

## B230

### 30 kN SERVO-HYDRAULIC DYNAMIC TESTING SYSTEM (DTS-30)

The DTS-30 Dynamic Testing System is a servo-hydraulic testing machine utilizing digital control of a high performance servo valve to provide accurate loading wave shapes up to 100 Hz. The DTS-30 can be operated in tension, compression dynamic loading and is suited to testing a diverse range of materials such as asphalt, soil, unbound granular materials, fibres and plastics.

The DTS-30 is underpinned by Pavetest's leading edge CDAS digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.

The DTS-30 Dynamic Testing System is compact, fully integrated, user and environmentally friendly.

The machine includes:

- B230-03** 150 kN Load frame
- B230-04** 30 kN Servo-hydraulic actuator (100 mm Stroke)
- B230-05** 2.2 kW Hydraulic Power Supply
- B206** 16 Channel Control and Data Acquisition System (CDAS) & TestLab software (see page 104)
- B230-01** Load cell ( $\pm 30$  kN)
- B230-02** 100 mm actuator LVDT

#### MAIN FEATURES:

- Compact, robust (150 kN) load frame
- Small footprint; 90 cm x 135 cm, including hydraulic power supply and climatic chamber
- Reaction frame embedded in the test chamber
- Portable temperature control unit
- Fully configurable to suit a large range of testing applications
- Digital Servo-Hydraulic control
- 4 axis control and 16 channel data acquisition as standard

#### ADVANTAGES:

- The DTS-30 fatigue rated, servo-hydraulic actuator utilizes metal labyrinth bearings and seals.  
The labyrinth bearings and seals are designed to reduce friction and maintain low operating temperatures. The bearings experience little-to-no wear, operate at high speeds and offer a long service life.
- The speed of the HPS pump motor is controlled using a variable-frequency drive (VFD), or inverter drive.  
This enables the motor to be slowed down, or turned off, when the oil flow from the pump exceeds the flow required by the actuator at any given time. This not only reduces noise and heat generation but also offers cost savings, by reducing power consumption.  
Furthermore, the HPS can operate at 50 Hz or 60 Hz.

#### TECHNICAL SPECIFICATIONS:

- **Load frame** Between Columns 600 mm  
Vertical Space 800 mm
- **Servo actuator** Capacity  $\pm 30$  kN  
Frequency up to 100 Hz  
Stroke 100 mm
- **Hydraulic Power Supply** Pressure up to 160 bar; user defined  
Flow rate up to 7,5 litres/min  
Dimensions: 650(h) x 550(d) x 450(w) mm  
Mains Power: 208V - 240V, 50/60 Hz, 2.5kW, 1 ph

Power Supply: 208V - 240V, 50/60 Hz, 2.5 kW, 1 ph  
Dimensions: 2100(h) x 900(d) x 700(w) mm with temperature controlled cabinet



**B230 30 kN Servo-Hydraulic Dynamic Testing System with B231 temperature controlled cabinet**

#### ACCESSORY:

- B231** Temperature controlled cabinet: -20°C to +80°C to suit DTS-30

**TEST CONFIGURATIONS and RELATED JIGS:**  
see pages 110 and 111



**WHAT MAKES IT DIFFERENT MAKES IT BETTER!**

The DTS-30 is Universal Testing Machine (UTM), but not as most people know it. It does not conform to the “me too” attitude of most UTM manufacturers. The innovations featured on the DTS-30 are built on many years of experience, developing, studying and using various universal testing machines from a number of manufacturers.

The first thing you will notice about the DTS-30 is the absence of a reaction frame. **The reaction frame** most certainly exists, but it's **embedded in the test chamber**. This provides a very sleek appearance, maximizes the space inside whilst reducing the space required outside.

Since it is mandatory to control the test temperature of most pavement materials, e.g. asphalt, **the test chamber is insulated and forms part of the temperature controlled cabinet**.

Most UTM manufacturers opt for an elaborate (and expensive) moveable crosshead, only to find that its range (and usefulness) is limited by the climatic chamber.

The DTS-30 has a remotely positioned reaction shaft that adjusts the work space. However, you won't need to adjust it often because the **servo-hydraulic actuator has 100 mm of stroke**.

**PORTABLE TEMPERATURE CONTROL UNIT**

The temperature control unit attaches to the test chamber using a magnetic seal and can be wheeled away when not required or for servicing.

This also makes servicing, replacing or upgrading the temperature control unit virtually effortless: it can be removed without dismantling the machine or disrupting the testing program.

**A BOTTOM LOADING MACHINE**

Before this current crop of universal testing machines, many dynamic testing machines were bottom loading. More recently, the Asphalt Mixture Performance Tester (AMPT) changed the mindset of the testing community by highlighting the benefits of a bottom loading machine.

Firstly, **it is a neat, compact and integrated solution**, that places all hydraulic components within easy reach: gone are the long hydraulic hoses that run up and down the side of the machine and got in the way. They have been replaced by **shorter hoses that connect the actuator to the hydraulic power supply** that's tucked neatly away behind the machine, under the test chamber.

Can't see the **Control and Data Acquisition System (CDAS)**? That's because **it's housed neatly, in the cabinet in front of the machine**. You won't see a tangle of cables either; they enter the cabinet through the floor of the test chamber or through the back of the cabinet and connect to the CDAS.

The door of the cabinet can be held ajar to allow transducers to be re-allocated or opened completely for servicing. Unused transducers can also be stored out of harm's way.

Moreover, the DTS-30 reaction frame is symmetrical; **the servo-hydraulic actuator and reaction shaft can be interchanged to make the DTS-30 top loading**.



B230 DTS-30 Dynamic Testing System, open



B206 16 Channel CDAS








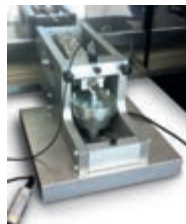
section B



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**MATEST**

TESTING KIT	RELEVANT STANDARD(S)	DYNAMIC SYSTEM	ACCESSORIES CONSUMABLES	PICTURE
<b>B250 KIT</b> <b>IDTM</b> Indirect Tensile Modulus	AASHTO TP31 Resilient modulus of bituminous mixtures by indirect tension  ASTM D4123 Indirect Tension Test for Resilient Modulus of Bituminous Mixtures  AS/NZS 2891.13.1 Resilient modulus of asphalt - Indirect tensile method  EN 12697-26 Annex C - Indirect tension to cylindrical specimens (IT-CY)	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B250-03</b> Asphalt proving ring  <b>B250-04</b> 100 mm diameter PVC specimen  <b>B250-05</b> 150 mm diameter PVC specimen  <b>B250-06</b> Torque screwdriver  <b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen	
<b>B251 KIT</b> <b>IDTF</b> Indirect Tensile Fatigue	EN 12697-24 Annex E – Indirect tensile test on cylindrical shaped specimens	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B251-01</b> LVDT mounting strip gluing jig (Included in B251 KIT)  <b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen  <b>B251-51</b> LVDT mounting strip to suit 100 mm specimen  <b>B251-52</b> LVDT mounting strip to suit 150 mm specimen	
<b>B260 KIT</b> <b>UCC</b> Uniaxial cyclic compression	EN 12697-25 Cyclic compression. Test Method A - Uniaxial cyclic compression test with confinement	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen	
<b>B253 KIT</b> <b>IDTOS</b> Indirect Tensile modulus, creep compliance and strength using on-specimen transducers	ASTM D7369 Resilient Modulus of Bituminous Mixtures by Indirect Tension Test  AASHTO T 322 Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B253-02</b> Gauge point template, 100 mm specimen (Included in B253 KIT)  <b>B253-03</b> Gauge point template, 150 mm specimen (Included in B253 KIT)  <b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen  <b>B253-51</b> Short gauge point  <b>B253-52</b> Long gauge point	
<b>B212</b> <b>4PB</b> Four Point Bending	AASHTO T 321 Fatigue Life of Compacted Hot-Mix Asphalt (HMA) Subjected to Repeated Flexural Bending  ASTM D7460 Fatigue Failure of Compacted Asphalt Concrete Subjected to Repeated Flexural Bending  AG:PT/T233 & ASTM 03 Fatigue life of compacted bituminous mixes subject to repeated flexural bending  EN 12697-24 Annex D - Four point bending test on prismatic shaped specimens  EN 12697-26 Annex B - Four point bending test on prismatic specimens (4PB-PR)	<b>B230</b> DTS-30 with Climatic chamber (B231)	<b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen  <b>B210-02</b> 4PB PVC Beam  <b>B210-03</b> 4PB Reference beam	
<b>B280 KIT</b> <b>2PB</b> Two Point Bending	EN 12697-24 Annex A - Two-point bending test on trapezoidal shaped specimens (2PB-TR)  EN 12697-26 Annex A - Two point bending test on trapezoidal specimens (2PB-TR)	<b>B230</b> DTS-30 with Climatic chamber (B231)	<b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen  <b>B280-51</b> 2PB Mounting 25 mm apex plate (Included in B280 KIT)  <b>B280-52</b> 2PB Mounting 50 mm apex plate (Included in B280 KIT)  <b>B280-53</b> 2PB Mounting base plate (Included in B280 KIT)  <b>B280-02</b> Two point Bending (2PB) gluing jig	

TESTING KIT	RELEVANT STANDARD(S)	DYNAMIC SYSTEM	ACCESSORIES CONSUMABLE	PICTURE
<b>B261 KIT PD</b> Permanent deformation	AS/NZS 2891.12.1 Determination of the permanent compressive strain characteristics of asphalt - Dynamic creep test	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen  <b>B260-03</b> 100 mm top platen  <b>B260-04</b> 150 mm top platen	
<b>B255 KIT E*</b> Dynamic modulus	AASHTO T342 Determining Dynamic Modulus of Hot Mix Asphalt (HMA)	<b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B202</b> AMPT Gauge Point Fixing Jig  <b>B203</b> AMPT Dynamic Verification Device  <b>B253-53</b> AASHTO T342 gauge point  <b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen	
<b>B270-01 TRM</b> Triaxial resilient modulus	AASHTO T307 Determining the resilient modulus of soils and aggregate materials	<b>B220</b> DTS-16  <b>B230</b> DTS-30  <b>B240</b> DTS-130	<b>B270-02</b> External LVDT mounting kit  <b>B290-02</b> 2 X Displacement transducer (±5 mm)  <b>B293-02</b> Pressure transducer (±600 kPa)  <b>S315-07</b> 100 mm diameter bottom platen  <b>S314-03</b> 100 mm diameter top platen  <b>B270-04</b> Air reservoir assembly confining pressure upgrade kit (for DTS-16) or <b>B270-03</b> Air reservoir assembly with confining pressure control (for DTS-30/130)	
<b>B270-01 CCT</b> Cyclic triaxial compression	EN 12697-25 Cyclic compression. Test Method B - Triaxial cyclic compression test	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B270-02</b> External LVDT mounting kit  <b>B290-02</b> 2 X Displacement transducer (±5 mm)  <b>B293-02</b> Pressure transducer (±600 kPa)  <b>B270-05</b> 110 mm diameter bottom platen  <b>B270-06</b> 110 mm diameter top platen  <b>B292-01</b> Temperature transducer (-80°C to +80°C)  <b>B270-04</b> Air reservoir assembly confining pressure upgrade kit (for DTS-16) or <b>B270-03</b> Air reservoir assembly with confining pressure control (for DTS-30/130)	
<b>B254-01 SCB</b> Semi-Circular Bending	EN 12697-44 Tensile Strength and Fracture Toughness-Crack Propagation	<b>B220</b> DTS-16 with Climatic chamber (B221)  <b>B230</b> DTS-30 with Climatic chamber (B231)  <b>B240</b> DTS-130 with Climatic chamber (B241)	<b>B250-01</b> Basic Indirect Tensile Jig  <b>B290-07</b> Deformation gauge  <b>B250-07</b> Temperature measuring kit: two RTDs (-80°/+80°) and dummy asphalt specimen	

