

ADVANCED PAVEMENTS TESTING SYSTEMS

**ASPHALTQUBE**® EMS TECH

Modular Electromechanical Servoactuation  
QC Asphalt Tester

# A Compact and Modular EmS Asphalt Testing System

Based on the revolutionary Electromechanical Servoactuation Technology (EmS), the compact and modular AsphaltQube democratizes all the most common QA/QC asphalt tests. Delivering 15kN with low noise level, its small footprint and affordability means that it's the perfect solution for both static and mobile QA/QC testing facilities.



Exceptional cooling performance with advanced integrated water-cooled thermoelectric refrigeration.



Compressed air only required for optional Triaxial Cell.



A small footprint for any laboratory, office, classroom or mobile facility.



The new Environmental Chamber features two side double doors allowing full 180° access.



Optional integrated compressor for Triaxial Cell.



Excellent wave-shape fidelity and improved dynamic performance compared to servo-pneumatic systems.



Perform high frequency fatigue to slow speed static testing with ease.



Single phase electrical connection makes powering AsphaltQube hassle free.



Thermoelectric cooling and EmS greatly reduce maintenance costs.



Easy installation with no HPS, water cooling or laboratory compressed air required.



Clean and with no bulky HPS or associated noise.



No hydraulic oil ensures an environmentally friendly testing solution.

Perform all the most common QA/QC Asphalt Test Standards in one compact, modular, easy to use machine.

### Range of Easy Access Two Door Environmental Chambers

High performance thermoelectric temperature control and environmental chambers design allows easy access for test set-up and testing temperatures with a range up to -10°C.

### Advanced Thermoelectric Refrigeration

Two systems available:  
**Advanced** – Water-cooled with integrated water-chiller delivering excellent temperature control from -10°C to +60°C;  
**Standard** – fan-cooled for temperatures between +2°C and +60°C.



### 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).

### 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.



AsphaltQube is:

#### Easy and Versatile

AsphaltQube features easily interchangeable test fixtures, transducers and load cells complying to international test standards allowing for quick and easy transition of test set-ups.

#### Fully Integrated

Fully integrated and compact, the AsphaltQube is the perfect solution for both static and mobile testing. 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.

#### Innovative

AsphaltQube includes a range of new technologies, including the revolutionary Electromechanical Servoactuation (EmS) Actuator delivering 15kN of force with no need for a Hydraulic Power Supply.

# A New Approach

Our radical new approach democratizes the most common QA/QC asphalt mixture performance tests that were previously only available to high-end research laboratories.



## Electromechanical Servoactuation (EmS)

AsphaltQube benefits from IPC Global's revolutionary new EmS technology utilizing a high pre-load ball-screw that delivers 15kN backlash free force with minimal noise.

EmS technology is environmentally friendly with clean operation, requiring no hydraulic power supply. It offers excellent reliability, accurate testing, lower maintenance and is more economical compared to Servo- hydraulic and Servo-pneumatic testing solutions. The innovative design ensures it can be quickly and easily maintained only requiring lubrication Cycles every 500 hours.

The EmS technologies are housed in a robust frame only occupying a small laboratory footprint. This and the heavy duty casters, adjustable feet and requiring less than 3.4kW of power makes the AsphaltQube the ideal solution for both static and mobile laboratories.

## Unique Ground Breaking Technology



### Easy, quick, versatile and low maintenance

- Purpose-built for dynamic testing of asphalt
- Excellent wave-shape fidelity
- Environmentally friendly
- Silent and clean operation
- No compressed air or hydraulic power supply
- Unparalleled value



## Testing Efficiency

Easy-to-use and ergonomic testing system that greatly increases the efficiency of asphalt testing.

### Thermoelectric Cooling and Heating

#### How it works

AsphaltQube utilizes maintenance-free and long life thermoelectric cooling and heating for high performance and reliability. The solid state construction of Peltier Devices and innovative advanced engineering by IPC Global, provides market leading cooling and heating performance utilizing innovative pulse width modulation. Intelligently designed manifolds force airflow through heat sinks that are highly conductive featuring an efficient pin system for faster cooling and heating.

#### Two models available:

- One model comes with integrated water-chiller with high efficiency water-cooled Peltier devices that allow for high performance temperature control ranging from -10°C to +60°C.
- The other model comes standard with fan-cooled Peltier devices that deliver temperature range between +2°C and +60°C.

#### Near zero maintenance

With no moving parts, Peltier Thermoelectric Modules are virtually maintenance-free and have typical life span greater than 200,000 hours. Thermoelectric cooling is environmentally friendly with no refrigerant gases required. Separate heat sinks and Peltier Devices improve serviceability and allow for easy maintenance.

### All-in-One Computer Control

Available with an all-in-one touchscreen PC, AsphaltQube is easy to set-up and operate. The all-in-one PC, with optional wireless keyboard and trackpad, minimizes cabling and allows for easy operation of AsphaltQube.

The PC is mounted using a spring activated desk stand that provides ergonomic support and a high range of movement, including generous upward tilt and long arm reach. Three points of articulation enables effortless adjustment and is the ideal solution for Activity Based Workplaces.

### The Ultimate in HMA Testing Tools

#### Reaction Frame Kit

- Precision engineered from solid steel for high stiffness and excellent alignment
- Cross head easily adjusted, swung to one side or removed to accommodate Four Point Bend Kit
- Provides reaction for Cyclic Compression, Permanent Deformation, Indirect Tensile and Dynamic Modulus tests
- Used to secure triaxial cell for performing confined tests.

### Easily Interchangeable, Pluggable Transducers

IPC Global's AsphaltQube features easily interchangeable displacement transducers and load cells with 'plug and play' signal conditioners allowing you to quickly change between different test set-ups. The lockable side drawer and interchangeable transducers are unique to IPC Global. Eight BNC connectors provide raw analogue outputs from the signal conditioners to permit the use of external data logging equipment.



# Truly innovative Environmental Testing Chamber

## User-centric Testing System

Two opening doors gives exceptional access to easily change test set-ups and load specimens.



Interior light

Stainless steel construction

Double glazed, Argon filled, Low E glass

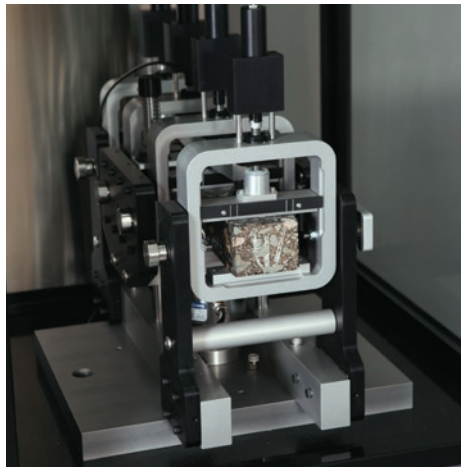
Optional fully integrated silent air compressor

Eliminates the need for an external air compressor.



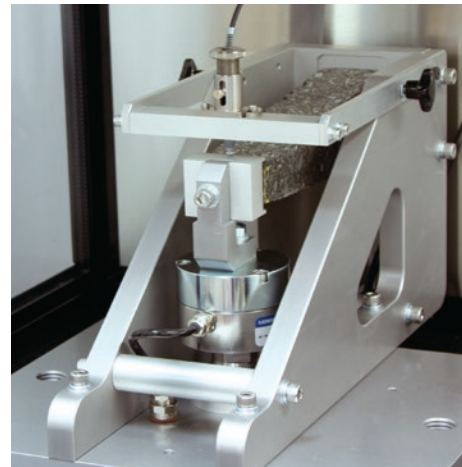
# Accessories for a Customized Testing System

We offer the widest range of accessories on the market.



**Four Point Bend**

- AASHTO T321–Fatigue (Formerly TP8)
- AG:PT/T274-15–Fatigue (Formerly AG:PT/T233, AST 03:2000)
- ASTM D7460–Flexural Fatigue
- EN 12697-24D–Resistance to Fatigue
- EN 12697-26B–Stiffness



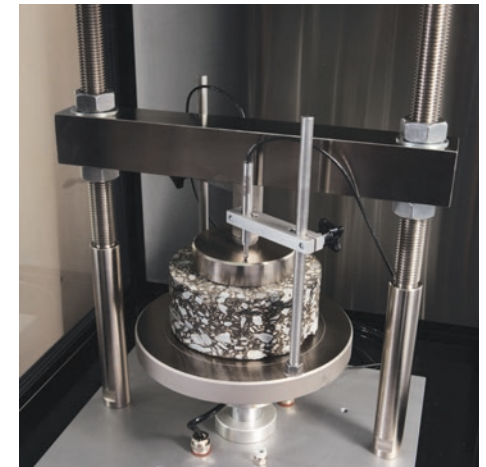
**Two Point Bend Trapezoidal**

- EN 12697-24A–Fatigue
- EN 12697-26A–Stiffness/Complex Modulus



**Overlay**

- ASTM WK 26816 – Reflective Cracking Test
- TxDOT Designation: Tex-248-F – Overlay Test



**Compression**

- AS 2891.12 – Permanent Deformation (Creep)
- BS 598-111 – Permanent Deformation (Creep)
- EN 12697-25A – Cyclic Compression

➤ IPC Global works closely with the Asphalt Research Community to develop new Test Standards and accessories so can perform all the most common Asphalt Tests with ease.



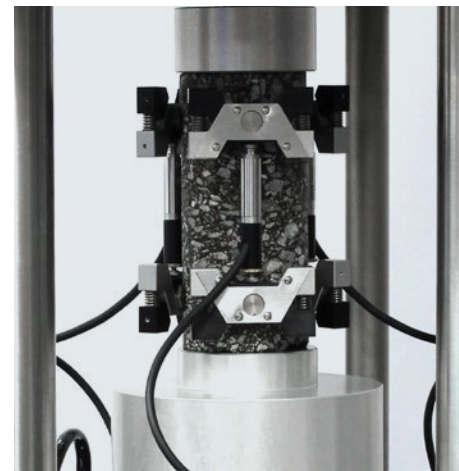
**Dynamic Modulus E\***

- AASHTO T342/TP62 – Dynamic Modulus
- AASHTO T378/TP79 – Dynamic Modulus E\*, Flow Number, Flow Time



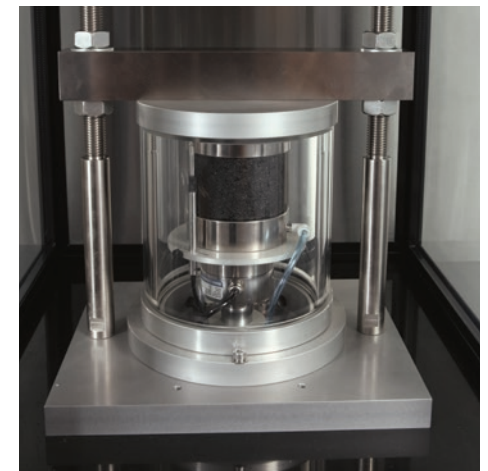
**Uniaxial Fatigue – Unconfined**

- AASHTO TP107 (S-VECD) – Simplified Viscoelastic Continuum Damage
- EN 12697-26D (DTC-CY) – Direct Tension-Compression
- EN 12697-26E (DT-CY) – Direct Tension Complex Modulus
- SCDUF – Simplified Continuum Damage Uniaxial Fatigue



**Small Diameter**

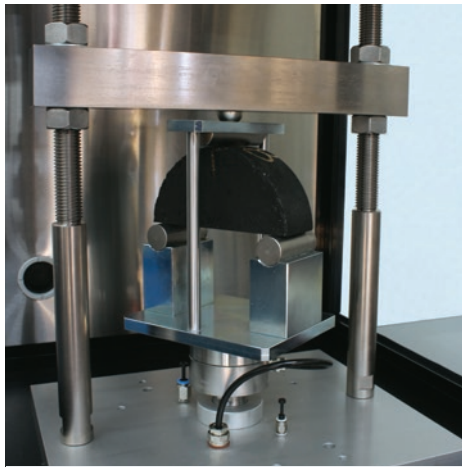
- Dynamic Modulus E\*
- Uniaxial Fatigue (S-VECD)



**Cyclic Compression – Triaxial**

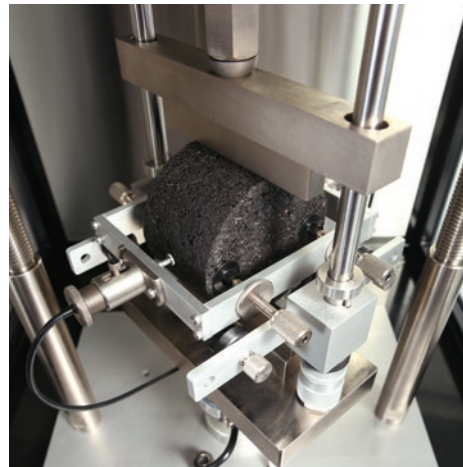
- EN 12697-25B – Permanent Deformation





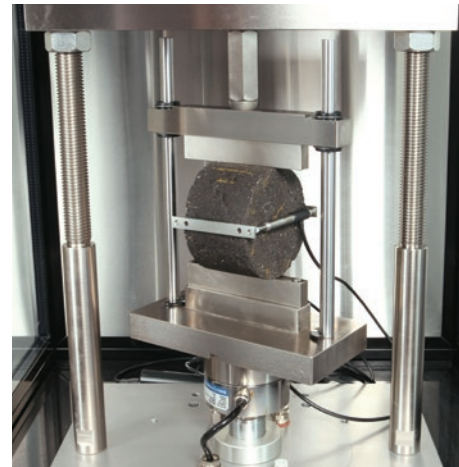
**Semi Circular Bend (SCB)**

- AASHTO TP124 (Illinois SCB) – Fracture Potential of Asphalt Mixtures Using the Flexibility Index Test (FIT)
- ASTM D8044 (LSU SCB) – SCB Cracking Resistance Test at Intermediate Temperature
- EN 12697-44 – Crack Propagation by Semi-Circular Bending Test



**Indirect Tensile**

- AASHTO TP31 – Resilient Modulus
- AS 2891.13.1 – Resilient Modulus
- ASTM D4123 – Resilient Modulus
- EN 12697-26C (IT-CY) – Stiffness



**Indirect Tensile**

- EN 12697-24E – Fatigue



**Indirect Tensile**

- AASHTO T322 (TP9) – Creep Compliance
- ASTM D7369 (NCHRP 1-28A) – Resilient Modulus

**NOTE:** All tests limited to the force and temperature range of the equipment.

# IMACS Control & Data Acquisition

Controlling AsphaltQube is IPC Global's Integrated Multi-Axis Control System (IMACS). IMACS delivers leading edge performance, unparalleled control and the ultimate in flexible data acquisition.

For servo-controlled testing machines, IMACS provides excellent waveform fidelity from integrated channel acquisition and control functions at 5kHz simultaneously on all channels.

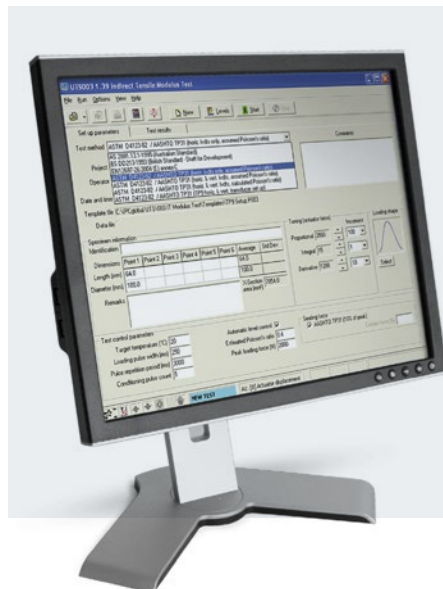
IMACS has low data noise performance with 4x over-sampled data and selectable filtration. It provides exceptional data resolution and control with up to 20-bit effective auto-ranging data acquisition. The flash-based firmware allows field updates of all modules.

AsphaltQube features two control axis and up to 8 channels of data acquisition. The Control & Data Acquisition system can be customized in accordance to your individual testing requirements. With IPC Global's IMACS you will have total confidence in your testing results.



In my 20 years of working with Testing Equipment related to Asphalt and Asphalt mixtures, I have never come across such beautifully engineered material testing equipment [sic AMPT].”

Dr. J. Murali Krishnan, Indian Institute of Technology Madras



## IMACS – Integrated Control & Data Acquisition System

- Real-time digital computer control with 32-bit processing
- Fully integrated acquisition and control functions
- Acquisition at speeds up to 5kHz, simultaneous on all channels
- Low data noise performance with 4x over-sampled data
- Exceptional data resolution and control with up to 20-bit auto-ranging data acquisition
- Flash based firmware allows field updates of all modules
- Ethernet communication port at 10/100Mb/s
- Total confidence in measurements from analogue inputs that auto-calibrate on power-up
- Acquisition and Control – 2 axis control (actuator and confining pressure), up to 8 channel data-acquisition (actuator displacement, axial load, confining pressure, temperature and 4x normalized transducer inputs e.g. for displacement).

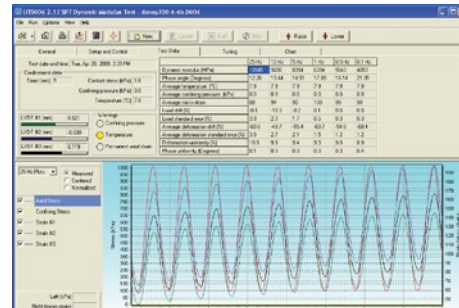
# World-class Software Application

IPC Global's powerful and professional UTS Software draws upon over 25 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.

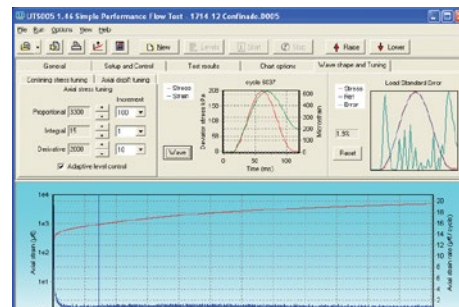
UTS Software is developed from expert knowledge of applications to run automated test routines and therefore speeds up testing. Written in powerful, professional Delphi, the UTS software features real-time graphs for monitoring the specimen under test; portable binary data files for sharing, reviewing & 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.



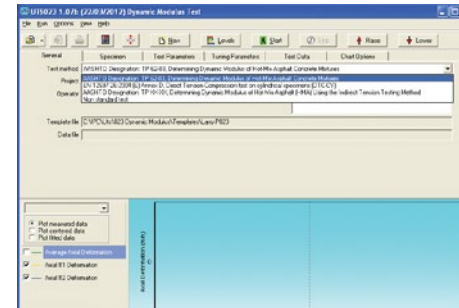
## Powerful professional Delphi software

Save time analyzing your materials using UTS software's clear, precise, rich, user friendly tab-based interface with multiple real time graphical displays.



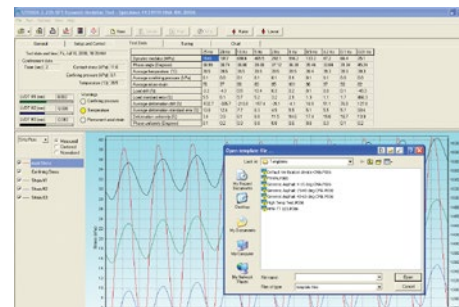
## The ultimate in clean accurate data

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



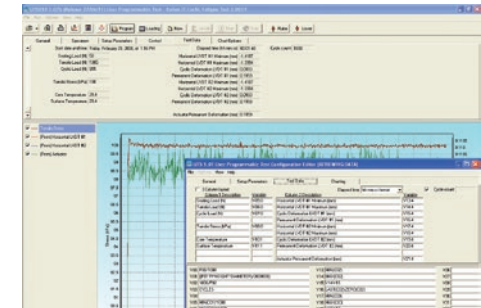
## Purpose-written test applications

With UTS test applications written around international standards you can concentrate on analyzing your materials; not on programming your testing machine.



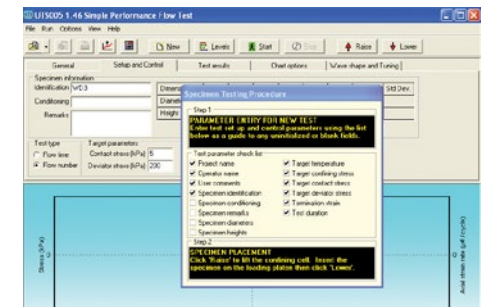
## Test templates

Specific test settings can be entered and saved by the Chief Engineer or Laboratory Manager for easy recall and testing by laboratory technicians. There is no need to configure the machine each time you want to perform a specific test.



## User programmable test

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.



## 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 the results, data points, test set-up parameters 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.

# System Specifications

|                                |   |
|--------------------------------|---|
| <b>Load Capacity</b>           | Static: 10kN < 0.1Hz/Dynamic: 15kN ≥ 0.1Hz  |
| <b>Load Cell</b>               | +/- 20kN low profile pancake type   |
| <b>Actuator Stroke</b>         | 30mm (+/-15mm stroke)   |
| <b>Actuator Type</b>           | Electromechanical Servoactuation (EmS)  |
| <b>Weight with Chamber</b>     | 250kg (with no accessories)   |
| <b>Dimensions with Chamber</b> | 1,630 x 830 x 830mm (H x W x D)   |
| <b>Plug-and-Play</b>           | Up to five interchangeable on-specimen displacement transducers, plus easily interchangeable load cells |

## Environmental Chamber

|                                 |   |
|---------------------------------|---|
| <b>Temperature Range</b>        | Standard range +2 to +60°C*<br>Extended range -10 to +60°C*   |
| <b>Temperature Accuracy</b>     | +/-0.5°C**  |
| <b>Noise Level</b>              | Less than 70db at 2m  |
| <b>Air Compressor and Dryer</b> | Low noise, integrated, automated operate-on-demand (optional) |
| <b>Dimensions</b>               | 690mm x 832mm x 720mm (HxWxD)                                 |
| <b>Weight</b>                   | 30kg  |

## Services

|   |  |
|---|--|
| <b>Power (without air compressor)</b>               | 230V, 50Hz, single phase, 9A<br>110V, 60Hz, single phase, 18A                          |
| <b>Power (with air compressor)</b>                  | 230V, 50Hz, single phase, 11A<br>110V, 60Hz, single phase, 22A                         |
| <b>Additional Power with Standard Range Chamber</b> | +2A @230V / +4A @110V  |
| <b>Additional Power with Extended Range Chamber</b> | +5A @230V / +10A @110V   |
| <b>Air</b>  | Clean dry air at 450-800kPa; 2 L/sec<br>(Optional integrated Air Compressor available) |

\* In an ambient condition of 23°C

\*\* At temperature probe positioned close to the specimen

## System Options

- AsphaltQube/AST Environmental Chamber
- AsphaltQube Reaction Frame kit
- All-in-One Touch Screen PC (optional)
- Air Compressor and Dryer – Low noise, integrated, automated operate-on-demand (optional)

## Control & Data Acquisition–IMACS

|                           |   |
|---------------------------|---|
| <b>Configuration</b>      | Fully integrated  |
| <b>Real Time Digital</b>  |   |
| <b>Computer Control</b>   | 32-bit Processing   |
| <b>Acquisition Speeds</b> | 5kHz (simultaneous on all channels)   |
| <b>Data Oversampling</b>  | At least 4x   |
| <b>Data Resolution</b>    | 20 bit auto-ranging data acquisition  |
| <b>Communication</b>      | USB 2.0: 12Mb/s /Ethernet: 10/100Mb/s   |
| <b>Firmware Update</b>    | Flash based   |
| <b>Analogue Inputs</b>    | Auto-calibrate on power up  |
| <b>Analogue Outputs</b>   | 8 BNC connectors for raw data logging   |
| <b>Control</b>            | 2 axis control (actuator and confining pressure)  |
| <b>Acquisition</b>        | Up to 8 Channel data acquisition (actuator displacement, axial load, 3 to 4 on-specimen displacement transducers, confining pressure and temperature) |

## Accessories

### Triaxial Cell

|                           |  |
|---------------------------|--|
| <b>Cell Dimensions</b>    | 210 x 319mm (Dia.xH)   |
| <b>Confining Pressure</b> | 210kPa   |
| <b>Specimen Size</b>      | 100x 150mm (Dia.x H) nominally, 50x 135mm (Dia.x H)<br>38/50 x 110mm (Dia.x H) |

## Accessories (Continued)

### Four Point Bend Test

|   |   |
|---|---|
| <b>Control</b>  | Selectable non-linear regression data fitting on some applications                                    |
| <b>On-specimen displacement transducers</b>             | LVDT +/- 0.5mm or +/- 1mm   |
| <b>Weight</b>   | 35kg  |
| <b>Dimensions</b>                                       | 400 x 230 x 460mm (H x W x D)   |
| <b>Specimen sizes</b>                                   | Maximum height 70 mm<br>Maximum width 80 mm<br>Length from 380 mm to 500+ mm                          |
| <b>Accommodates typical specimens</b>                   | 50 x 50 x 400 mm<br>60 x 60 x 400 mm<br>50 x 63 x 400 mm<br>70 x 70 x 500 mm                          |
| <b>Loading spans</b>                                    | Inner span ≤118.5 mm to >140 mm<br>Outer span ≤355.5 mm to >420 mm                                    |
| <b>Yoke Alignment Tool (H x W x Outer span centers)</b> | 50 x 50 x 355.5 mm<br>70 x 70 x 420 mm (optional)   |
| <b>Test Standards</b>                                   | AASHTO T321; AG:PT/T274-15 (Formerly AG:PT/T233, AST 03:2000); ASTM D7460; EN 12697-24D; EN 12697-26B |

### Two Point Bend Trapezoidal Test

|                       |                               |
|-----------------------|-------------------------------|
| <b>Weight</b>         | 6.5kg                         |
| <b>Dimensions</b>     | 215 x 140 x 425mm (H x W x D) |
| <b>Test Standards</b> | EN 12697-24A; EN 12697-26A    |

### Overlay Test

|                       |   |
|-----------------------|---|
| <b>Weight</b>         | 10kg  |
| <b>Dimensions</b>     | 210 x 130mm (H x Dia.)  |
| <b>Test Standards</b> | ASTM—Reflective Cracking Test<br>TxDOT Designation: Tex-248-F— Overlay Test |

### Compression / Cyclic Compression Test Kit

|                       |  |
|-----------------------|--|
| <b>Weight</b>         | 12kg   |
| <b>Dimensions</b>     | 275 x 215mm (H x Dia.)                             |
| <b>Specimen Size</b>  | 100 & 150mm (Dia.)                                 |
| <b>Test Standards</b> | AS 2891.12; BS 598-111; EN 12697-25A; EN 12697-25B |

### Dynamic Modulus Test

|                       |  |
|-----------------------|--|
| <b>Weight</b>         | 10kg   |
| <b>Dimensions</b>     | 150 x 100mm nominally (H x Dia.)                             |
| <b>Test Standards</b> | AASHTO T342/TP62; AASHTO T378/TP79; NCHRP 9-19<br>NCHRP 9-29 |

### Tension-Compression / Complex Modulus Test

|                       |   |
|-----------------------|---|
| <b>Weight</b>         | 3kg   |
| <b>Dimensions</b>     | 200 x 105mm (H x Dia.)                                      |
| <b>Test Standards</b> | AASHTO TP107 (S-VECD); EN 12697-26D;<br>EN 12697-26E; SCDUF |

### Small Diameter

|                      |   |
|----------------------|---|
| <b>Weight</b>        | 2kg   |
| <b>Dimensions</b>    | 150 x 100mm (H x Dia.)  |
| <b>Specimen Size</b> | 38, 50, 75mm (Dia.) for Uniaxial Fatigue<br>38, 50 and 75mm (Dia.) for Dynamic Modulus E* |

### Semi Circular Bend Test / Indirect Tensile Tests

|                       |   |
|-----------------------|---|
| <b>Weight</b>         | 9kg   |
| <b>Dimensions</b>     | 275 x 200 x 285mm (H x W x D)   |
| <b>Test Standards</b> | AASHTO TP124 (Illinois FIT/SCB); AASHTO T322/TP9;<br>AASHTO TP31; AS 2891.13.1;<br>ASTM D4123; ASTM D7369; ASTM D8044 (LSU SCB);<br>EN 12697-24E; EN 12697-26C; EN 12697-44 |

# Testing Standards Available

- ✓ **AASHTO T378/TP79** – Dynamic Modulus and Flow Number for Hot Mix Asphalt
- ✓ **AASHTO TP107** – Damage Characteristic Curve from Direct Tension Cyclic Fatigue Tests on Asphalt Mixtures (SVECD)
- ✓ **AASHTO TP116** – Rutting Resistance Using iRLPD (incremental Repeated Load Pavement Deformation) with minimum strain rates
- ✓ **AASHTO TP124 (Illinois SCB)** – Fracture Potential of Asphalt Mixtures Using the Flexibility Index Test (FIT)
- ✓ **AASHTO T342/TP62** – 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
- ✓ **EN 12697-24A, 12697-26A** – Resistance to Fatigue and Stiffness by Two-Point Bending Test on Trapezoidal Shaped Specimens.
- ✓ **AASHTO T321, ASTM D7460, EN 12697-24D, EN 12697-26B, AS 03:2000, AG:PT/233, AG:PT/T274**  
Stiffness and Resistance to Fatigue by Four-Point Bending Test on Prismatic Shaped specimens.
- ✓ **EN 12697-25B** – Triaxial Cyclic Compression on Hot Mix Asphalt

# Sample Preparation Equipment



## PREsBOX®

Asphalt Prism Shearbox Compactor

PREsBOX provides the latest in asphalt specimen preparation and mix evaluation technology. High quality asphalt prisms are produced from which beams and cylinders with excellent air voids distribution, homogeneity and particle orientation can be cut. With minimal operator involvement PREsBOX allows rapid and repeatable production of asphalt specimens in the laboratory.



## Galileo and Galileo Research

Advanced Research Gyrotory Compactors

The new flagship gyrotory compactor that incorporates innovative Electromechanical Servoactuation and patented Orbital gyrotory motion system.



## Autosaw II

Advanced Automated Asphalt Saw

The new and improved Autosaw II is the most advanced asphalt cutting saw available and is the perfect device for advanced testing laboratories. Its fully automated asphalt sawing system with integrated clamping system allows for fast and easy cutting of rectangular beams, trapezoidal prisms, overlay test specimens, semi-circular specimens, and trimming of cylindrical specimens.



## Multi Core-Drill

Advanced Asphalt Core Drill

The Multi Core-Drill is a superior laboratory asphalt core drill whose robust and rigid design provides precise coring of asphalt prisms, cylindrical and slab samples to the highest quality. Designed to be easy to use, flexible and adaptable, it ultimately provides users with precise drilling capabilities, enabling users to have absolute confidence in the quality of their test specimens and the reliability of their test results.

## Ordering information

Please see IPC Global Advanced Pavements Testing Systems catalogue and [www.controls-group.com/ipcglobal](http://www.controls-group.com/ipcglobal).



## ► IPC Global Customer Care

### At IPC global we are proud of our products.

We are dedicated to supplying high quality, accurate, affordable, easy-to-use systems for Advanced Testing of asphalt, binders and other pavement materials.

As a valued customer of IPC Global you will receive continuous, expert support and advice for your instrument. Furthermore, we offer full installation and training in the correct operation of your IPC Global equipment.

For support from our expert Customer Care Team, contact your local IPC Global-Controls office/distributor or email [ipcglobalsupport@controls-group.com](mailto:ipcglobalsupport@controls-group.com).

Visit our website for more information [www.controls-group.com/ipcglobal](http://www.controls-group.com/ipcglobal).



## ► Contact Us

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[www.controls-group.com](http://www.controls-group.com)

#### Italy (HEAD OFFICE)

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