatability: 0.2%
- Shipping weight: approx. 8 kg

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: 1 cP

**Spindle models**

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**Accessories**

81-PV0118/2
Aluminium disposable test chamber

81-PV0118/3
Stainless steel reusable test chamber
Rotational Viscometers

**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: 1 cP
- 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.

**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.

**81-PV0118/2**
Aluminium disposable test chamber

**81-PV0118/3**
Stainless steel reusable test chamber

**Accessories**
(for both versions)

**81-PV0118/I**
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.

**81-PV0118/2**
Aluminium disposable test chamber

**81-PV0118/3**
Stainless steel reusable test chamber

**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.
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In line with its continual program of product research and development, CONTROLS S.p.A. reserves the right to alter specifications to equipment at any time.

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