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TECHNOLOGY
PART OF THE COOPER GROUP

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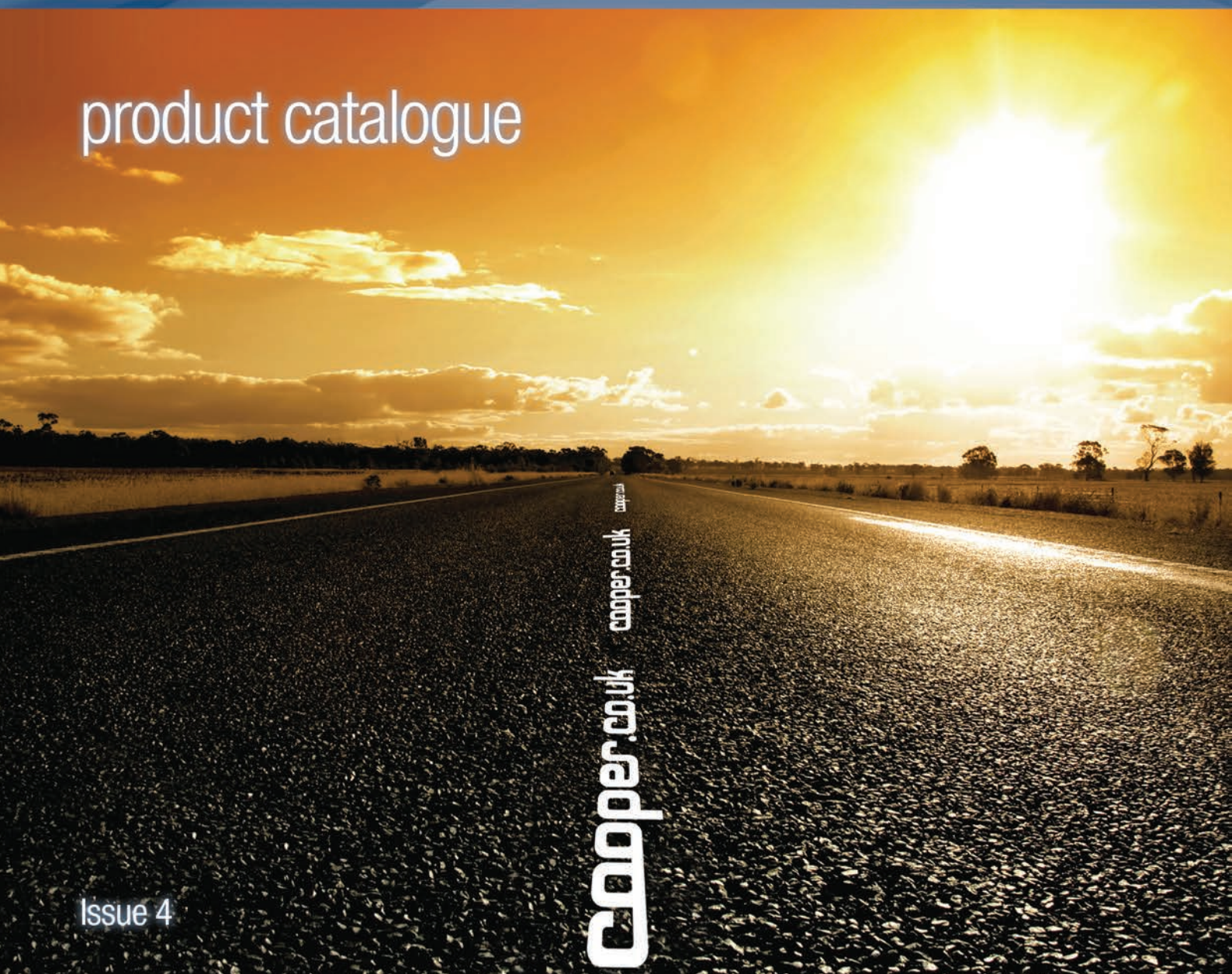
product catalogue



Issue 4

Pioneers in Asphaltic & Unbound Materials Testing

Established in 1990, Cooper Technology is a British company and the world leader in the design and manufacture of high performance testing equipment for asphaltic and unbound materials used in highway construction.

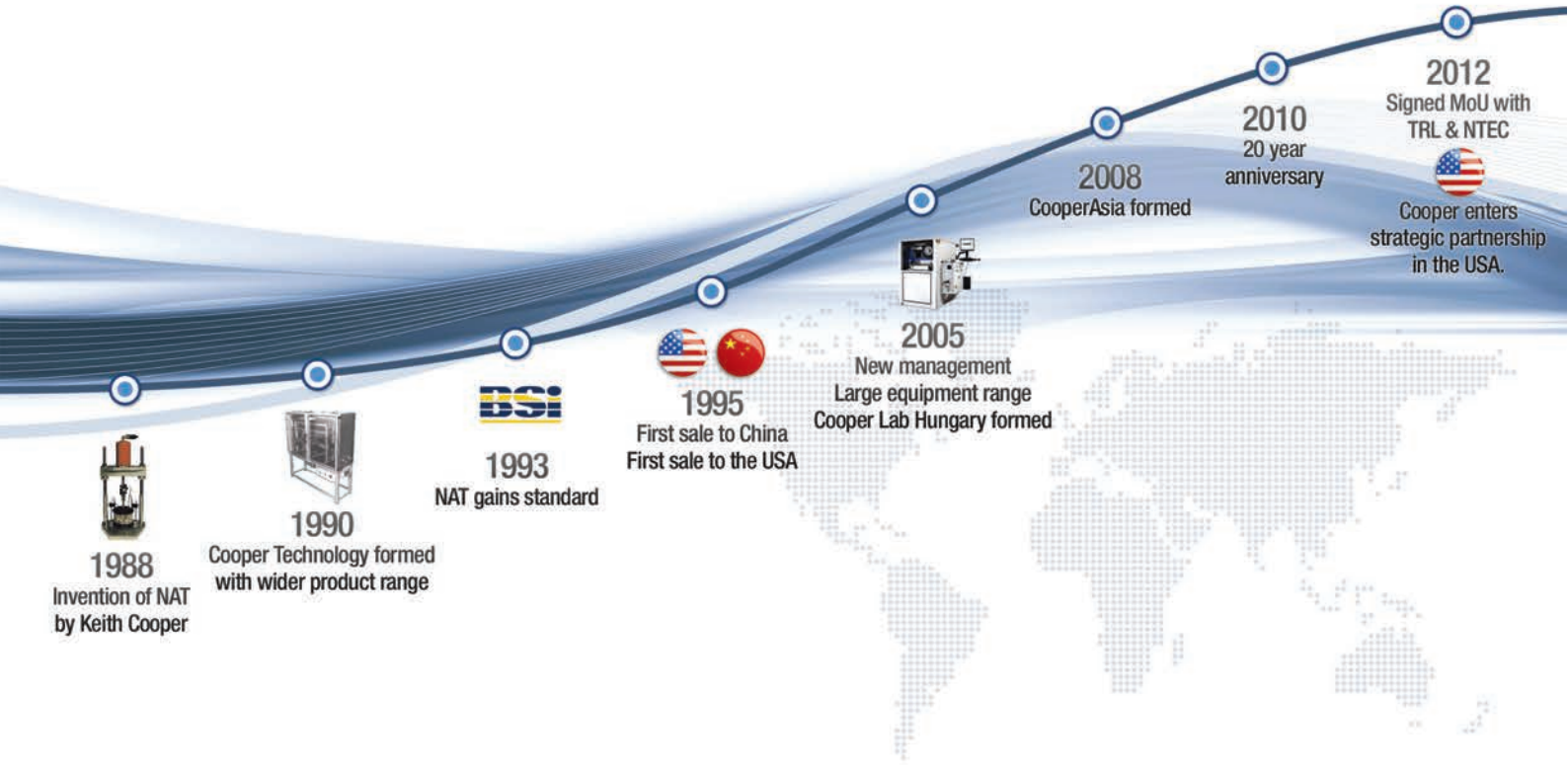
The Nottingham Asphalt Tester (NAT), designed in the 1980's by our Chairman Keith Cooper whilst at the University of Nottingham, was the first of its type. Since then our product range has increased steadily and now includes Gyratory Compactors and Roller Compactors to prepare and compact specimens in addition to Servo Hydraulic and Servo Pneumatic Universal Testers, Triaxial Testers, Fatigue Systems and Wheel Trackers to perform worldwide standards.

Why choose Cooper?

GLOBAL SUPPLIER THAT IS LOCAL ENOUGH TO CARE...

As a customer focused business, we listen. The Cooper Technology approach is to first establish customer requirements and then to offer best advice on the options available in order that customers can make informed decisions. We pride ourselves on working in partnership with customers rather than just "order taking".

Our consultative approach ensures that the application is fully understood before an order is accepted, thus ensuring the equipment ordered is fit for purpose and will deliver the expected results and reliably day after day and year after year.



DESIGN, DEVELOP, AUTOMATE, TEST...

Cooper Technology is much more than a manufacturer: all our machines are fully designed and developed by our dedicated in-house design team, all our engineers are degree educated in their relevant fields, and every engineering discipline is covered.

Mechanical Design
Via the use of 3D CAD packages we ensure our business is best positioned to utilise the most state of the art geometrical modeling systems available. These systems further permit calculating customer specific solutions within the shortest possible time.

Electrical/Electronic Design
The team work according to the very latest norms in system technology. Our customers expect electronic products that have better quality, more flexibility and new features at a competitive price. To remain at the forefront of today's market demands, we equip our design engineers with systems that deliver flexibility, high performance and reliability.

Software design
NI LabVIEW is our chosen solution: our highly trained professional users develop using this language. NI LabVIEW is a graphical development environment that combines the ease of use of configuration-based tools with the flexibility of a powerful programming language. It enables the programmer to quickly create user interfaces as well as perform advanced control, signal processing and analysis, communication and logging.

Hydraulic/ Pneumatic
Global industry specialists team up with Cooper engineers to deliver a system that utilises the best possible solutions on the market today. Our servo Hydraulic/Pneumatic solutions have delivered reliably over the last 20 years, whilst being consistently refreshed in order to ensure the perfect interface with mechatronic solutions.

ACADEMIC LINKS...

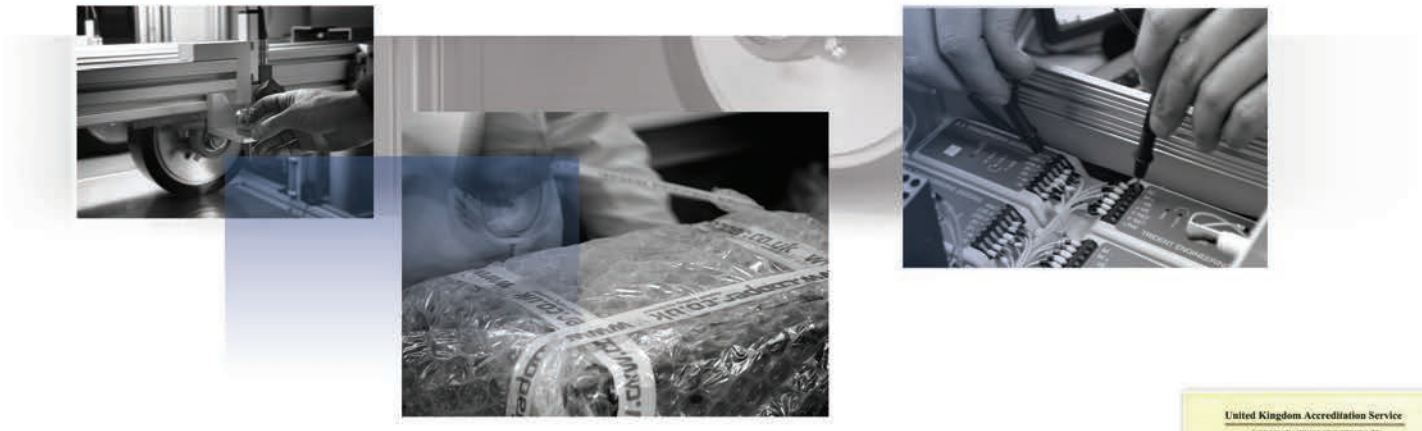
Nottingham
Our heritage is one of close links with the pavement engineering department of Nottingham University. This department, now known as NTEC, has global recognition and is seen as being at the forefront of pavement research. In 2011 PUMA (Precision Unbound Material Analyser) was developed as a part of collaborative project with NTEC.

Our longstanding relationship with Nottingham is now stronger than ever with the signing of three way **Memorandum of Understanding between Cooper, NTEC and the TRL (Transport Research Laboratory).** The organisations will coordinate resources and activities to actively cooperate on the pursuit of projects involving the supply of laboratory equipment, laboratory testing and related consultancy services

Standards Committees
Our expertise often plays a critical part in the development of new, and existing test standards. We are at the forefront of standard development, working closely with key decision makers worldwide and harnessing links with new related industries, ensuring that practical solutions to everyday problems are achieved.

Calibration Services from the Industry Specialist

Prior to dispatch, where appropriate, each piece of our test equipment is calibrated by qualified engineers using procedures and equipment which are scrutinised annually by the United Kingdom Accreditation Service (UKAS). The International Laboratory Cooperation (ILAC) links UKAS with accreditation bodies worldwide. All equipment needs to be UKAS calibrated and traceable to national standards in order to satisfy typed testing as described in the EN13108. Although equipment from Cooper Technology normally continues to perform correctly and produce accurate results for many years, over time and through application there could be some component wear and the output from electronic components may drift. A highways material laboratory is not an ideal environment for instruments that must, in some cases, measure displacements within accuracies in excess of one millionth of a metre.



QUALITY ASSURANCE

When choosing Cooper Technology as your business partner, you are also selecting our international reputation for competence, integrity and innovation. Each item of equipment is subject to rigorous quality tests at every stage of its design and manufacture to ensure that we provide our customers with an outstanding product.

Quality is fundamental to our activity; it not only relates to the final product but extends also to the systems we employ. Our systems are internationally recognised via ISO 9001:2008. Our certified partner in helping us achieve this recognition is BSI (British Standards Institute). For over 100 years, BSI has led the way in developing the concept of standards and ensuring that they are relevant to your business. No other certification body can offer the expertise, knowledge and recognition that is associated with a BSI certificate.

ISO9001 FM515407 0611B

cooper

premium care

Cooper Technology's business philosophy is to work closely with individual testing organisations to explore their needs and to find solutions to the challenges they face. Preventative maintenance is essential to ensure that key equipment operates day after day. It is imperative that this should be carried out by trained, experienced engineers and that OEM parts are used.

Our customers stress that quality service and rapid response are essential factors considered when purchasing capital equipment. Cooper Premium Care has been developed as a customer-focused solution to mitigate the effect of factors that may adversely affect your operation, giving you **total peace of mind.**

THE BENEFITS OF COOPER PREMIUM CARE SERVICE AND MAINTENANCE CONTRACT:

- All work is undertaken by trained engineers skilled in the installation, maintenance and repair of asphalt testing equipment
- All work is covered under warranty (parts and labour)
- Only OEM parts used
- Implementation of effective maintenance regimes
- Risk of unforeseen maintenance costs greatly reduced
- Early warning of potential problems
- Increased equipment life and residual values
- Rapid response guaranteed with priority service
- Reduction of downtime
- Protection of your investment
- Facilitation of budgeting and record keeping

COOPER PREMIUM CARE SERVICE AND MAINTENANCE CONTRACT INCLUDES**:

- 48 hour response*[1]
- Priority remote support for issues and technical queries
- Annual preventative service planned at your convenience
- Full access to the Cooper knowledge database via a trained technician
- Free of charge callouts*[2]
- 10% discount on parts
- First 125 miles radius included as standard

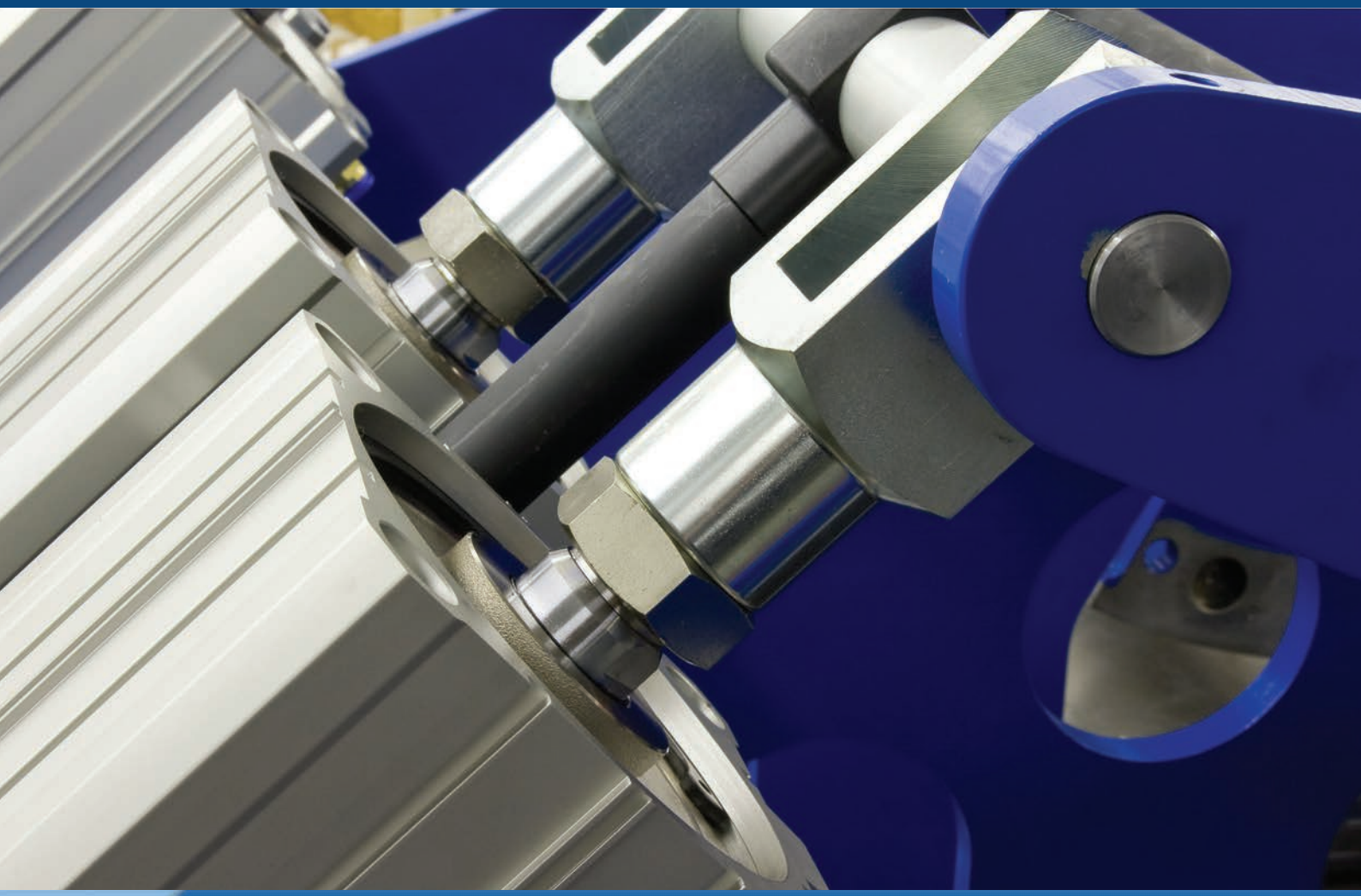
* Parts extra
** Machine misuse, internal IT problems and standard calibrations are not included under this agreement, these issues will be charged separately

*1 Within normal working hours, Monday to Friday 8:30am to 5.00pm, any issue will be recorded and responded to accordingly
*2 Depending on SLA terms and conditions.

QUALITY SERVICE AT AN AFFORDABLE PRICE - WHY SETTLE FOR ANYTHING LESS!

for more information call our support team on +44 (0) 1773 512 174 or email support@cooper.co.uk

our products



contents

Servo-Pneumatic Universal Testing Machine

CRT-UTM-NU

Rapid determination of modulus, permanent deformation and fatigue of bituminous mixtures using cylindrical specimens that are cored from the highway or prepared in the laboratory

BRIEF INTRODUCTION

This machine is a development of the NAT which was developed by Keith Cooper and Professor Steven Brown at the University of Nottingham. The use of a high precision servo-pneumatic valve in conjunction with a low-friction actuator and sophisticated data acquisition and control, results in a performance that is equal to many servo-hydraulic systems.

Accurate, digitally generated waveforms are applied by the actuator producing repeatable stress variations in test specimens that are simulative of those in a road pavement due to moving traffic. The actuator is double-acting allowing both compressive and tensile forces to be applied. A triaxial cell system is available for the measurement of the resilient modulus of unbound materials.

KEY FEATURES

- Low cost dynamic loading universal test system ideally suited to testing asphalt and unbound granular materials
- Double acting low friction actuator with integral stroke transducer
- Utilises high performance ceramic spool servo-valve
- High quality stainless steel frame
- Issued with UKAS accredited certificate of calibration for EN 12697-24; EN 12697-25, EN 12697-26
- Accessories available to perform a range of standard and non standard test methods
- Can be supplied with standard software to perform EN, ASTM and AASHTO test methods and universal software with which to design non standard test routines

KEY USES

- Assessment of resistance to permanent deformation (rutting)
- Measurement of stiffness modulus
- Assessment of resistance to fatigue cracking
- Resilient modulus of unbound materials
- Mix design

TEST METHODS INCLUDE

ASPHALT

Modulus
- EN 12697-26 Annex C
- EN 12697-26 Annex D & E
- ASTM D7369
- ASTM D4123
- ASTM D3497
- AASHTO TP31
- AASHTO TP62 / TP79

Permanent Deformation
- EN 12697-25 Methods A & B

Fatigue
- EN 12697-24 Annex E
- ASTM D7313 DCT (Disc shaped compact tension test)
- EN 12697-44 SCB (Semi circular bending test)

Simple Performance Tests
- Dynamic Modulus; Flow number, Flow time
  NCHRP9-19; NCHRP9-29

UNBOUND MATERIALS

- AASHTO T307 (previously TP46)
- NCHRP 1-28A

SYSTEM ELEMENTS

The CRT-UTM-NU is comprised of:

- A rigid stainless steel test frame with adjustable height cross-head
- A precision servo-valve with ceramic spool
- Pneumatic actuator with low friction seals and integral stroke transducer
- Load transducer (±20kN capacity)

ADVANCED DATA ACQUISITION SYSTEM*

» 20 bit resolution, 5kHz per channel
» Will accept any voltage transducer in any channel using TEDS Thermocouples
» 1024 data points per cycle
» Up to 16 digital input & output channels
» Ethernet/USB/RS232 to PC communication

* Available late 2012

Servo-Hydraulic Universal Testing Machine

CRT-UTM-HYD

A new generation of Universal Testing Machine combining state of the art technology with proven reliability and precision for research and standard testing

BRIEF INTRODUCTION

The Servo-Hydraulic Universal Testing Machine (CRT-UTM-HYD) is a well designed, inexpensive machine specifically developed for the testing of materials used in pavement construction.

A motorized, adjustable crosshead reduces the time between test setups. The programmable temperature cabinet provides the possibility to perform frequency/temperature sweeps. Accurate waveforms are digitally generated and applied by the actuator producing repeatable conditions that are simulative of those created by moving or static vehicles. The actuator is double-acting allowing both compressive and tensile forces to be applied. Various systems are available for the measurement of the modulus of unbound materials.

KEY FEATURES

- Designed to perform a range of tests on asphaltic paving materials, sub-grade soils and granular sub-base materials
- Double acting fatigue rated hydraulic actuator with integral stroke transducer
- Utilises Star servo valve with 'Sapphire Technology'
- Motorised adjustable lower crosshead with automatic hydraulic frame clamping
- Integral programmable temperature controlled cabinet
- Issued with UKAS accredited certificate of calibration for EN 12697-24; EN 12697-25, EN 12697-26
- Accessories available to perform a range of standard and non standard test methods
- Can be supplied with standard software to perform EN, ASTM and AASHTO test methods and universal software with which to design non standard test routines

KEY USES

- Assessment of resistance to permanent deformation (rutting)
- Measurement of stiffness modulus
- Assessment of resistance to fatigue cracking
- Resilient modulus of unbound materials
- Mix design

TEST METHODS INCLUDE

ASPHALT

Modulus
- EN 12697-26 Annex C
- EN 12697-26 Annex D & E
- ASTM D7369
- ASTM D4123
- ASTM D3497
- AASHTO TP31
- AASHTO TP62 / TP79

Permanent Deformation
- EN 12697-25 Methods A & B
- DD226

Fatigue
- EN 12697-24 Annex E
- ASTM D7313 DCT (Disc shaped compact tension test)
- EN 12697-44 SCB (Semi circular bending test)

Chinese Tests
- Bending; Creep; Splitting Test
- T 0738-2011

Simple Performance Tests
- Dynamic Modulus; Flow number, Flow time
  NCHRP9-19; NCHRP9-29

UNBOUND MATERIALS

- AASHTO T307 (previously TP46)
- NCHRP 1-28A
- EN13286-7

SYSTEM ELEMENTS

The CRT-UTM-HYD is comprised of:

- A rigid stainless steel loading frame
- An externally mounted fatigue rated hydraulic actuator with Star servo valve
- A sophisticated data acquisition and control system
- An integral temperature controlled cabinet -20 to 30°C with double glazed viewing door
- A motorised adjustable lower crosshead with automatic hydraulic frame clamping
- Load transducer (±25kN capacity)

ADVANCED DATA ACQUISITION SYSTEM*

» 20 bit resolution, 5kHz per channel
» Will accept any voltage transducer in any channel using TEDS Thermocouples
» 1024 data points per cycle
» Up to 16 digital input & output channels
» Ethernet/USB/RS232 to PC communication

* Available late 2012

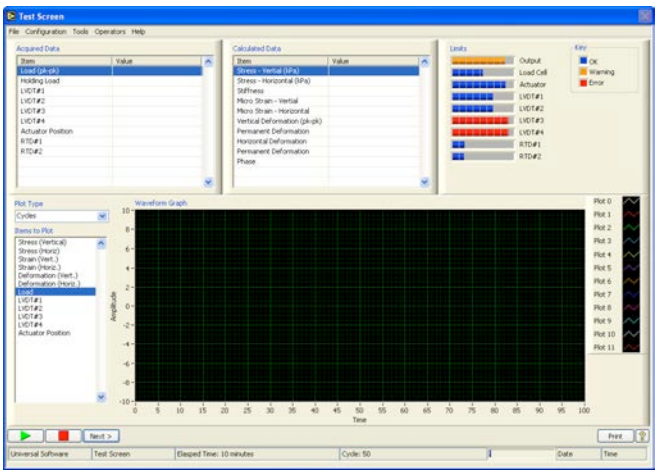
Servo-Pneumatic Universal Testing Machine CRT-UTM-NU
Servo-Hydraulic Universal Testing Machine CRT-UTM-HYD

SPECIFICATIONS	CRT-UTM-NU	CRT-UTM-HYD
Maximum Load	Electronically limited to 15.5kN	25kN to 110kN
Load Transducer	±20kN	Variable dependant on capacity
Actuator Stroke mm	30	50
Frequency	0 to 30 Hz	0 to 70 Hz
Electrical Supply[1]	220-240 Volts 50 Hz @ 13A	3 Phase 415 Volts 50 Hz @ 16A
Compressed Air	7-10 bar at 600 L/min	7 bar @ 100 L/min
Dimension mm (WxDxH)	Frame 360 x 400 x 740 Control Box 360 x 280 x 140	Cabinet 1000 x 1300 x 2400 Power Pack 630 x 580 x 890 *Please enquire for 110kN machine
Working space required mm (WxDxH)	825 x 1650 x 2100 when fitted in cabinet CRT-TCC	1100 x 2300 x 2600
Estimated Weight Kg	Frame 30 Control box 6	Cabinet 680 Power Pack 60
PC	Included	Included

[1] others available upon request

SOFTWARE

- User friendly, intuitive and reliable Windows software developed using LabVIEW
- Standard test software available to meet specific EN, ASTM and AASHTO test methods
- Universal test software for the development of test methods using static, sinusoidal, haversine, square, triangular with user selected frequencies and data collection rates
- Stored test data can be imported into a spreadsheet package to be analysed by the user
- Utilities are included for transducer check, diagnostic routines and calibration



Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-ITSMFAT-SET

Indirect tensile stiffness modulus and fatigue measurement system to perform EN 12697-26 (Annex C) and EN 12697-24 (Annex E) *

- Sub-frame for 100 mm and 150 mm Ø specimens
- Specimen alignment jig
- Loading strips and displacement transducer yoke for 100 & 150 mm Ø specimens
- 2* CRT-ITLV AC LVDT displacement transducer ±0.25 mm range
- CRT-CALCR. Calibration check ring for checking accuracy of load and displacement transducers used in Indirect Tensile Stiffness Modulus test
- 2* CRT-SPTLVDT displacement transducer ±1.0 mm range
- On specimen fatigue clamping frame for 100 mm Ø specimens
- Setup jig
- Crosshead with linear bearings
- 1* 7mm spanner
- Test software to meet latest standard specifications

* Can be sold as two separate accessories CRT-IT-SET and CRT-FAT-SET

CRT-IT-RESMOD

Resilient modulus test system to perform AASHTO TP31 and ASTM D4123

- Sub-frame, Loading strips for Ø 101.6 mm and Ø 152.4 mm specimens
- 2 * CRT-SPTLVDT displacement transducer ±1.0 mm range
- 2 * CRT-ITLV AC LVDT
- 4*horizontal LVDT adjusters
- 2 *vertical LVDT adjusters, LVDT yoke
- Test software to meet latest standard specifications

CRT-D7369

Resilient modulus test system to perform ASTM D7369

- Sub-frame, Loading strips for Ø 101.6 mm and Ø 152.4 mm specimens,
- 2 * displacement transducer ±1.0 mm range,
- 2 * displacement transducer ±0.25 mm range
- 8* Clip-on LVDT holders, 16 * target, Target placer unit,
- 1* Epoxy adhesive,
- Test software to meet latest standard specifications

CRT-SPTLV

Test system to perform dynamic modulus according to AASHTO TP62 / Simple Performance Test

- 2* Clip-on CRT-SPTLVDT displacement transducer ±1.0 mm range
- 4* Clip-on LVDT holders, 24 targets
- LVDT stud placer unit
- LVDT stud placer top plate
- 1* upper platen 100 SPT
- 1* lower platen 100 SPT
- 2* 100mm dia. X 0.5 PTFE disc
- 1* araldite glue
- Pneumatic fittings
- Test software to perform Dynamic modulus for permanent deformation

CRT-4PT-BB

Test system to perform four point bending beam according to EN 12697-24 Annex D, EN 12697-26 Annex B and AASHTO T321-03 (TP8) to be used on UTM-HYDs
Beams from 40 x 40 to 70 x 70 mm cross sections and 400 mm long

Accessories (cont)

CRT-PD-SET

Dynamic and static creep measurement system to perform EN12697-25 (Method A) and DD226

- 1* 100 mm platens (top and bottom) with holders
- 1* 150 mm platens (top and bottom) with holders
- 2* CRT-PDLV. AC LVDT displacement transducer ±5.0mm range
- 1*CRT-INDENT
- Test software to meet latest standard specifications

CRT-PRESTRIAX-SET

Dynamic and static creep(Flow) measurement system with confining stress to perform EN12697-25 Method B

- Pressure range 0 – 500kPa
- Triaxial cell with internally mounted load cell
- Pneumatic control system with pressure controller and pressure indicator
- 1* Ø100 mm perforated hardened polished upper platen
- 1* Ø150 mm perforated hardened polished upper platen
- 1* Ø100 mm perforated hardened polished lower platen
- 1* Ø150 mm perforated hardened polished lower platen
- Platens are M.S. grade 070M20 case hardened to 750HV to a depth after grinding of at least 0.5 mm. They are surface ground and polished.
- 2*CRT-PDLV
- 3* Ø100 mm neoprene membranes
- 3* Ø150 mm neoprene membranes
- Test software to meet latest standard specifications

Note: CRT-PRESTRIAX-SET can be used to perform EN12697-25 Method A if a Ø96mm top platen is ordered

Note: Software is also available to perform Flow Time and Flow Number

CRT-DTC-UTM14 and CRT-DTC-UTM25

Direct Compression and Tension measurement system to perform EN12697-26 Annexes D&E (DT-CY/CT-PR/DTC-CY) for CRT-UTMs

- Mechanical frame
- 3 x CRT-SPTLV AV LVDT displacement transducers ±1.0mm
- LVDT conditioning card
- LVDT mounting clamp, screw and stud
- 6 x magnets and gluing jig
- 300mm actuator rod for DTC-UTM25 only
- Test software to meet latest standard specifications

CRT-EN13286-7

Unbound system to perform EN 13286-7 (used only with UTM-HYD)

- CRT-EN13286-7M Mould
- CRT-EN13286-7-MEM Membrane for triaxial cell 150x400mm- Pack of 2

CRT-UNIVSOFT

Facilitates the design of test routines that can include multiple wave types, test stages and methods of data acquisition

CRT-COMP-650

Standard air compressor (up to 7bar and 600 L/m) for supply of air to CRT-UTM-NU

CRT-FT06-AIRDRYER

Air dryer with 600 L/s flow rate and 3°C dew point

CRT-T307

Triaxial system to perform AASHTO T307 on 200mm * Ø100mm specimens of unbound material

- Triaxial cell with internally mounted load cell
- Base adaptor with fluid connections for top platen, bottom platen and cell
- Pressure range 0 – 500kPa
- Pneumatic control system with vacuum, closed loop pressure control and pressure transducer
- 1* Ø100 mm top platen, 1* Ø100 mm membrane stretcher
- 3 * Rubber membranes for 200 mm x Ø100 mm specimens, 4 * O-rings Ø100 mm
- 2* LVDTs
- 2 * Porous end caps for Ø100 mm specimens
- 1 * Plastic Ø100 mm dummy specimen
- Test software

Note: CRT-T307 can be used to perform EN12697-25B on Ø100 mm specimens if ordered with steel platens

CRT-T307+

Triaxial system to perform AASHTO T307 on 300 mm * Ø150 mm and 200 mm * Ø100 mm specimens of unbound material

- Triaxial cell with internally mounted load cell
- Base adaptor with fluid connections for top platen, bottom platen and cell
- Pressure range 0 – 500kPa
- Pneumatic control system with vacuum, closed loop pressure control and pressure transducer
- 1* Ø100 mm top platen
- 1* Ø150 mm top platen
- 1* Ø100 mm membrane stretcher
- 1* Ø150 mm membrane stretcher
- 2* LVDTs
- 2 * Porous end caps for Ø100 mm specimens
- 2 * Porous end caps for Ø150 mm specimens
- 1 * Plastic Ø100 mm dummy specimen
- 1 * Plastic Ø150 mm dummy specimen
- 4 * O-rings Ø100 mm
- 4 * O-rings Ø150 mm
- 3 * Rubber membranes for 200 mm x Ø100 mm specimens
- 3 * Rubber membranes for 300 mm x Ø150 mm specimens
- Test software

Note: CRT-T307+ can be used to perform EN12697-25B on Ø100mm and Ø 150mm specimens if ordered with steel platens

CRT-TCC Temperature controlled cabinet for CRT-UTM-NU

The temperature can be controlled to 0.2ºC over the range - 25ºC to + 60ºC using a P.I.D. digital temperature controller, the CAL3200. Forced air over the heater and cooling fins and through the air duct in the rear wall ensures a uniform temperature throughout the cabinet. Defrost water drains via a pipe on the back of the cabinet to a heated tray underneath the cabinet where the water will evaporate. The cabinet also features an over temperature device which will switch off the fans, heating, cooling and illuminates a warning light if the set temperature is exceeded. The front door is double-glazed and contains a heating element to ensure that the glass door remains clear. When testing asphalt good temperature control is essential. Test data shows that a 1% change in temperature can cause up to 10% variation in stiffness results.

Precision Unbound Material Analyser

CRT-PUMA

> Innovative test equipment which fills the gap between complex laboratory tests and CBR

BRIEF INTRODUCTION

The Precision Unbound Material Analyser (PUMA) is a new type of laboratory test equipment designed to fill the gap between expensive and complex laboratory tools (such as triaxial cells) and more empirical methods (such as the California Bearing Ratio test). It is designed to generate realistic values of modulus for use in road pavement design.

The PUMA can be used to test unbound, hydraulically bound and asphaltic materials. It has been designed as a low cost, easy to use and practical tool, but one which is capable of generating scientifically meaningful data (Modulus and Resistance to Permanent Deformation), for use in road pavement design. It can be used to test specimens made from granular material, soil or lightly stabilised material etc, with a maximum particle size of 31.5mm.

The PUMA is proposed as a direct equivalent to the Springbox, with the advantage that initial stress conditions can be accurately controlled. It is a simple test, suited to generic specification, that holds the promise of increased confidence in pavement foundation design, particularly in cases where favourable weather conditions during construction result in unrepresentatively high Dynamic Plate Test (DPT) values, or in cases where stabilised soils or cold-mix asphalt are employed.

KEY FEATURES

- Designed for use within a UTM loading frame.
- Compatible with existing loading systems currently used for asphalt testing.
- Compaction can be carried out using existing vibrating hammer equipment.
- Flexibility to alter stress conditions (vertical and horizontal) and the number of load cycles if desired.
- Possibility to carry out the test directly under DPT equipment in order to simulate as closely as possible the likely in-situ value.
- Equipment is applicable to all unbound materials with particle size up to 31.5mm
- Suitable for tests on hydraulically bound materials

KEY USES

- Determination of stiffness modulus under different stress conditions, allowing pavement design to be more scientifically based than is possible when relying on an assumed relationship to an in-situ DPT value.
- Measurement of rate of increase of permanent deformation, which can be directly related to design against rutting, applicable to relatively thinly surfaced roads
- Tests cold mix asphalt

STANDARDS

- To Be Confirmed:
  IAN 73/06 - DESIGN GUIDANCE FOR ROAD PAVEMENT FOUNDATIONS

SYSTEM ELEMENTS

The CRT-PUMA is comprised of:

- Two adjustable steel bands
- Mould wall segments (eight pieces of hardened steel)
- Base plate
- Base
- Platen
- Rubber lining strips
- T-sections (placed between mould wall segments to prevent particle escape)
- Strain Gauged Measurement Band
- Compaction jacket
- Loading platen
- 2x CRT-PDLV (LVDT ± 5.00mm range)
- LVDT frame
- O-ring
- Data acquisition system

Precision Unbound Material Analyser

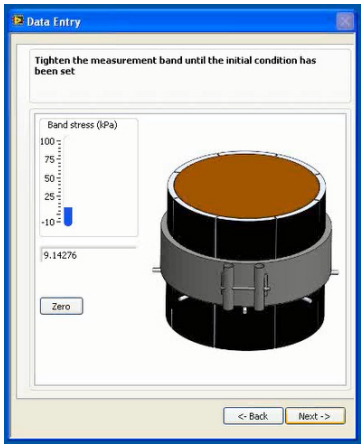
CRT-PUMA

SPECIFICATIONS

Maximum Applied Force	15.5kN using CRT-UTM-NU and 25kN using CRT-UTM-HYD
Specimen Height mm	150
Specimen Ø mm	150
Dimension mm (WxDxH)	240 x 320 x 200
Working space required mm (WxDxH)	Designed for use within CRT-UTM-NU and CRT-UTM-HYD
Estimated Weight Kg	25
PC	Not required, integral to UTMs

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- The software records the following to text file for compatibility with common spreadsheet software such as Microsoft Excel:
  - ✓ Axial Stress
  - ✓ Axial Strain
  - ✓ Radial (Confining) Stress
  - ✓ Radial Strain
  - ✓ Stiffness Modulus
  - ✓ Poisson's Ratio

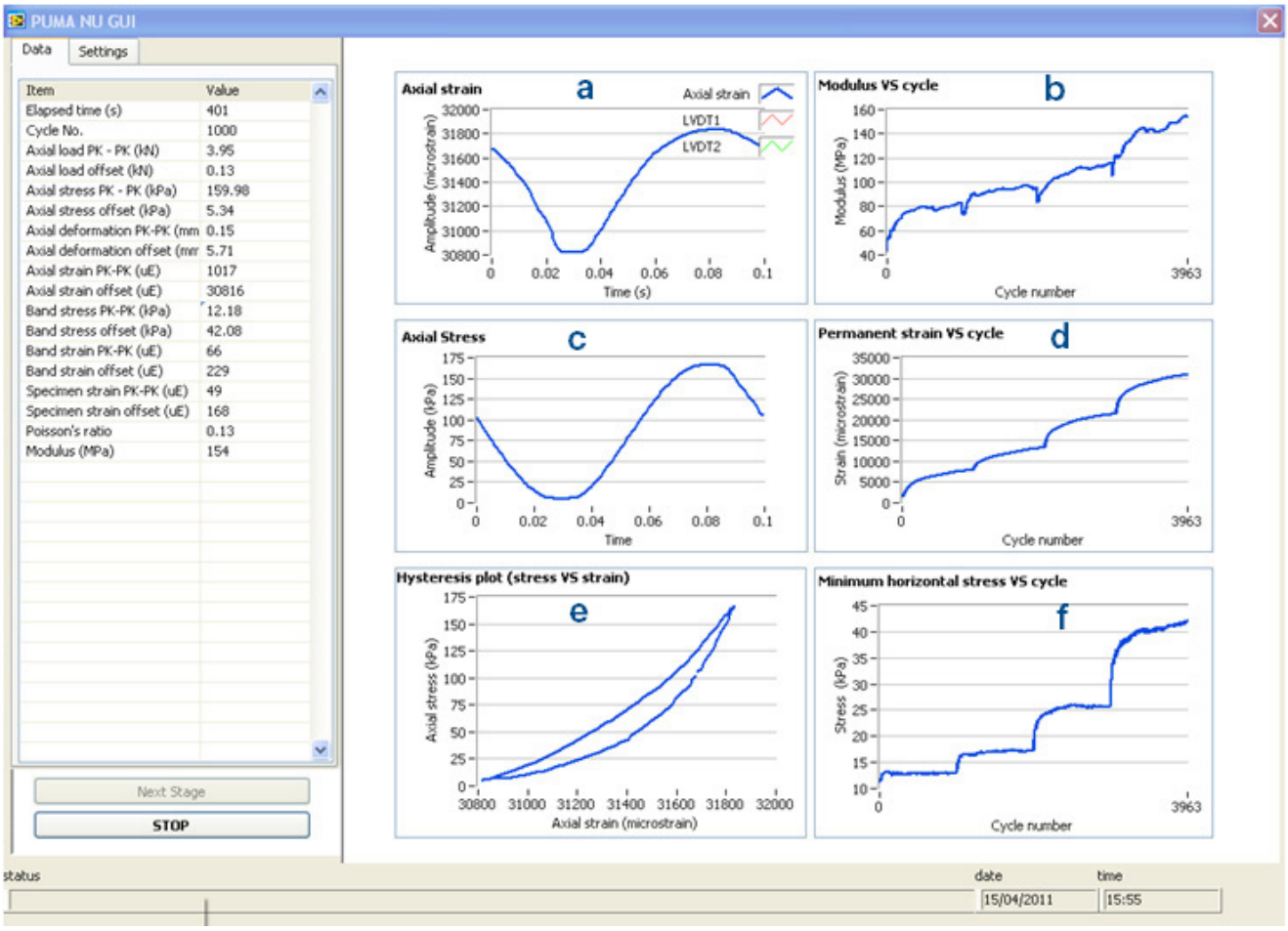


Calibration & Maintenance

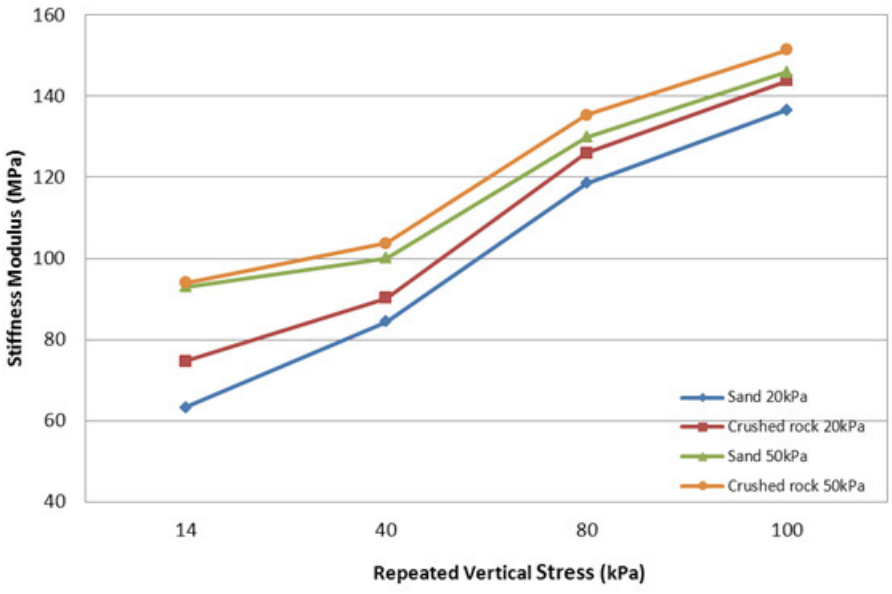
Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

The key to the PUMA lies in its application of realistic stresses by the elastic restraining band surrounding the eight side wall segments. This simulates the lateral stress developed in a pavement layer under a vertical wheel load. Axial stress (c) is controlled; axial strain (a and d), horizontal stress (f) and horizontal strain are measured; modulus (b) is computed. Note also the characteristic stress-strain relationship (e) for an unbound material.



Below is a chart showing the effect of changing both repeated axial force, and the initial confining stress for both sand and crushed rock as measured by the PUMA.



Compression Testing Machine

CRT-CTM250-II

High quality and versatile compression testing machine with certification of a UKAS accredited calibration

BRIEF INTRODUCTION

The CRT-CTM250-II was developed to perform a variety of compressive strength tests including Duriez, Indirect Tensile Strength and Marshall Stability.

A rigid floor-standing test frame with bench-height working surface, twin columns and adjustable height cross-head houses a hydraulic cylinder with a load capacity of up to 300kN. The movement of the cylinder is controlled by custom software with feedback from either the stroke transducer or the load cell fixed to the cross-head. During testing, the machine operator is protected by a safety enclosure.

KEY FEATURES

- Highly rigid test frame
- Hydraulic loading under computer control
- Pancake load cell (250kN capacity)
- Innovative quick-release Duriez mould system
- Three position adjustable cross-head height
- Large bench-height working surface
- Can be configured for tensile tests if required
- Includes PC preloaded with test software
- Interlocked safety enclosure with clear polycarbonate door
- Supplied with certification of a UKAS accredited calibration

KEY USES

- Duriez assessment of moisture susceptibility
- Measurement of Tensile Strength in indirect tensile mode
- Measurement of Marshall Stability and Flow
- Various strength tests

STANDARDS

- EN 12697-12
- EN 12697-23
- EN 12697-44 (Semi-circular bending beam)
- ASTM D6931
- NF P98-251-1/4 Duriez

SYSTEM ELEMENTS

The CRT-CTM250-II is comprised of:

- A bench-height stainless steel working surface with twin 70mmØ stainless steel columns, spaced 500mm apart
- A moveable crosshead that can be adjusted to provide a working space that has a height of 500 to 750mm
- A 300kN capacity actuator with 380mm stroke that includes an integral displacement transducer
- Variable speed of travel between 50 and 100mm/min
- A low-profile 250kN load cell fixed to the cross-head
- High-speed digital closed-loop force or displacement control
- An interlocked safety enclosure that has a clear polycarbonate door
- Concealed hydraulics
- Integrated PC with preloaded software

Compression Testing Machine

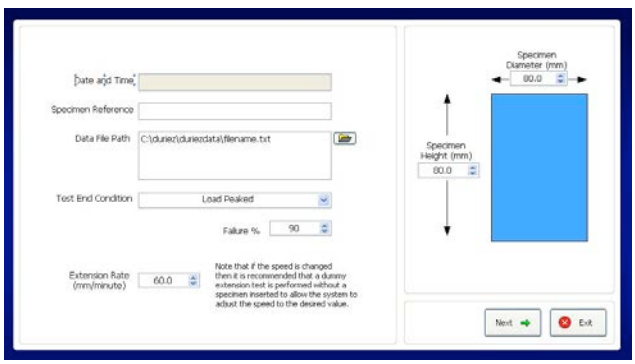
CRT-CTM250-II

SPECIFICATIONS

Ram Stroke mm	400
Ram speed range	50 to 70 mm/min
Load Cell	250kN
Deformation Transducer mm	400
Clearance Between Columns mm	530
Electrical Supply	3 Phase 415 Volts 50Hz @ 16A (others available)
Dimension mm (WxDxH)	2100 x 616 x 2111
Working space required mm (WxDxH)	2300 x 1616 x 2300
Estimated Weight Kg	1000
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software performs compaction, specimen de-moulding and the strength test
- Real time plots of displacement and force are displayed on screen
- The rate of loading is accurately closed-loop controlled by the software
- Displacement and load information are saved to disk during both compaction and the strength test
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for transducer check, diagnostic routines and calibration
- Flexible software with additional options available for non-standard tests



Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-DURM-80
Duriez mould with internal Ø of 80mm

CRT-DURMBT-80
Base and top for 80mm Duriez mould

CRT-DURMS-80
Pair of half-circle spacers for 80mm mould

CRT-DURM-120
Duriez mould with internal Ø of 120mm

CRT-DURMBT-120
Base and top for 120mm Duriez mould

CRT-DURMS-120
Pair of half-circle spacers for 120mm mould

CRT-MARSH-SM
Stability mould for mechanical frame

CRT-MARSH-IT
Indirect tensile testing head for 100 & 150mm

CRT-CTM-SCB
Semi Circular Beam Bending system to perform EN 12697-44
Crack propagation and tensile strength

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Stand Alone Four Point Bending Beam Machine

CRT-SA4PT-BB

A low cost, accurate beam testing system which facilitates the rapid throughput of modulus and fatigue tests

BRIEF INTRODUCTION

Bending tests are widely used for measuring the stiffness modulus and assessing the fatigue resistance of asphaltic paving materials. Four point bending tests are included in CEN, AASHTO and Chinese test specifications. The specimen is a prismatic beam which is subjected to sinusoidal loading in either the controlled strain or controlled stress modes.

The CRT-SA4PT-BB uses advanced servo pneumatic technology and a high-speed digital data acquisition and control system together with user-friendly software. During testing both graphical and tabular data are displayed on screen and test data is stored to disc in Microsoft Excel™ compatible format. The clamps are at 118.5mm centres (the distance between the outer clamps is 335.6mm (14 inches) according to AASHTO specifications[2] but the height and width of the beam can be varied).

[2] Tests on beams containing aggregates greater than 20mm are not strictly in accordance with annex D of EN 12697-24 which states that this non-compliance should be explicitly mentioned in the test report.

KEY FEATURES

- Frequency range 0.1 to 30Hz[1]
- Low cost pneumatic stand alone four point bending machine
- Utilises a low-friction actuator and high performance ceramic spool servo-valve
- On-specimen measurement system removes errors due to frame flexure
- Accepts AASHTO beam sizes
- Sinusoidal controlled strain or controlled stress fatigue test modes
- Constant torque motorized specimen clamping to eliminate errors due to localised beam indentation
- Self-contained loading system
- User friendly software for determination of fatigue resistance and stiffness modulus
- Supplied with certification of a UKAS accredited calibration

KEY USES

- Mix design
- End product specification
- Assessment of new materials

STANDARDS

- EN 12697-24 Annex D
- EN 12697-26 Annex B
- AASHTO T321-03 (TP8)
- Chinese Standard

[1] At higher strains or on stiff mixtures, higher frequencies are not always achievable. For regular testing with such conditions the CRT-LH4PT-BB should be considered.

SYSTEM ELEMENTS

The CRT-SA4PT-BB is comprised of:

- An aluminium test frame
- Precision servo-valve with ceramic spool
- Pneumatic actuator with low friction seals
- Fatigue-rated pancake load cell (±5kN capacity)
- On specimen cradle for deflection measurement
- Constant torque beam clamping system using re-circulating balls screws
- Linear bearings allowing free translation of all four clamps
- Roller bearings allowing free rotation of all four clamps
- Digital signal processor control unit
- ±1.0mm range AC LVDT displacement transducer
- ±7.5mm range AC LVDT displacement transducer

Note: Precise control of temperature is essential for all asphalt testing. A temperature controlled cabinet (CRT-TCC) is available separately.

Stand Alone Four Point Bending Beam Machine

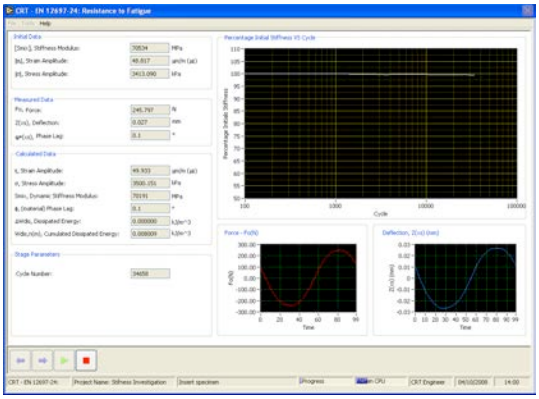
CRT-SA4PT-BB

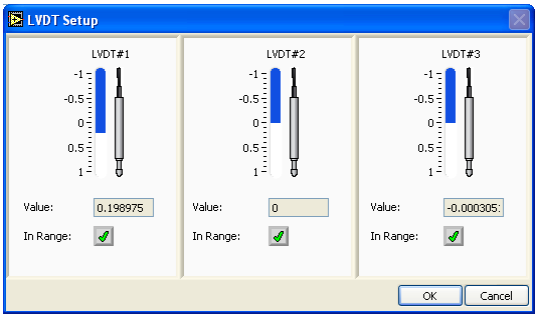
SPECIFICATIONS

Force Transducer	±5kN
Specimen Transducer Range	± 1 mm
Actuator Stroke mm	10
Frequency	0.1 to 30 Hz
Electrical supply	220-240 Volts 50 Hz @ 13A (others available)
Compressed Air	7-10 bar @ 600 L/min
Dimensions mm (WxDxH)	Test Frame 440 x 190 x 570 Data Acquisition Box 360 x 280 x 140
Working space required mm (WxDxH)	826 x 1650 x 2100 when fitted in cabinet CRT-TCC
Estimated Weight Kg	Test Frame 45 Data Acquisition Box 6
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Specifically written to meet EN 12697-24 Annex D and EN 12697-26 Annex B
- The user interface can be translated into the user's preferred language – please enquire
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for curve fitting of acquired data; testing of system's inputs and outputs; phase correction and a transducer database for storing calibration factors





Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-TCC
Temperature controlled cabinet for CRT-UTM-NU and CRT-SA4PT-BB
The temperature can be controlled to 0.2ºC over the range -25ºC to + 60ºC using a P.I.D. digital temperature controller, the CAL3200.

Forced air over the heater and cooling fins and through the air duct in the rear wall ensures a uniform temperature throughout the cabinet. Defrost water drains via a pipe on the back of the cabinet to a heated tray underneath the cabinet where the water will evaporate.

The cabinet also features an over temperature device which will switch off the fans, heating, cooling, and illuminates a warning light if the set temperature is exceeded. The front door is double-glazed and contains a heating element to ensure that the glass door remains clear.
When testing asphalt good temperature control is essential. Test data shows that a 1% change in temperature can cause up to 10% variation in stiffness results.

CRT-BEAM
Dummy PVC beam 50x50x380mm

CRT-COMP-1210
Large Compressor (up to 10bar and 1200l/min) for supply of air to two pieces of large flow equipment such as Roller Compactors and Four Point Bending rigs

CRT-F12T-AIRDRYER
Air dryer with 43cfm flow rate and 3C dew point. 230/1/50

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Large Hydraulic Four Point Bending Machine

CRT-LH4PT-BB

The only machine on the market to accept variable beam lengths

BRIEF INTRODUCTION

Bending tests are widely used for measuring the stiffness modulus and assessing the fatigue resistance of asphaltic paving materials. Four point bending tests are included in CEN, AASHTO and Chinese test specifications. The specimen is a prismatic beam which is subjected to sinusoidal loading in either the controlled strain or controlled stress modes. This equipment is capable of testing over a wider frequency range (up to 60 Hz) than can be achieved with pneumatic loading systems.

The CRT-LH4PT-BB uses advanced servo-hydraulic technology and a high-speed digital data acquisition and control system together with user-friendly software. During testing both graphical and tabular data are displayed on screen and test data is stored to disc in Microsoft Excel™ compatible format. The test frame is housed in a temperature controlled cabinet with fan-assisted air circulation and a temperature range of -20 to 30°C. The unique constant torque clamping and three-transducer deflection measurement system of the CRT-LH4PT-BB can be configured to accept different beam sizes. This means that the ratio between beam dimensions and maximum aggregate size of test specimens will satisfy the requirements of the relevant European specifications.

KEY FEATURES

- Frequency range 0.1 to 60Hz
- High quality servo hydraulic four point bending machine
- Double acting fatigue rated hydraulic actuator with integral stroke transducer
- Utilises Star servo valve with 'Sapphire Technology'
- Unique three transducer on-specimen deflection measurement system
- Accepts various beam sizes: 380 to 660mm in length and 50 x 50mm to 100 x 100mm cross-section
- Temperature controlled cabinet range -20 to 30°C
- Sinusoidal controlled strain or controlled stress fatigue test modes
- Constant torque motorized specimen clamping to eliminate errors due to localised beam indentation
- User friendly software for determination of fatigue resistance and stiffness modulus
- The possibility to make frequency/temperature sweeps
- Supplied with certification of a UKAS accredited calibration
- Covered for noise reduction

KEY USES

- Mix design
- End product specification
- Assessment of new materials

STANDARDS

- EN 12697-24 Annex D
- EN 12697-26 Annex B
- AASHTO T321-03 (TP8)
- Chinese Standard

SYSTEM ELEMENTS

The CRT-LH4PT-BB is comprised of:

- Stainless steel and aluminium test frame
- Matched fatigue rated servo hydraulic actuator and valve
- Fatigue-rated pancake load cell (±10kN capacity)
- Software automated cradle holding three on-specimen LVDTs for deflection measurement
- Constant torque beam clamping system using re-circulating balls screws
- Linear bearings allowing free translation of all four clamps
- Roller bearings allowing free rotation of all four clamps
- Digital signal processor control unit
- Temperature controlled cabinet with double-glazed door, internal lighting and powerful fan-assisted air circulation -20 to 30°C

Large Hydraulic Four Point Bending Machine

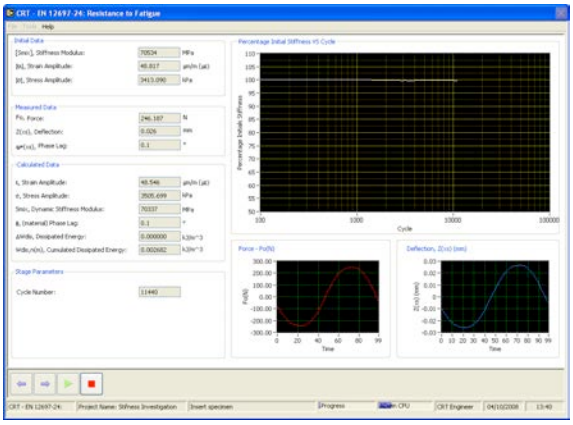
CRT-LH4PT-BB

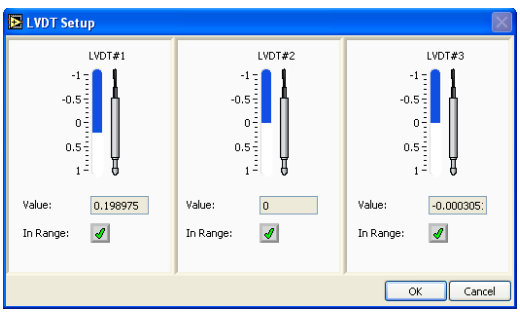
SPECIFICATIONS

Force Transducer	±10 kN
Specimen Transducer Range mm	3 x ±1
Actuator Stroke mm	10
Frequency	0.1 to 60 Hz
Temperature (Integral Cabinet)	-20 to 30°C
Electrical supply	3 Phase 415 Volts 50 Hz @ 16A (others available)
Compressed Air	7–10 bar @ 100 L/min (optional integral extra)
Dimensions mm (WxDxH)	1050 x 1600 x 2100
Working space required mm (WxDxH)	2050 x 2600 x 2300
Estimated Weight Kg	650
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Specifically written to meet EN 12697-24 Annex D and EN 12697-26 Annex B
- The user interface can be translated into the user's preferred language – please enquire
- One software package performs both fatigue and complex modulus testing
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for curve fitting of acquired data; testing of system's inputs and outputs; phase correction and a transducer database for storing calibration factors



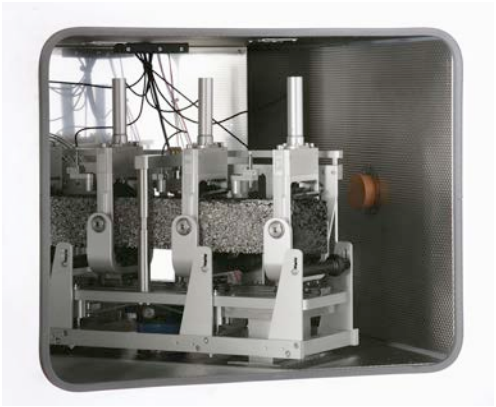


Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

	CRT-BEAM Dummy PVC beam 50x50x420mm
	CRT-BEAMLARGE Dummy PVC beam 100x100x660mm
	CRT-LH4PT-COMPAIR Integral compressed air option

Multi-sized Beams



100x100mm Beam cross section

50x50mm Beam cross section

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device. Please enquire for further details.

Note: This device should be checked and calibrated annually.

Two Point Trapezoidal Bending Beam Machine

CRT-2PT

Optimisation of the setting-up time with intelligent software, and accurate temperature control with an integrated temperature cabinet

BRIEF INTRODUCTION

Bending tests are widely used for measuring the stiffness modulus and assessing the fatigue resistance of asphaltic paving materials. The two-point bending test on trapezoidal specimens is, arguably, the most repeatable and reproducible bending test method detailed in the relevant EN12697 standards. In this test the specimen is mounted as a vertical cantilever. The base is fixed and the top is moved sinusoidally with a constant displacement amplitude. The trapezoidal shape ensures that the maximum values of bending stress and strain occur away from the ends of the specimen where there are likely to be stress concentrations. With the Cooper Technology equipment, two trapezoidal specimens are tested simultaneously and stiffness modulus can be determined at a range of frequencies and temperatures. In the fatigue test the specimens are subjected to a constant strain amplitude at a selected frequency and temperature until the stiffness modulus decreases to a user-selected target level (normally 50 percent of its initial value).

KEY FEATURES

- Rigid test frame housed within temperature cabinet
- Temperature cabinet with fan assisted air circulation and glazed viewing door
- Temperature cabinet range -20 to 30°C
- Machine designed to test two specimens simultaneously
- Frequency range from 0.1 to 30Hz
- Precise manual setting of strain amplitude
- Accurate pre-test displacement transducer adjustment using software feedback
- Two high-precision ±2.5kN fatigue rated piezoelectric force transducers
- High-speed control and acquisition system for interfacing to host computer
- User-friendly software for fatigue and stiffness modulus tests
- Software for automatically carrying out frequency sweeps
- Supplied with certification of a UKAS accredited calibration

KEY USES

- Mixture design
- End product specification
- Assessment of new materials

STANDARDS

- EN 12697-24 Annex A
- EN 12697-26 Annex A
- NF-P98-260-2

SYSTEM ELEMENTS

The CRT-2PT is comprised of:

- A rigid welded frame
- An integrated temperature controlled cabinet with double-glazed door, internal lighting and powerful fan-assisted air circulation (-20 to 30 ±0.5)°C
- Two ±2.5kN fatigue rated force sensors
- Option of one or two ±1mm range LVDT displacement transducers
- Accurate eccentric for strain adjustment
- Internally lit integrated temperature control cabinet
- Mounting heads for the testing of 250mm high x 25mm thick specimens with top width 25mm and bottom width either 56mm or 70mm
- Digital signal processor control unit

Two Point Trapezoidal Bending Beam Machine

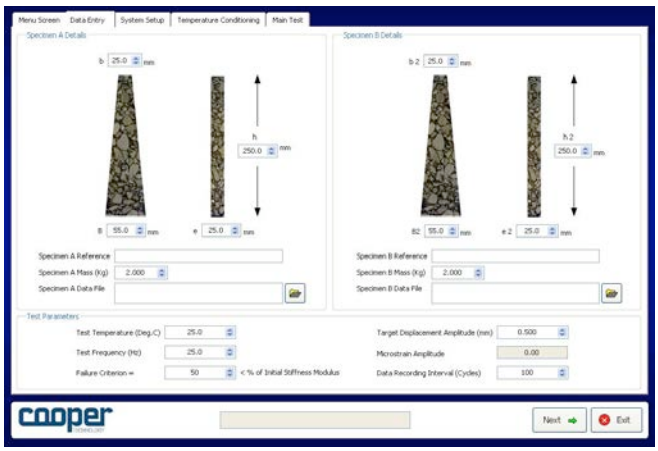
CRT-2PT

SPECIFICATIONS

Force Transducer	2 x 2.5kN Miniature fatigue rated
Specimen Transducer Range	± 1 mm
Frequency	1 to 30Hz
Electrical supply	220-240 Volts 50 Hz @ 16A
Dimensions mm (WxDxH)	1050 x 974 x 1950
Working space required mm (WxDxH)	2050 x 1974 x 2100
Weight Kg	800
PC	Included
Temperature (integral cabinet)	-20 to 30°C

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Specifically written to meet EN 12697-24 Annex A and EN 12697-26 Annex A
- One software package performs both fatigue and complex modulus testing
- The software allows a range of strain amplitudes and frequencies to be tested
- The operator is guided through setting up the samples and performing the test
- Real-time graphs show the force and the deformation as well as the relationship between rigidity and number of cycles
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for transducer check, diagnostic routines and calibration



Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-2PT-GLUE
Trapezoidal beam gluing frame
Trapezoidal beam gluing frame for 56*25*25*250mm and 70*25*25*250mm specimens. Two specimens can be glued simultaneously.

CRT-2PT-MEAS
Trapezoidal beam measuring frame
Trapezoidal beam measuring frame for 56*25*25*250mm and 70*25*25*250mm specimens

CRT-2PT-CAPEND25
Pair of additional top and bottom clamps

CRT-2PT-CAPEND50
Pair of additional top and bottom clamps

CRT-2PT-MODULUS
Software to determine stiffness modulus to perform EN 13697-26 Annex A

CRT-2PT-SGB
Strain gauged beam

CRT-2PT-LVTD2
Add-on - Option for second LVDT

CRT-2PT-NC
Non contact Capacitative transducer

CRT-2PT-CALKIT
Calibration kit for force, frequencies and displacement

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Hamburg (Immersion) Wheel Tracker

CRT-WTIM

The only truly sinusoidal Hamburg wheel tracker on the market.
Another representation of Cooper quality and attention to detail

BRIEF INTRODUCTION

The Hamburg type dual arm immersion wheel tracker is widely used to evaluate the resistance to rutting and moisture susceptibility of asphalt mixtures following either EN12697-22 or AASHTO-T324.
The device was developed in the 1970's by Esso A.G. of Hamburg, Germany. It was based on the TRL wheel tracker which is also now included in EN12697-22. Originally the Hamburg test was used by the City of Hamburg to measure rutting susceptibility. The test was performed for 9,540 wheel passes at either 40 or 50°C. Water was used to obtain the required test temperature rather than air. The City of Hamburg later increased the number of wheel passes to 19,200 and found that some mixtures began to deteriorate from moisture damage. Greater than 10,000 wheel passes was generally needed to show the effects of moisture damage.
Specimens can be prepared in the laboratory, or cores taken from the road can be used. Loaded steel or rubber wheels track a sample under regulated load, speed and temperature, whilst the development of the rut is constantly monitored and recorded throughout the test.

KEY FEATURES

- Able to perform AASHTO-T324 and EN 12697-22
- State of the art software which provides higher level users with options, and lab technicians ease of use
- A dedicated immersion wheel tracker (wet and dry wheel trackers compromise on temperature control)
- A mechanical re-circulating water bath controls the temperature to within ± 0.5°C in a range of (20-75) ºC
- Variable speed range between 15 and 30RPM
- Two displacement transducers attached to the wheel support arms measure the depth of the ruts as they develop with a resolution of 0.01mm to a maximum rut depth of 50mm
- The depth of the rut is measured automatically and constantly as specified in the AASHTO and EN standards
- Rubber or stainless steel wheels, and various widths to alter the applied pressure
- Various mould options including laboratory compacted and cores (AASHTO and EN)
- UKAS Certificate supplied
- Cooper is the world number one wheel tracker manufacturer

KEY USES

- Investigation of resistance to rutting
- Investigation of moisture susceptibility
- Testing of laboratory compacted slabs
- Testing of field cores
- Production of creep slope, stripping inflection point and stripping slope

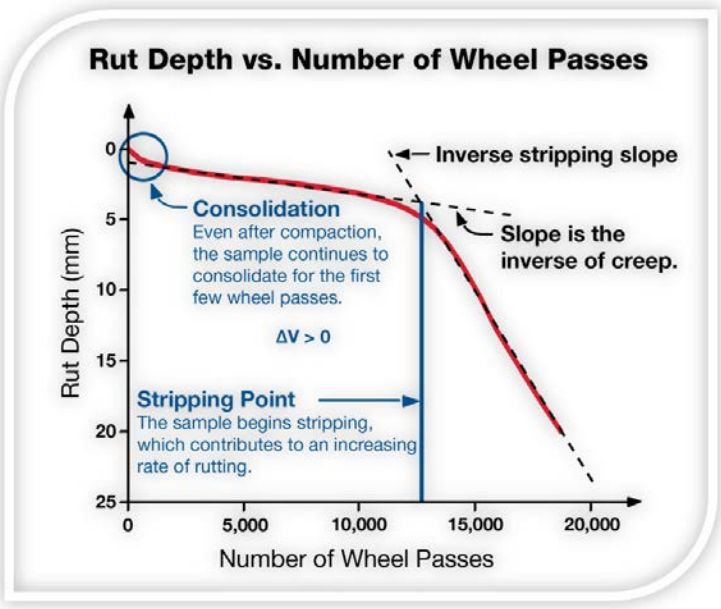
STANDARDS

- EN 12697-22
- AASHTO-T324
- Other national standards where relevant

SYSTEM ELEMENTS

The CRT-WTIM is comprised of:

- Electrically driven loaded wheel arms
- Temperature controlled water bath
- Highly accurate rut measurement system
- Windows based software



Hamburg (Immersion) Wheel Tracker

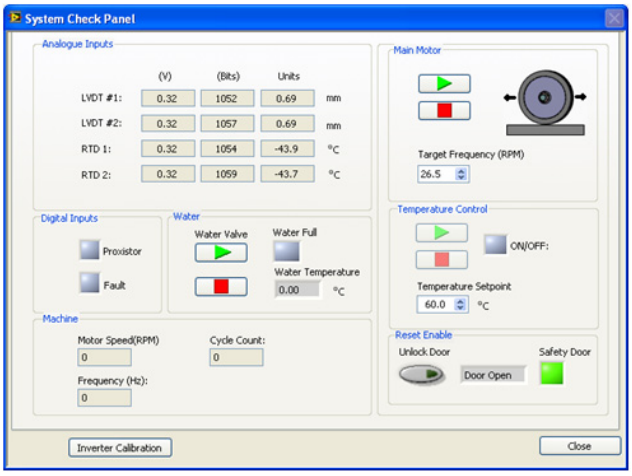
CRT-WTIM

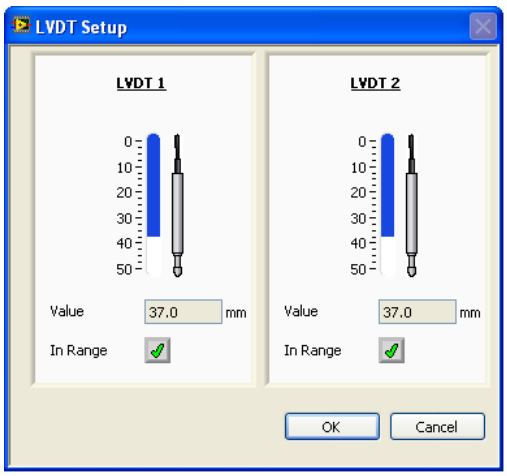
SPECIFICATIONS

Wheel Speed	Variable up to 30 cycles (60 passes) per minute
Wheel Load	700 ± 10 N
Mould Dimensions mm	305 x 305 and 305 x 400 (others available, please contact us or see accessories)
Slab Thickness mm	50 - 100 (different thicknesses can be tested with spacers)
Rut Depth Transducer Range mm	50
Temperature Range	20 - 75 ºC
Electrical Supply	380-415 Volts 50Hz @ 16A (others available)
Dimension mm (WxDxH)	1430 x 1380 x 1260
Estimated Weight Kg	687
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software allows two standard but fully customisable testing methods AASHTO-T324 and EN 12697-22
- The operator is guided through every step of the test
- Real-time display of current water temperature, specimen temperature and rut depth
- Data is recorded to disk at regular intervals for further analysis
- Software communicates with the Immersion wheel tracker via the USB interface
- Utilities are included for transducer check, diagnostic routines and calibration
- Excel import data output





Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-50SS	Stainless Steel Mould 305 x 305 x 50mm depth
CRT-WTRCM-100SS	Stainless Steel Moulds 305 x 305 x 100mm depth
CRT-RCM-50WSS	Stainless Steel Moulds 400 x 305 x 50mm depth
CRT-RCM-100WSS	Stainless Steel Moulds 400 x 305 x 100mm depth
CRT-WTIM-16050	Stainless Steel Moulds 320 x 160 x 50mm depth
CRT-WTIM-160100	Stainless Steel Moulds 320 x 160 x 100mm depth
CRT-WTIM-18050	Stainless Steel Moulds 320 x 180 x 50mm depth
CRT-WTIM-180100	Stainless Steel Moulds 320 x 180 x 100mm depth
CRT-WTIM-26050	Stainless Steel Moulds 320 x 260 x50mm depth
CRT-WTIM-260100	Stainless Steel Moulds 320 x 260 x100mm depth
CRT-WTIM-DIAM200	Mould for 200 mm cores
CRT-WTIM-WHSS	Stainless steel wheel for Immersion Wheel Tracker according to AASHTO-T324
CRT-WTIM-WHR	Rubberised Stainless steel wheel for Immersion Wheel Tracker according to EN 12697-22
CRT-WTIM-LIFT	Mould lifting hoist
CRT-WTIM-CHILLER	Chiller cooling down to 20°C

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Auto Lift Arm ECO Wheel Tracker

CRT-WTECO-A
(European Community registered design #: 001699042)

> The Auto Lift Arm ECO Wheel Tracker saves energy, is space efficient and can double daily testing output

BRIEF INTRODUCTION

Wheel tracking is used to assess the resistance to rutting of asphaltic materials under conditions which simulate the effect of traffic. A loaded wheel tracks a sample under specified conditions of load, speed and temperature while the development of the rut is monitored continuously during the test. Test specimens can be either slabs prepared with a laboratory compactor or 200mm Ø cores cut from the highway.

The CRT-WTECO-A™ wheel tracker performs both procedures A and B specified for the small scale device in EN 12697-22. Procedure A requires that six specimens are tested. For procedure B only two specimens need to be tested, but rut depth must be measured at more points along the longitudinal rut profile and the tests are longer. To speed up the testing process the CRT-WTECO-A™ was designed to test two specimens within one working day via a pre-programmable unique lift arm mechanism (European Community registered design #: 001699042).

KEY FEATURES

- Tests materials for roads with axle loads up to 13 tonnes
- Fully programmable automated lift arm, enables up to twice the normal test throughput
- Automated pre programmable sample conditioning
- Small and compact for maximum energy efficiency, 28% saving over CRT-WTEN1
- Integral temperature controlled cabinet with fully glazed doors
- PID control of test temperature in the range 40°C to 62°C
- Specimens compacted with the Cooper Technology Roller Compactor can be transferred directly to the wheel tracker without de-moulding
- User-friendly Windows™ software
- Supplied with UKAS accredited calibration certification and CE marked

KEY USES

- Determination of the rut resistance of asphaltic paving materials.

STANDARDS

- EN 12697-22 Small device
- AGPT/T231 (supersedes AST 01)
- T 0719

SYSTEM ELEMENTS

The CRT-WTECO-A™ is comprised of :

- A fabricated frame supporting a single innovative hinged loading arm, enclosed by an insulated cabinet which uses PID control linked to a PRT for accurate closed loop temperature control.
- A rubber-tyred wheel which runs on top of the specimen and applies 700N to the specimen.
- A table which is reciprocated a distance of 230mm on linear bearings at 26.5rpm.
- One precision linear pot for rut measurement.
- A fully glazed lifting door which enable visual monitoring of the test if required and easy practical access.

Auto Lift Arm ECO Wheel Tracker

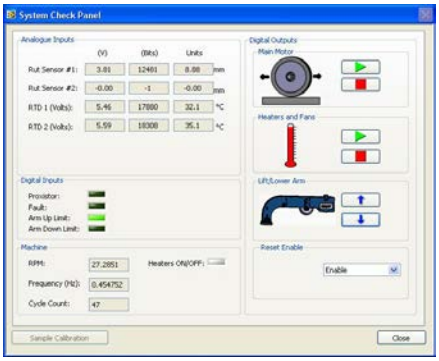
CRT-WTECO-A

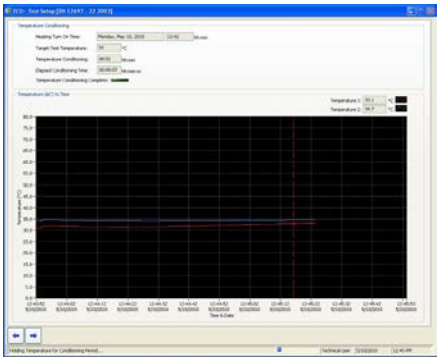
SPECIFICATIONS

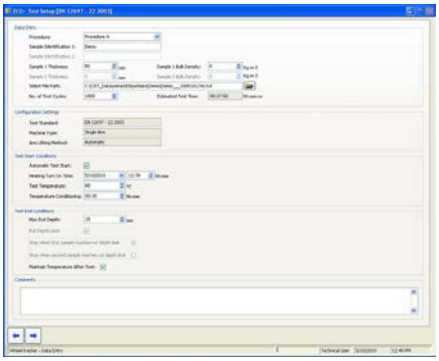
Wheel Load	700N
Mould Dimensions mm	305 x 305
Wheel Speed	26.5 cycles per minute
Slab Thickness mm	35 to 100
Rut Depth Transducer Range mm	50
Temperature Range	40 to 62°C
Electrical Supply	220-240 Volts 50/60Hz @ 13A (others available)
Dimension mm (WxDxH)	1450 x 540 x 1450
Working space required mm (WxDxH)	2450 x 540 x 2000
Estimated Weight Kg	380
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Programmable for auto start, enabling up to double daily testing output
- Programmable sample conditioning to enable test to start prior to the working day
- Software automatically starts the wheel tracker, maintaining the speed at the specified 26.5 cycles per minute
- Measures rut depth and sample temperature automatically at regular intervals
- The rut profile is captured automatically by the software and analysed to calculate the rut depth
- A continuously updated on-screen graph shows rut depth versus time, along with the rut profile and temperature
- Software stops the wheel tracker on completion of a test and prints a test report if required
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for transducer check, diagnostic routines and RTD calibration
- USB PC link
- Excel import data output







Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-50
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 50mm deep[1]

CRT-WTRCM-100
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 100mm deep[1]

CRT-INSERT-10
Mould - Aluminium Insert 305 x 305 x 10mm - used to adjust mould depth[1]

CRT-INSERT-5
Mould - Aluminium Insert 305 x 305 x 5mm - used to adjust mould depth[1]

CRT-WT-DIAM200
Split holder with steel base-plate for 200mm Ø core specimen

CRT-ECOWH-IRDH-20-80
Rubber wheel for Wheel Tracker for EN 12697-22

CRT-ECOWH-IRDH-20
Rubber wheel for Wheel Tracker for AGPT/T231(supersedes AST 01)

CRT- WTECO-MCS
Mould Conditioning Shelf

[1] Please enquire for any other depths

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.

UKAS accreditation to satisfy typed testing as described in EN 13108.

Please enquire for further details. Note: This device should be checked annually.

Wheel Tracker Small Devices - 1 & 2 Arms

CRT-WTEN1
CRT-WTEN2
CRT-WTAUS

The CRT-WTEN1 and CRT-WTEN2 are supplied with a UKAS certificate of accreditation validating conformance to EN 13108

BRIEF INTRODUCTION

Wheel tracking is used to assess the resistance to rutting of asphaltic materials under conditions which simulate the effect of traffic. A loaded wheel tracks a sample under specified conditions of load, speed and temperature while the development of the rut is monitored continuously during the test. Test specimens can be either slabs prepared with a laboratory compactor or 200mm Ø cores cut from the highway.

The CRT-WTEN1 wheel tracker performs both procedures A and B specified for the small scale device in EN 12697-22. Procedure A requires that six specimens are tested. For procedure B only two specimens need to be tested, but rut depth must be measured at more points along the longitudinal rut profile. To speed up the testing process the CRT-WTEN2 was designed to test two specimens simultaneously.

KEY FEATURES

- Tests materials for roads with axle loads up to 13 tonnes
- Rigid test frame built from extruded aluminium section
- Integral temperature controlled cabinet with double glazed doors
- PID control of test temperature in the range 40°C to 62°C
- Rack for pre-test temperature conditioning of specimens
- The CRT-WTEN2 tests two specimens simultaneously
- Specimens compacted with the Cooper Technology Roller Compactor can be transferred directly to the wheel tracker without de-moulding
- Closed-loop speed control
- User-friendly Windows™ software
- Supplied with certification of a UKAS accredited calibration

KEY USES

- Determination of the rut resistance of asphaltic paving materials

STANDARDS

- EN 12697-22 Small device
- AST 01:2004
- BS 598-110:1998

SYSTEM ELEMENTS

The CRT-WTEN1 is comprised of

- A solid extruded aluminium frame supporting an insulated cabinet which uses PID control linked to a PRT for accurate closed loop temperature control
- A rubber-tyred wheel runs on top of the specimen and applies 700 or 520N to the specimen
- A table which is reciprocated a distance of 230mm on linear bearings at 26.5rpm
- One LVDT for rut measurement
- Large double glazed doors for full access which enable visual monitoring of the test if required

The CRT-WTEN2 is as above, but with two wheels so that specimens can simultaneously be tracked.

Wheel Tracker Small Device

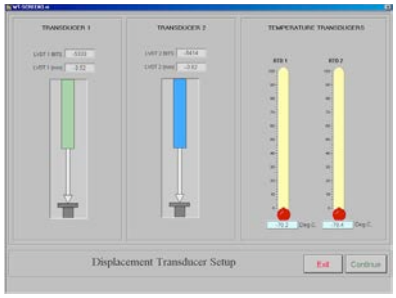
CRT-WTEN1
CRT-WTEN2
CRT-WTAUS

SPECIFICATIONS

Wheel Load	700/520N
Mould Dimensions	305 x 305mm (others available)
Wheel Speed	26.5 cycles per minute
Slab Thickness	40 to 100mm (others available)
Rut Depth Transducer Range mm	50
Temperature Range	40 to 60°C
Electrical Supply	Single 220-240 Volts 50/60 Hz @ 13A (others available) Dual 220-240 Volts 50/60 Hz @ 16A (others available)
Compressed Air	Dual 7-10 bar @ 600 L/min
Dimensions mm (WxDxH)	Single 1579 x 840 x 1740 Dual 1750 x 1090 x 1970
Working space required mm (WxDxH)	Single 1680 x 1840 x 1940 Dual 1850 x 3090 x 2070
Estimated Weight Kg	Single 448 Dual 500
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software is designed to perform EN 12697-22 Small device
- Software automatically starts the wheel tracker, maintaining the speed at the specified 26.5 cycles per minute
- Measures rut depth and sample temperature automatically at regular intervals
- The rut profile is captured automatically by the software and analysed to calculate the rut depth
- A continuously updated on-screen graph shows rut depth versus time, along with the rut profile and temperature
- Software stops the wheel tracker on completion of a test and prints a test report if required
- Stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for transducer check, diagnostic routines and RTD calibration



Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-50
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 50mm deep[1]

CRT-WTRCM-100
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 100mm deep[1]

CRT-INSERT-10
Mould - Aluminium Insert 305 x 305 x 10mm - used to adjust mould depth[1]

CRT-WT-DIAM200
Split wooden holder with steel base-plate for 200mm Ø core specimen

CRT-WH-IRDH-80-20
Rubber wheel for Wheel Tracker for EN 12697-22

CRT-WH-IRDH-20
Rubber wheel for Wheel Tracker for AST 01:2004 and BS 598:110

CRT-WT-VM
Add on to accept any mould sizes from 260mm. Retroffitable. For CRT-WTEN1

CRT-WTRCM-50L
Mould - Wheel Tracker/Roller Compactor 260 x 305x 50mm deep

CRT-WTRCM-100L
Mould - Wheel Tracker/Roller Compactor 260 x 305 x 100mm deep

[1] Other sizes available, please enquire

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Wheel Tracker Large Device

CRT-WTENLD

Optimisation of the wheel tracking test time and result accuracy through computerised control

BRIEF INTRODUCTION

Wheel tracking is used to assess the resistance to rutting of asphaltic materials under conditions which simulate the effect of traffic. In this machine, two 500 x 180mm specimens are tested simultaneously by tracking with wheels fitted with pneumatic tyres under specified conditions of load, speed and temperature while the development of the rut profile is monitored at specified intervals during the test.The moulded specimens are inserted and removed from the wheel tracker using an Easy-load system.

A unique instrumented measurement device, linked to the data acquisition, is used to measure the development of rutting during testing. The test procedure and conditions are controlled and data acquired using Windows™ software running on a host computer via a high speed digital interface and signal conditioning system.

KEY FEATURES

- Tests materials for roads with axle loads of at least 13 tonnes
- Unique rut profile measurement device linked to data acquisition system
- Integral temperature controlled cabinet
- Test temperature range 40 to 60°C
- Tests for specified number of cycles or to specified rut depth
- Double glazed doors for viewing test
- Easy-load system for specimen handling
- Conditioning of specimens at test temperature
- User friendly Windows™ software
- Automatic test start/stop
- Closed loop speed control
- Specimens can be compacted in the CRT-RCENLD-II and then wheel tracked without demoulding
- Supplied with certification of a UKAS accredited calibration

KEY USES

- Determination of the rut resistance of asphaltic paving materials

STANDARDS

- EN 12697-22 Large device
- NF P98-253-1

SYSTEM ELEMENTS

The CRT-WTENLD is comprised of:

- A rigid metal frame supporting an insulated cabinet which uses PID control and four PRTs(two specimen and two air) for accurate closed loop temperature control
- Two tables which are normally set to lift and apply 5kN load to the moulded specimens
- Two 400mm Ø pneumatic tyres that are reciprocated in a sinusoidal motion a distance of 410mm at a frequency of 1Hz
- Three LVDTs on the rut profile measurement device
- Two automatic vertically sliding double glazed pneumatic doors which provide excellent access and enable visual monitoring of the test when required
- An LCD screen and keyboard which are installed on an arm with adjustable height

Wheel Tracker Large Device

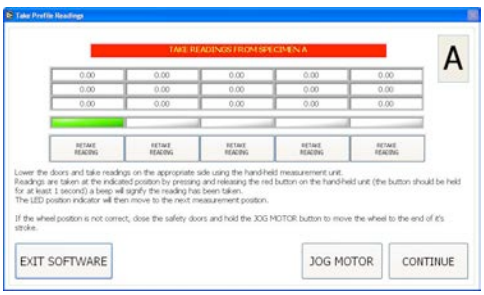
CRT-WTENLD

SPECIFICATIONS

Wheel Load	5kN
Mould Dimensions mm	500 x 180
Wheel Speed	1Hz
Slab Thickness	50 to 100 mm (other sizes available)
Rut Depth Transducer mm	25
Temperature	40 to 60°C
Electrical Supply	3 Phase 415 Volts @ 32A (other supplies available)
Compressed Air	7-10 bar @ 600 L/min
Dimensions mm (WxDxH)	1500 x 1400 x 1700
Working space required mm (WxDxH)	5500 x 2400 x 1900
Estimated Weight Kg	1054
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software is designed to perform EN 12697-22 Large device
- Integrated acquisition system for data capture and machine control
- Software automatically starts the wheel motion and brings the specimens up into contact with the moving wheels
- Rut depth of both specimens is monitored according to the procedure specified in the standard
- Three linear displacement transducers are housed in a frame which slides over the moulds on each side of the machine
- The frame is positioned at five pre-determined measurement points to allow a total of 15 rut readings to be automatically captured by the software
- Readings are automatically stored and on-screen graphs show rut development as well as historical rut data. The acquired rut data is also saved to disk
- Software stops the wheel tracker on completion of a test and prints a test report if required
- The stored test data can be analysed and compared with other test data utilising a spreadsheet package
- Utilities are included for transducer check, diagnostic routines and RTD calibration



Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-100LD
Mould - Large Device Wheel Tracker/Roller Compactor 500 x 180 x 100mm deep

CRT-INSERT-50LD
Mould - Insert 500 x 180 x 50mm deep

CRT-WTRCLD-FK
Lifting trolley specifically designed for use with the Roller Compactor and Wheel Tracker Large Device.

CRT-WTRCLD-TREP
Replacement pneumatic tyre for Large Device Wheel Tracker/ Roller Compactor

CRT-WTRCLD-IREP
Replacement inner tube for Large Device Wheel Tracker/ Roller Compactor

CRT-WTRCLD-EXT
Valve Extender for tyre for Large Device Wheel Tracker/ Roller Compactor

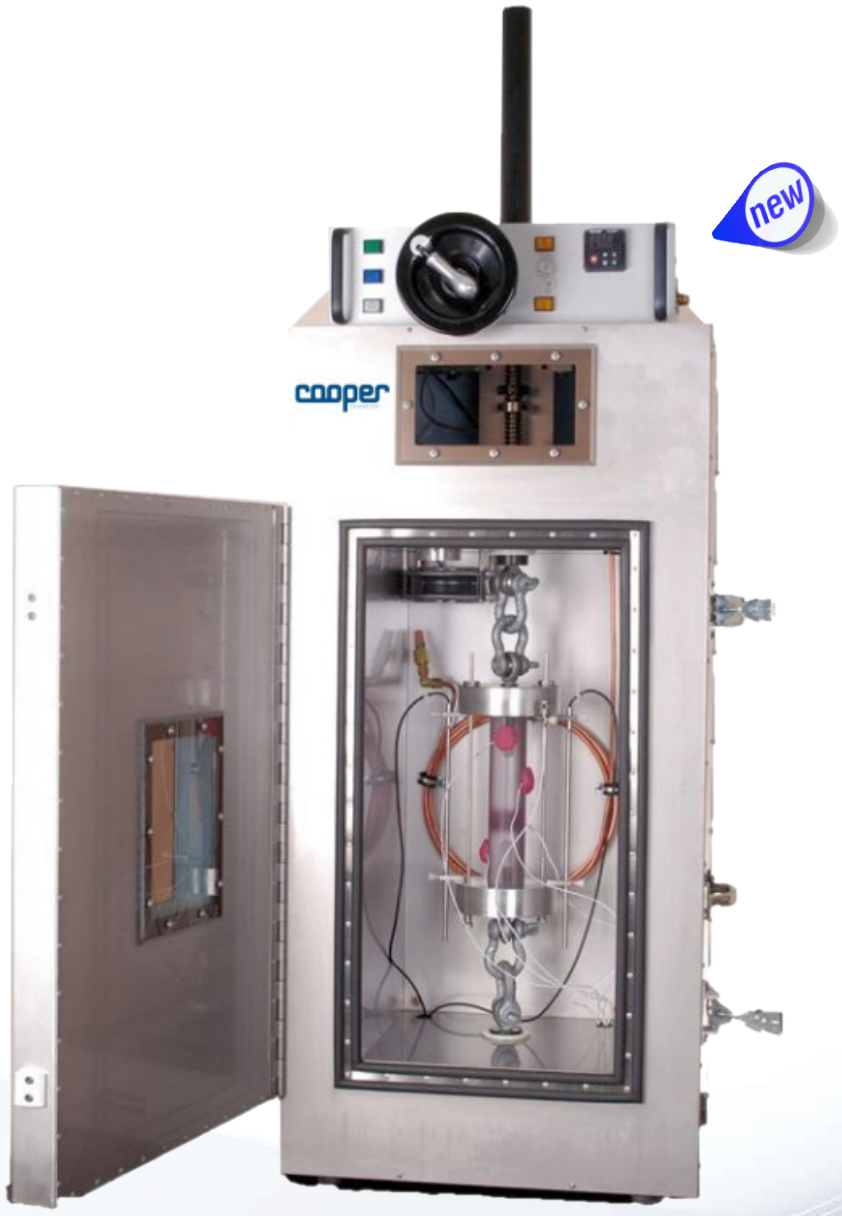
Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Asphalt Pavement Thermal Testing System (TSRST)

CRT-APTTS



Optimise Low Temperature Performance of Asphaltic Concrete Mixtures.
Complies with AASHTO TP10 and prEN 12697-46

BRIEF INTRODUCTION

The OEM-Cooper Thermal Stress Restrained Specimen Tess (TSRST) is used to determine the low-temperature cracking susceptibility of asphalt concrete. In the early 1990s the TSRST was developed by OEM with Oregon State University (OSU) as part of the Strategic Highway Research Program in the USA. The test method became AASHTO TP10.

More recently the TSRST test has been included as one of the tests within prEN12697-46. OEM-Cooper have developed the TSRST to perform tests included in this standard. Now as a multipurpose low temperature testing machine the TSRST has been renamed the Asphalt Pavement Thermal Testing System (APTTS)

With over 20 years of experience, and as the original developers of the TSRST OEM-Cooper are the recognised word experts in the field.

In the uniaxial tension stress test (UTST), a specimen is pulled with a constant strain rate at constant temperature until failure. Results of the UTST are the maximum stress (tensile strength) b t(T) and the corresponding tensile failure strain e failure(T) at the test temperature T (figure 1).

In the thermal stress restrained specimen test (TSRST), a specimen, which length is held constant, is subjected to a temperature decrease with constant temperature rate. Due to the prohibited thermal shrinkage, cryogenic stress is built up in the specimen. The results are the progression of the cryogenic stress over the temperature scry(T) and the failure stress scry, failure at the failure temperature Tfailure (figure 2)

In the relaxation test (RT), the specimen is subjected to a spontaneous strain e, which is held on constant level. The decrease of tension stress by relaxation over the testing time is monitored. The results are the time of relaxation trel and the remaining tension stress srem after the test ended (figure 3).

In the tensile creep test (TCT), the specimen is subjected to a constant tension stress s at a constant temperature T. The progression of the strain e is measured. After a given time, the stress is withdrawn. Rheological parameters describing the elastic and viscous properties of the asphalt can be determined by interpreting the strain measurements (figure 4).

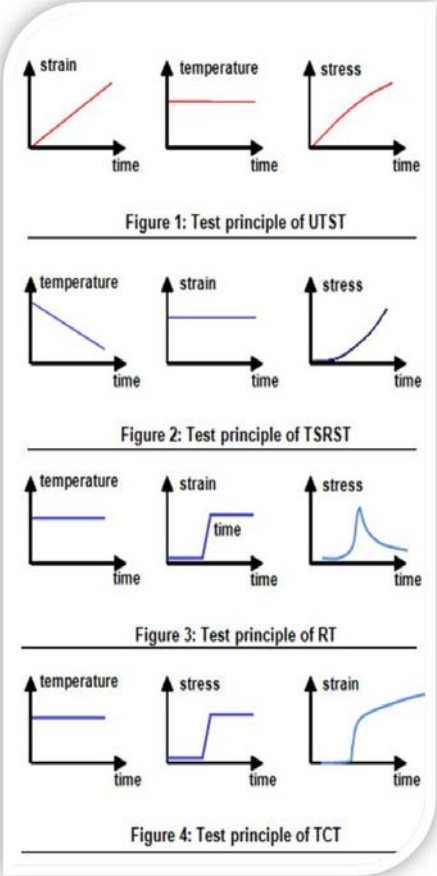


Figure 1: Test principle of UTST

Figure 2: Test principle of TSRST

Figure 3: Test principle of RT

Figure 4: Test principle of TCT

KEY FEATURES

- Cool or heat an asphaltic concrete specimen at a constant rate or hold a constant temperature
- Simulate actual field conditions with user programmable temperature profiles
- Perform cyclic temperature testing
- Minimises radial and/or transverse forces with dual clevis and rod end assemblies

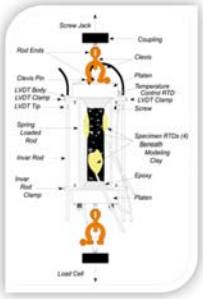
STANDARDS

- AASHTO TP10
  - Thermal Stress Restrained Specimen Test (TSRST)
- prEN 12697 46
  - Uniaxial Tension Stress Test (UTST)
  - Thermal Stress Restrained Specimen Test (TSRST)
  - Relaxation Test (RT)
  - Tensile Creep Test (TCT)

KEY USES

- Determines the failure characteristics of Asphaltic Concrete (AC) specimens when cooled below freezing according to a user defined temperature profile.
- Evaluates low temperature performance of field cores from existing roads.
- Test laboratory compacted cores of new or experimental mixes.
- Demonstrates the effects on low temperature performance of modified binders and from adding modified to standard binders

EQUIPMENT



A stepper-motor driven screw-jack applies tensile strain or maintains the specimen in a static position.
Two or four Linear Variable Differential Transformers (LVDTs) monitor changes in the length of the specimen, while the load cell monitors the tensile load. Spring-loaded guide rods mounted between the upper and lower platens minimize unwanted tensile stress due to gravity. Two or four Resistance Temperature Devices (RTDs), are used to monitor air or specimen temperature. An environmental cabinet RTD senses the enclosure temperature.

TESTING

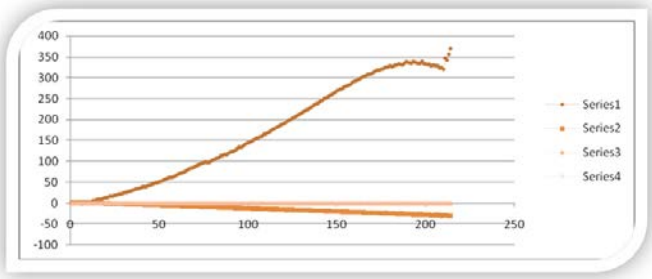
Position the prepared asphaltic concrete specimen perpendicular and central to the platens using the Specimen Alignment Stand. Epoxy the specimen ends to both platens. Place the specimen in the environmental cabinet, attach the transducers and adjust the LVDTs, run the required test procedure. On completion of the required test period, or at test failure the APTTS software will stop the test and adjust the cabinet temperature as required.

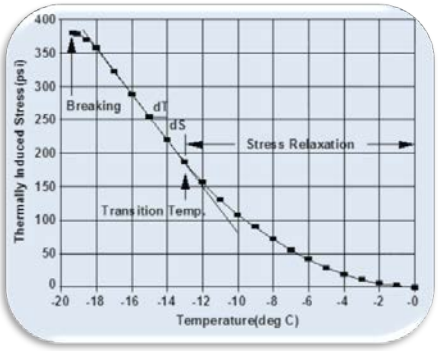
SPECIFICATIONS

Spécimen dimensions	
Prismatic	40 x 40 x 160 - 60 x 60 x 250 mm
Cylindrical	Ø 40 x 160 - Ø 60 x 250 mm
Temperature	-50 °C to +50 °C
Force	22.5kN max
Screw Jack travel	±150 mm
Transducers	
Displacement (AASHTO TP10)	
Range	±0.5 mm
Resolution	0.05 µm
Accuracy	±0.1% Full Scale
Transducers	
Displacement (prEN12697-46)	
Range	±2.5 mm
Resolution	<0.05 µm
Accuracy	±0.1% Full Scale
Transducers	
Load	
Range	22.5 kN
Resolution	0.5 N
Accuracy	±0.1% Full Scale
Transducers	
Temperature	
Range	-70 °C to + 180 °C
Resolution	0.1 °C
Accuracy	0.3 °C
Cooling agent	Liquid nitrogen (LN2) or air chiller

SOFTWARE

The APTTS software controls your test, logs data, plots the data points and produces graphs.





AASHTO TP10

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-APTTS-T0073
Stand, Specimen Alignment (recommended 1)

CRT-APTTS-T0074
Fixture, Calibration; 5000 lbf

CRT-APTTS-T0174
Fixture, Calibration, 2250 lbf2 / 3348kgm2 (recommended 1)

CRT-APTTS-T0030
Platen, Specimen (recommended 10)

CRT-APTTS-T0075
Assembly, Alignment Rod (recommended 6)

CRT-APTTS-T0076
Proof Test Assembly (recommended 1)

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device. Please enquire for further details.

Note: This is a precision piece of testing equipment. It should be checked by a trained engineer annually.

Prall Tester

CRT-PRALL (Studded Tyre Wear Test)

new

High quality, repeatable and reproducible machine,
complies with EN 12697-16 A.
Dual chambers for reduced variability

BRIEF INTRODUCTION

Studded tyres greatly reduce skidding and accidents on snow or ice covered roads. However, all too often the studs come into contact with the road surface. The use of studded tyres is very costly in terms of annual load wear. Additionally, as the studded tyres wear the pavement they eventually cut ruts in the road that can fill with water to create a hydroplaning hazard in wet weather. A further issue is the polluting dust that is created. The Prall Test (Method A) has proved to be the most successful way to investigate abrasion due to studded tyres. At the same time reproducibility has been an issue. At Cooper we have assessed the aspects of the test crucial to performance and improved them, via the fitment of a second test chamber, thus significantly reducing variability.

The CRT-PRALL is designed to carry out the Prall Test according to EN12697-16 Method A in which a cylindrical specimen of asphalt having a diameter of 100mm and a length of 30mm is tested at a temperature of 5°C. The specimen is worn by abrasive action over a standard time period of 15 minutes by 40 steel spheres. The loss of volume in millilitres is recorded and reported as the abrasion value.

KEY FEATURES

- Robust and high quality stainless steel test chambers x 2
- Inlet and outlet ports are connected to flexible hoses via quick release adaptors
- Comes with a replaceable insert with glued rubber (neoprene) plate to fix to the upper surface of the lid
- Efficient locking guard system to satisfy CE legislation
- Fitted drain
- Supplied with spheres made of stainless steel according to ISO 3290
- Fitted with 'flow controller' on the chamber lid inlet port to regulate the flow of water to each chamber
- Flow of water to each chamber is variable over the range of 0 to 4 litres per minute, greater control and flexibility
- Precision engineered equipment with controlled flow of water to each chamber, to an accuracy of 0.2 litres per minute
- User friendly, state of the art PLC based control system, mounted within its own enclosure to allow positioning away from the equipment
- Made in the United Kingdom, Fully CE marked

KEY USES

- Determination of wearing of asphalt pavements
- Investigation of abrasion due to studded tyres

STANDARDS

- EN 12697-16 Method A

SYSTEM ELEMENTS

The CRT-PRALL is comprised of:

- Two test chambers
- Motor, water pump and water reservoir
- PLC interface control system
- 40 stainless steel spheres for each test chamber

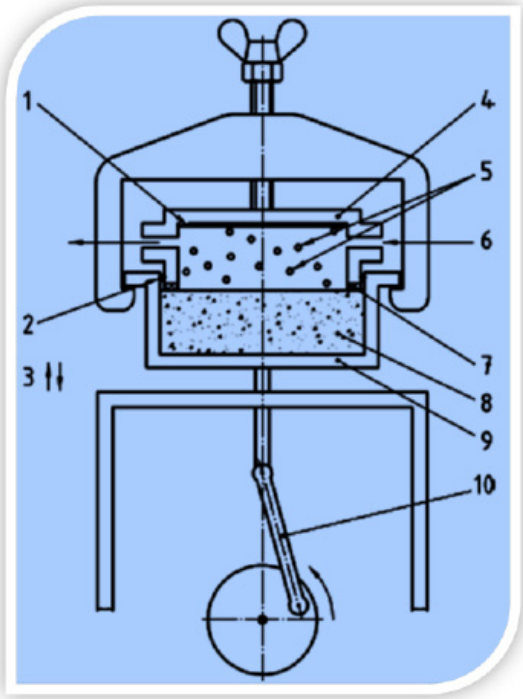


Figure1- General Arrangement

The reciprocating drive is produced by a motor, variable cam plate, and connection rod as shown in Figure 1.
The stroke length of the reciprocating drive can be optional according to customer requirements
Nominally set to the standard requirement of (43 ± 1) mm.

1. Rubber Plate
2. Flat rubber ring
3. Stroke
4. Lid
5. Steel Spheres
6. Cooling water
7. O-ring
8. Specimen
9. Test Chamber
10. Connection rod

Prall Tester

CRT-PRALL (Studded Tyre Wear Test)

SPECIFICATIONS

Length of connection rod mm	200 ± 5
Motor power requirement (3 Phase)	6 kW 50 Hz
Motor speed (variable)	150 to 1500 rpm
Steel Spheres diameter mm	11.50 to 12.01
Steel Spheres hardness value HRC	63 to 66
Control System	PLC controlled Mains pressure water required

SOFTWARE

- User friendly and reliable control system controlled via PLC interface
- The interface allows the user to set the temperature of the water reservoir, speed of the motor and the flow of the coolant water into each test chamber prior to starting the test
- The interface displays the temperature of the water reservoir, speed of the motor and the flow of the coolant water into each test chamber
- Data is recorded throughout the test and can be exported to PC via a data stick for further analysis
- The safety relay ensures that the door on any test chamber does not open until the motor has come to a standstill and water supply has been isolated

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

notes...

Indentation Testing Machine

Using Cubes or Marshall Specimens (Hardness Tester)
CRT-IND

A high quality machine for the indentation test with advanced auto data logging software to record and present the results via real time charts

BRIEF INTRODUCTION

The Indentation Testing Machine CRT-IND for determining the resistance to penetration of road and mastic asphalt by loading a cylindrical pin and measuring the indentation in a sample over a given time.
The CRT-IND comprises of a frame incorporating a stainless steel water bath with drain facility, method of applying the 500 Newton load and means of recording the test results.* Immersion heater is not included but can be offered as additional equipment.
The apparatus conforms to the requirements of EN 12697-20.The maximum nominal size of the aggregates should be less or equal to 16 mm.

It comes with optional auto data logging software which saves test data files, shows a graphical representation of the test in real time, reduces operator involvement and thus eliminates chances of error.

KEY FEATURES

- Auto data logging software available which:
  - Reduces operator involvement
  - Eliminates chances of error
  - Generates graphical representation of the test in real time
  - Saves operator data, sample information data, time, and pertinent information relevant to the specific sample on test
  - Reduces test costs significantly
- Heater element to comply with both temperatures requested by EN standard
- Stainless steel, temperature controlled water bath with drain facility
- Digital indicator with digital communications.
- CE Marked and Made in United Kingdom

KEY USES

- Determines the depth of indentation.
- To test the behavior of mastic asphalt, rolled and other such asphalts.

STANDARDS

- EN 12697-20

SYSTEM ELEMENTS

- Loading frame
- Loading apparatus capable of smooth transfer of preliminary and total test loads to the specimen
- 100 mm2 & 500 mm2 indentor pins
- Temperature controlled water bath
- Gauge stand integral to base of water bath
- Digital indicator with digital communications
- Test mould for cube specimens
- Optional immersion heater and PC data logging software

Indentation Testing Machine

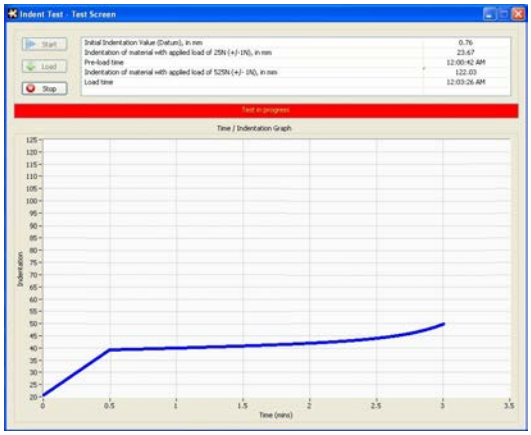
Using Cubes or Marshall Specimens (Hardness Tester)
CRT-IND

SPECIFICATIONS

Preliminary Force	(25 ± 1) N
Total Test Force	(525 ± 1) N
100 mm2 Indentor Pin Diameter mm	(11.3 ± 0.1)
500 mm2 Indentor Pin Diameter mm	(25.2 ± 0.1)
Indentor Pin length	≥20 mm
Indentor Pin Thread Length	8 mm (approx.)
Deflection of Apparatus Upon Application of Force mm	<0.01
Base Plate Thickness mm	> 20
Water Tank Capacity	25 litres
Water Temperature Range	Ambient or 5 °C (whichever is higher) to 95 °C
Water Temperature Stability	± 0.5 °C
Digital Indicator Resolution mm	0.01
Digital Indicator Communications Protocol	Digimatic via USB 2.0
Weight Kg	75 (approx.)
Dimensions mm (w x d x h)	500 x 800 x 1000
Electrical Supply	240 VAC, 1φ, 50/60 Hz, 4.5 A, 1 kW

SOFTWARE

CRT-INSOFT, A Cooper Technology designed and developed software package that allows for the automatic capture to PC of test data from the indentation test at the two required test temperatures* and over the four time durations. This software shows a graphical representation of the test in real time, storing the data in text files that can subsequently be opened in Excel.



*Additional function allows the user to input a temperature between 5°C (or ambient if higher) and 95°C.

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

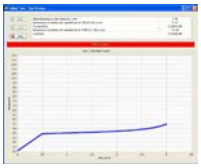
CRT-PTM69
Penetration Test Mould 69 mm (adjustable mould)
Used during the cube penetration test.

CRT-CUBM
Cube mould 70.7mm to prepare indentation specimens

CRT-IMHEAT
Immersion heater

CRT-INDHD100
Spare Indent Heads
100 mm2 Pin Diameter

CRT-INDHD500
Spare Indent Heads
500 mm2 Pin Diameter



CRT-INSOFT
INSOFT Software
Saves data from the indent test at the two test temperatures* and over the four time durations. Also shows a graphical representation of the test in real time. *Additional function allows the user to input a temperature between 5 degrees Celsius (or ambient if higher) and 95 degrees Celsius.
Laptop included with the software

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.

We can also offer UKAS calibrated temperature monitoring at an extra cost.

Note: This device should be calibrated and checked annually. Please enquire for further details.

Cooper-Vialit Cohesion Pendulum

CRT-VCP

> The European Standards EN 13808 and EN 15322 demand this test according to EN 13588 as a basis for the CE marking of all polymer-modified binders for the intended use of surface treatment

BRIEF INTRODUCTION

Vialit Cohesion Pendulum by Cooper CRT-VCP is a testing device to analyse the cohesion of bitumen in road construction.
The cohesion is one of the measures of the performance of a bituminous binder. It is important to use binders which have a sufficient level of cohesion according to the level of traffic to be supported.
Cohesion has originally been developed for surface dressing however it can be used for any type of binder (pure, modified or fluxed) which is to be used in different types of road applications. Knowledge of cohesion enables the choice of binder type for given traffic and site conditions.

KEY FEATURES

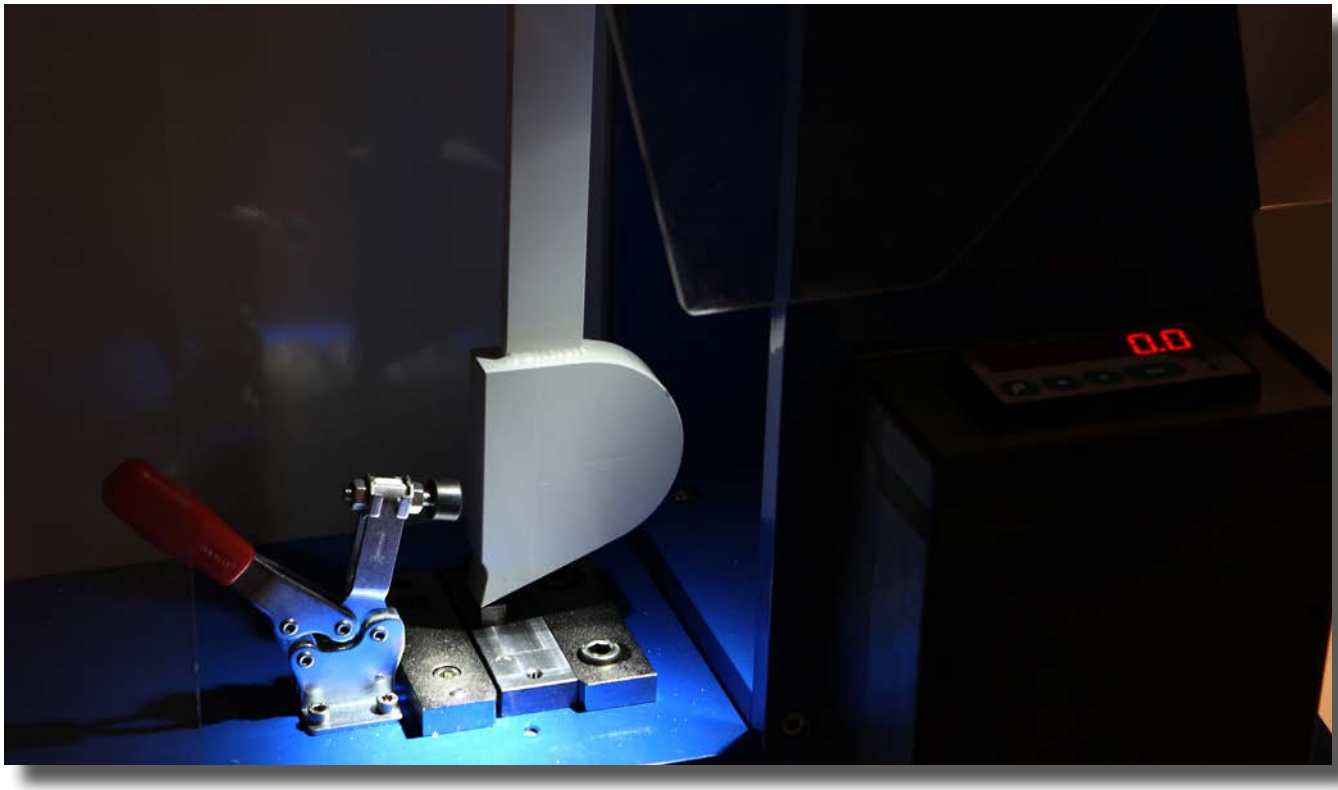
- Automatic security safety catch avoiding pendulum to crash after test impact
- Incremental angle sensor in combination with a digital display resolution of 0,1°
- 36 cube and cube holder combinations, which allows an economic production of test samples (included)
- Efficient safety system in compliance with EC - machinery directive 2006/42/EC which allows comfortable handling with maximum operational reliability
- Module with built-in RS 232-port (allows the metering of test value via computer, retrofittable by user)
- Software available for full automation of test

KEY USES

- Bitumen
- Bitumen emulsions
- Flux bitumen

STANDARDS

- EN 13588
- EN 13808
- EN 15322



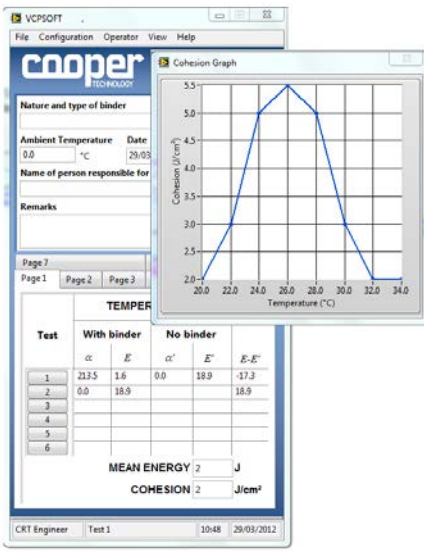
Cooper-Vialit Cohesion Pendulum

CRT-VCP

SPECIFICATIONS

Angle Measurement Range	360°
Angle Measurement Resolution	0.1°
Pendulum Mass	(1925 ± 95) g
Pendulum Parked Position	(4 ± 1)° from the vertical
Radius at Point of Impact mm	(500 ± 1)
Distance from Pendulum Centre of Gravity to Shaft mm	(295 ± 2)
Ambient Temperature Range	(18…28) °C
Electrical Supply	100-240 VAC, 50/60 Hz, 1A, 24W
Dimensions mm (WxDxH)	1200 x 600 x 1320
Estimated space required	Foot print 1200 x 600 x 1320 on bench top
Estimated Weight Kg	150
PC	Required for software- please enquire

SOFTWARE



- User friendly, intuitive and reliable windows software developed with National Instruments LabVIEW™
- Results are taken for the binder under test, across the pre-determined temperature range and displayed in real time.
- Results are stored in a single Microsoft Excel compatible csv file.
- Previously stored data can be up-loaded to allow changes/additions to the tests already carried out on the binder under test.
- On–screen chart shows the cohesion vs. temperature curve which updates in real time as new measurements are taken.
- Translation of the software is available into most languages.
- Retrofittable on previously supplied pendulums

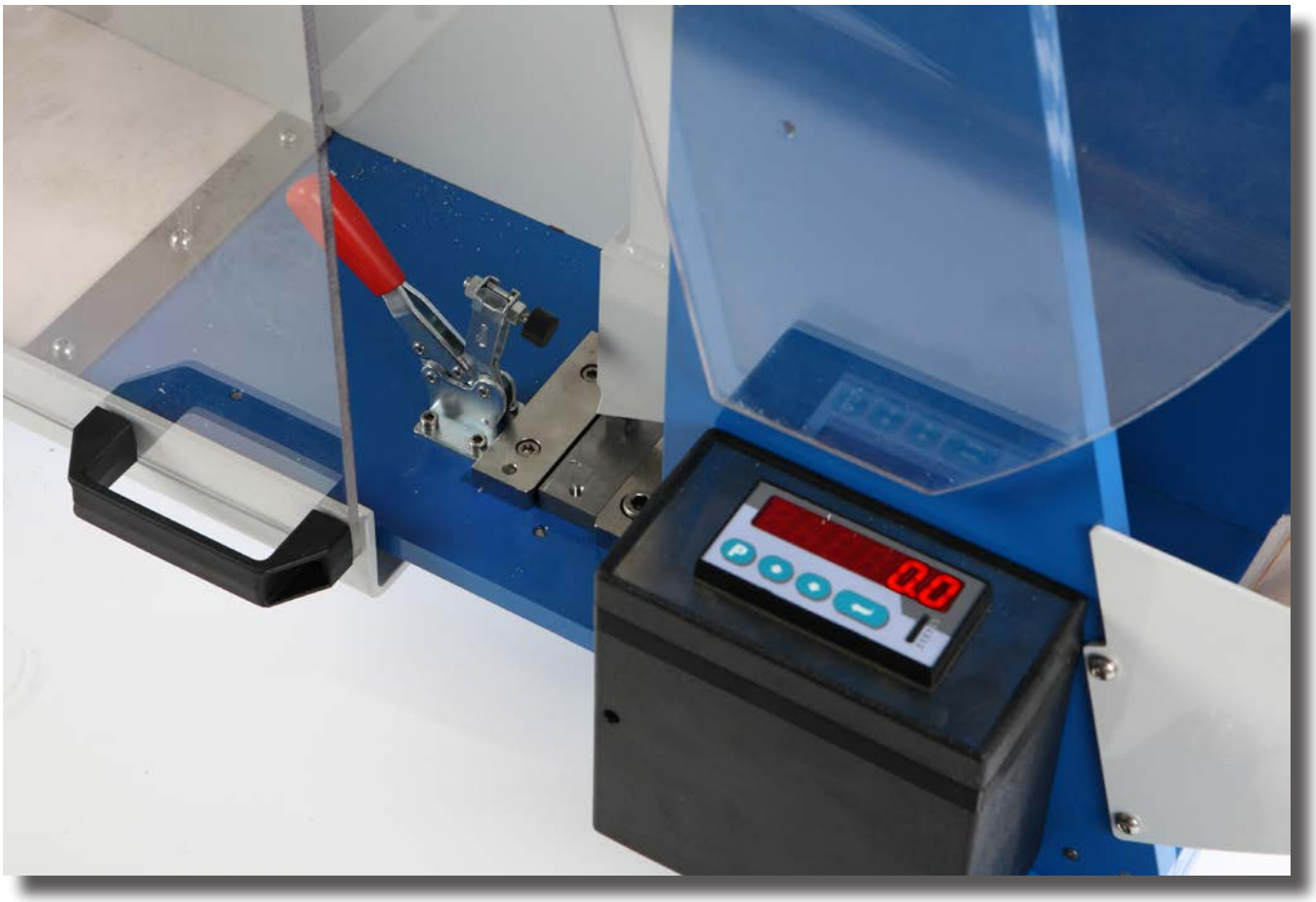
Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-VCP-CUB	Additional pair of cubes and cube holders
CRT- VCP-SOFT	Software to allow PC analysis of results. Laptop included with the software.

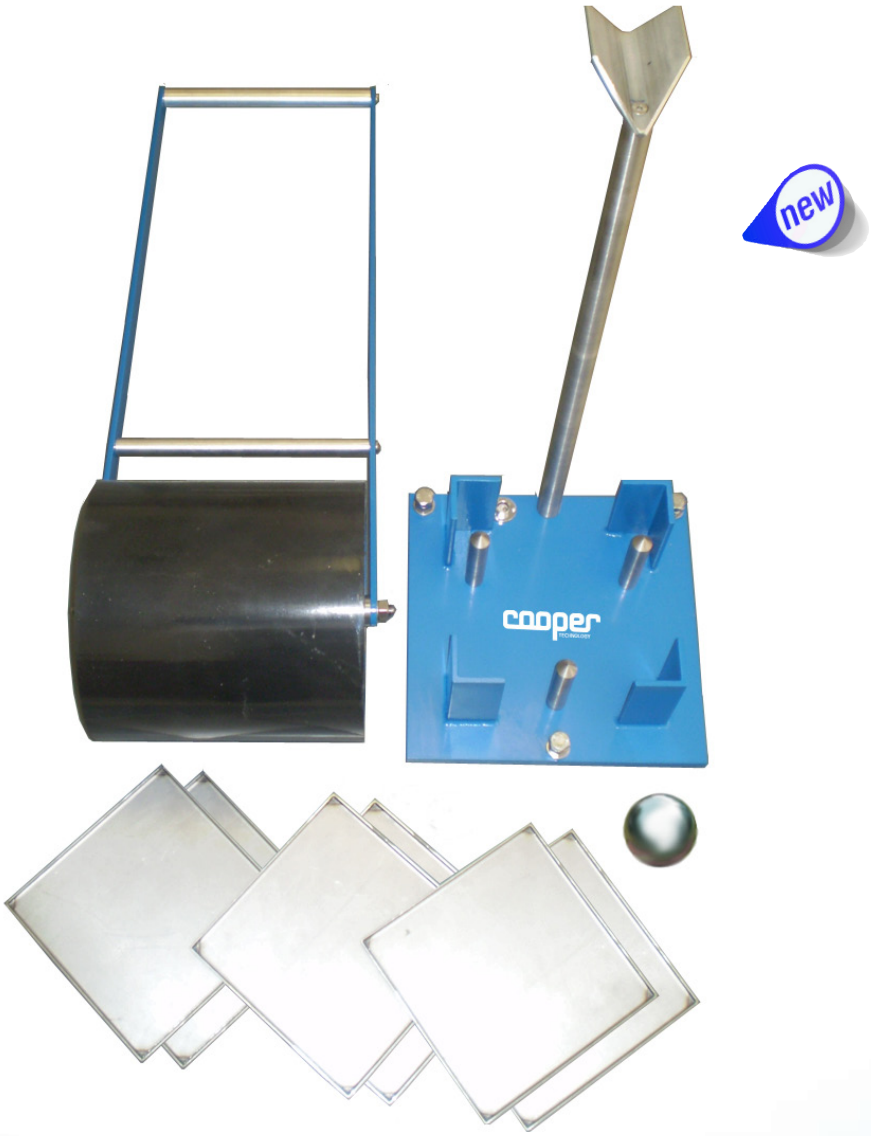
Calibration & Maintenance

Please note: It is advised to calibrate the machine annually.



‘Vialit Plate’ Adhesion Tester

CRT-VPAT



Easy to use, robust test apparatus to obtain consistent and repeatable results day after day. Complies with industry standards

BRIEF INTRODUCTION

The Cooper Vialit Plate Adhesion Tester CRT-VPAT is used to evaluate binder aggregate adhesivity by vialit plate shock test method. This method is an indicator of aggregate retention for chippings. The adhesion between binder and chippings form the basis of successful surface dressing.

Asphalt emulsion or hot binder is applied to stainless steel plates and aggregates are embedded in the binder using hand operational rubber wheel roller, which is fitted with bearings to ensure consistent, smooth rolling action. The prepared test plate is turned over and placed on 3 pointed support rods. Stainless steel ball is made to fall from an 'angled slide' three times within 10 seconds period onto the inverted test plates. The results are recorded as percent aggregate retention.

KEY FEATURES

- Robust and high quality hardware
- Fitted with inbuilt spirit level to allow easy alignment of base plate
- Supplied with high quality stainless steel test plates
- Stainless steel ball made according to European standard
- Fitted with 'angled slide' with inclination of (3.0 ± 0.5)° for consistent ball launch
- Easy to use, hand operational rubber roller fitted with bearings to ensure consistent, smooth rolling action
- Can be supplied with traceable calibration certificate
- Made in the United Kingdom

KEY USES

- Determination of binder aggregate adehesivity
- To design binder aggregate systems for surface dressing

STANDARDS

- EN 12272-3
- NF P98-274-1

SYSTEM ELEMENTS

The CRT-VPAT is comprised of:

- Stainless steel test plates x 6
- Stainless steel ball
- Rubber wheel roller

SPECIFICATIONS

Steel Ball	
Weight Kg	0.05
Diameter mm	50
Rubber Wheel Roller	
Weight Kg	25
Rubber thickness mm	15
'Angled slide' inclination	(3.0 ± 0.5)°
Overall Weight Kg	40

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Slurry Testing Machine

CRT-STM

High quality, simple and reliable machine, complies to EN 12774-5 for the determination of wearing and minimum binder content

BRIEF INTRODUCTION

The slurry surfacing test machine CRT-STM was developed to simply and reliably determine the minimum binder content of the mix under wet track abrasion conditions according to the determination of wearing test: EN 12274-5.

KEY FEATURES

- Abrasive head according to EN 12274-5
- Planetary gear system providing the abrasive head with rotating speed of 144rpm for 61 complete cycles of the planetary system
- Test bath fitted with three spindles to fix the test base plate
- 310mm diameter and 5mm thick test base plate with 3 or 4 knurled head screw fasteners
- Hose can be supplied made from 80° shore hardness rubber. The rubber is reinforced with double cord surface. The hose has an internal diameter 19mm and an external diameter of 31mm.
- Integral timing device stops the test automatically after 300 seconds
- Type A,B,C and D Ring shaped annular metal moulds available

KEY USES

- Determination of wearing
- Determination of minimum binder content

STANDARDS

- EN 12274-5

SYSTEM ELEMENTS

The CRT-STM is comprised of:

- Planetary gear system
- Abrasion head
- Test bath
- Test base plate
- Automatic timer
- Leveling plate
- Test piece bases
- Rubber hose

SPECIFICATIONS

Planetary Speed	144rpm for 61 complete cycles
Vertical kinetic friction force	22.3N
Test base plate diameter mm	310
Test base plate thickness mm	5
Test piece base density	700g/m2
Test bath dimensions mm (WxDxH)	400 x 400 x 125
Automatic timer duration	300 sec
Hose hardness	80° shore
Hose with standing pressure	> 2533MPa
Hose internal diameter mm	19
Hose external diameter mm	31
Dimension mm (WxDxH)	450 x 460 x 560
Estimated Weight Kg	35
Electrical Supply	220-240 Volts 50Hz @ 13A (others available)

Pendulum Skid Tester

CRT-PENDULUM

The Cooper-Wessex skid resistance tester is one of the best portable skid resistance tester in the world.

BRIEF INTRODUCTION

The Cooper-Wessex Pendulum Skid Tester CRT-PENDULUM is the high quality skid resistance testing equipment. Originally designed in the 1940s in the US, the instrument was further developed in the 1960s at the UK Transport Research Laboratory for the testing of road surfaces.

The CRT-PENDULUM measures the frictional resistance between a rubber slider mounted on the end of a pendulum arm and the test surface. This provides highway engineers with a routine method of checking the resistance of wet and dry surfaces to slipping and skidding, both in the lab and on site.

It is based on the Izod principle: a pendulum rotates about a spindle attached to a vertical pillar. At the end of the tubular arm a head of known mass is fitted with a rubber slider. The pendulum is released from a horizontal position so that it strikes the sample surface with a constant velocity. The distance travelled by the head after striking the sample is determined by the friction of the sample surface. A reading of Skid Resistance is obtained.

KEY FEATURES

- Designed for laboratory and in situ road surface testing
- Dispatched calibrated to EN1097-8 (accredited under ISO 9001:2000)
- Low friction arm, and lightweight pointer
- Comes with integral 'F' scale for use with small slider set for 76mm slide length. (PSV test)
- Repeatable and reproducible
- Supplied with robust carrying case
- Made in the United Kingdom

KEY USES

- Assessment of surface friction and skid resistance properties
- Testing of aggregates in the PSV (Polished Stone Value) test
- Testing of new road surface materials under development
- Testing of pedestrian walkways
- Traffic accident investigations,
- Litigation investigations
- Testing of pavers in the Flat Bed Polisher

STANDARDS

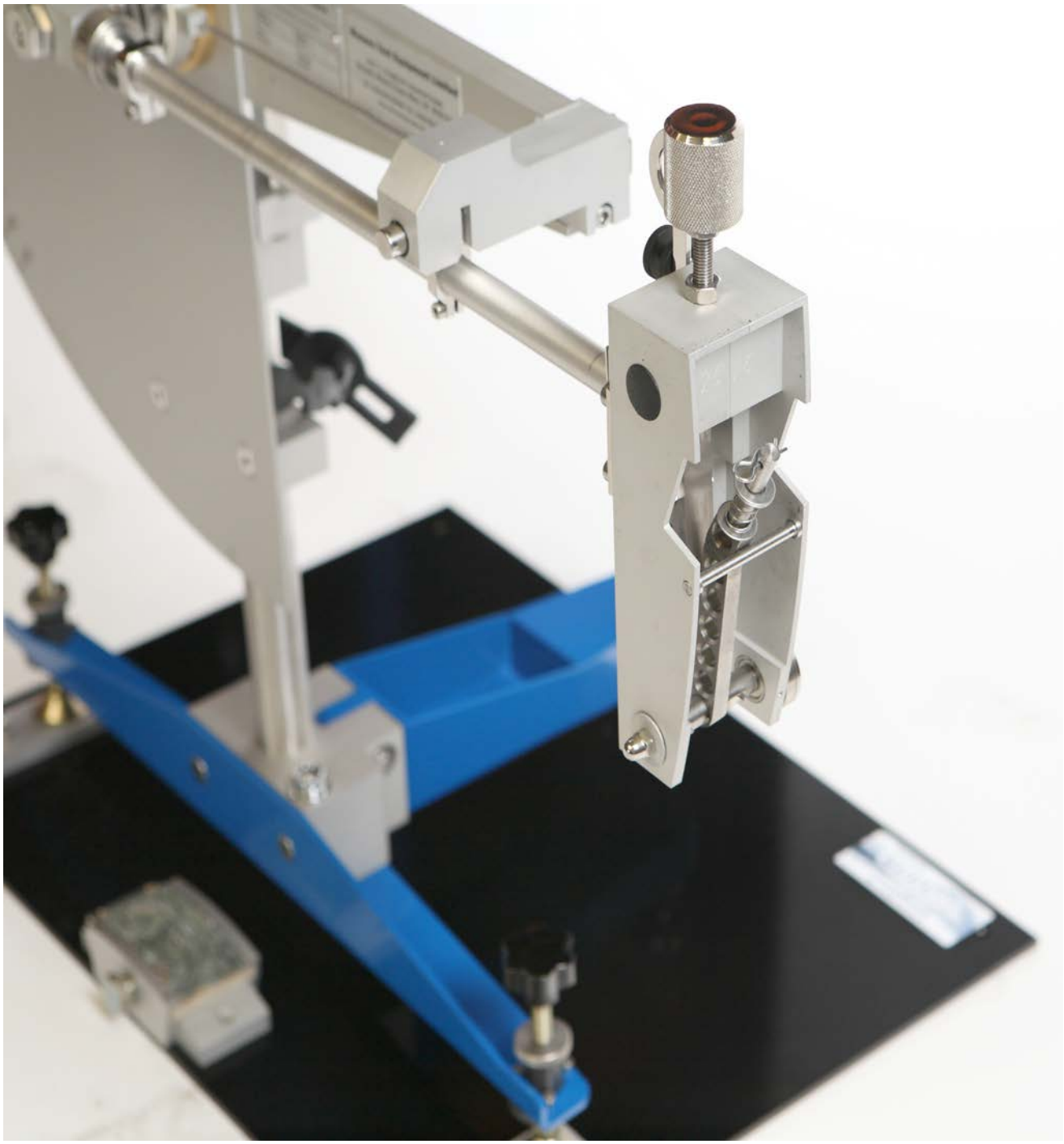
- EN 1097-8:2009
- BS 812 Pt. 114
- AS/NZS 4586:1999
- BS 6077 Pt 1
- BS 7044
- BS 7188
- BS 8204
- BS 7976
- EN 1436:1997
- EN 13036-4:2003
- ASTM E303-93

Pendulum Skid Tester

CRT-PENDULUM

SPECIFICATIONS

Dimensions mm (W x D x H)	700 x 300 x 700
Volume (packed) cu metres	0.15
Weight Kg	30



Accessories

Accessories listed below are not included in the price of the main device unless stated and should be purchased separately as per requirements.

	CRT-PEND-S886 Base Plate
	CRT-PEND-SPFEET Set of 3 Spreader Feet
	CRT-PEND-885/1050 1.25” Rubber Mounted PSV Slider
	CRT-PEND-885/1060 3.00” Rubber Mounted TRL (55) Slider
	CRT-PEND-885/1070 3.00” Rubber Mounted Four S (96)
	CRT-PEND-885/1431 3.00” Rubber Mounted CEN Slider
	CRT-PEND-CAL1 First traceable calibration
	CRT-PEND-885/1024 Tool Kit (included with main item)
	CRT-PEND-885/1200 Pendulum Instrument case (included with main item)

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device. Please enquire for further details.

Note: This device should be calibrated annually.

Polish Paver Machine

CRT-PPM

The Cooper-Wessex Polish Paver Machine specifically designed to meet international standards for the determination of the Polished Paver Value PPV

BRIEF INTRODUCTION

The Cooper-Wessex polish paver-value determination follows the BS812 aggregate abrasion method to polish the samples of pavers. The abrasion lap is modified by attaching standard a rubber disk. Corn emery and emery flour abrasives are fed to the samples under test as in the BS812 determination. The specimens are prepared to aggregate abrasion test specimen dimensions. Flat control specimens (of the same control stone as the PSV test) are also made to these dimensions.

After completion of the polishing procedure the degree of polish is measured with the Pendulum skid-resistance test in a similar way to the PSV test. A flat to curved correction factor is then applied to estimate the 'polished-paver value'; a correction being applied in the same way as the PSV test according to the level of the control specimens. The method has been published by the British Standards Institution a draft for development (DD 155). It also forms the basis of the draft European Standard.

KEY FEATURES

- Heavy duty mainframe on adjustable anti-vibration pads
- Steel lap wheel 610 mm diameter
- Precision machined steel shaft and sealed bearings.
- Resilient mounted electric motor
- Totally enclosed, grease filled gear box
- Scraper blades for sand removal
- Predetermined revolution counter

KEY USES

- Determination of Polished Paver Value

STANDARDS

- BS 7932:1998 (Determination of Polish Paver Value)
- DD 155

SPECIFICATIONS

Electrical Supply	230 V Single Phase* 50 Hz
Dimensions mm (W X D X H)	800 x 700 x 1100
Volume (packed) cu meters	0.79
Weight Kg	170

*Optional 110 V transformer version.

Consumables

Consumables listed below are not included in the price of the main device unless stated and should be purchased separately as per requirements.

CRT-PPM-S882/190
Corn Emery 25Kg Bags (Graded)

CRT-PPM-S882/191
Flour Emery 25 Kg Bags (Graded)

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.

Please enquire for further details. Note: This device should be checked annually.

Aggregate Abrasion Machine

CRT-AAM

The Cooper-Wessex Aggregate Abrasion machine determines the AAV by testing the measure of the resistance of aggregate to surface wear by abrasion

BRIEF INTRODUCTION

Inadequate abrasion resistance of road surfacing aggregates means an early loss of the texture depth required to maintain high speed skidding resistance. The Cooper-Wessex Aggregate Abrasion machine determines the Aggregate Abrasion Value by testing the measure of the resistance of aggregate to surface wear by abrasion.

Two specimens are pressed against the surface of a steel disc rotating in a horizontal plane, with a force of 0.365 Newton's per sq. centimetre. Sand, fed by hoppers, is used as an abrasive. After 500 disc revolutions the amount of material abraded is measured by calculation of the weight loss of the aggregate. The percentage loss in mass of chippings as known as the 'Aggregate Abrasion Value' (AAV), and ranges from about 1 for hard flints to over 16 for aggregates normally considered too soft for use in road surfacing.

KEY FEATURES

- Heavy duty mainframe on adjustable anti vibration pads
- Steel lap wheel 610 mm diameter
- Precision machined steel shaft and sealed bearings.
- Inverter drive to 3 phase motor for precise speed control
- Totally enclosed, grease filled gear box
- Scraper blades for sand removal
- Predetermined revolution counter
- 24 V DC control circuits for safety
- Interlocked cabinet lid for safety
- Sand Scoop to collect spendrift
- CE approved

KEY USES

- To determine the Aggregate Abrasion Value

STANDARDS

- EN 1097-8 : 2009
- BS 812 : Partie 113 : 1990

SPECIFICATIONS

Dimensions mm (WxDxH)	800 x 700 x 1100
Volume (Packed) cu metres	0.79
Palletised Dimensions mm (WxDxH)	1200 x 800 x 1280
Weight Kg	170
Electrical Supply	230v single phase 50Hz

Consumables

Consumables not included in the price of the main device unless stated and should be purchased separately as per requirements.

CRT-AAM-AGG
Leighton Buzzard Sand (25Kg bags)

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.

Please enquire for further details. Note: This device should be checked annually.

Accelerated Polishing Machine

CRT-APM

The Cooper-Wessex Accelerated Polishing Machine is the industry standard device for the determination of the Polished Stone Value PSV

BRIEF INTRODUCTION

Wessex Engineering first manufactured an Accelerated Polishing Machine
CRT-APM over 30 years ago, and were involved both in the development of the machine and the test procedures. Wessex has sold more than 1000 APMs globally.

In 1950 increased traffic flow and higher speeds, together with concerns about road safety led to research into the relationship between road materials and skid-resistance. Research at the UK Transport Road Research Laboratory showed a significant relationship between polishing of aggregates used in road surfaces and skid resistance. Tests were devised using an Accelerated Polishing Machine and a friction measuring device (known as the Pendulum Skid Tester, also supplied by Cooper-Wessex), to determine a Polished Stone Value (PSV).

Fourteen specimen aggregate samples are clamped around a rotating Road Wheel. These samples are subjected to two timed stages of abrasive polishing under a loaded rubber tyre. First by Corn Emery grit, and secondly by Flour Emery powder.

As the best quality market leaders Cooper-Wessex have recently been copied by low quality manufacturers. Imitators' machines may look similar, but precision, repeatability and reproducibility come only with years of experience.

KEY FEATURES

- High ground steel main spindle running in precision sealed ball bearings additionally protected by a labyrinth seal spindle axially loaded to eliminate end play.
- Adjustable 3 phase motor speed control with adjustable timing belt drive, reducing power consumption and improves control.
- Inverter drive to motor for precise speed control
- Digital display preset timer and revolution counter.
- Robust welded steel mainframe, standing on adjustable pads
- Specimens manufactured and easily removed from precision machined moulds.
- 14 Specimens located on 'Road Wheel' by rubber rings and held by simple side fixing.
- Tyred wheel easily removed for replacing tyres.
- Water gravity fed from high level tank through calibrated flow meter.
- Used abrasive and water collected in easily removable tray.
- Loaded tyre raised and lowered to the running surface by mechanical lifting device.
- Protection by covers and guards may be easily removed for maintenance.
- CE marked.
- ASTM option with pneumatic wheel.

KEY USES

- To produce polished stone samples of aggregates used in road surfaces, to simulate actual road conditions.

STANDARDS

- EN 1097-8:2009
  (formerly BS 812 pt114: 1989)
- ASTM E303-93
- ASTM D3319-99

Accelerated Polishing Machine

CRT-APM

SPECIFICATIONS

Road Wheel Speed	320 ± 5 rev min -1
Tyred Wheel Set Diameter mm	200 ± 3
Tyred Wheel Set Width mm	38 ± 2
Tyred Wheel Hardness	(69 ± 3) mm IRHD
Applied Load on the Wheel	(725 ± 10) Newton
Electrical Supply	230v/110v. 50/60 Hz Single Phase 13amp
Dimensions mm (WxDxH)	810 x 790 x 1230
Water Tank Height cm	155
Palletised Dimensions mm (WxDxH)	1200 x 800 x 1280
Weight (max) Kg	210
Volume cu meters	0.79

Accessories/Consumables

Accessories/consumables are not included in the price of the main device and may be purchased separately if required.

CRT-APM-886
Base Plate

CRT-APM-SAMP
Reference Sample – Moulded Criggion – Olivine Basalt

CRT-S882/190
Corn Emery 25Kg Bags (Graded)

CRT-S882/191
Flour Emery 25Kg Bags (Graded)

CRT-APM-S882/200
Control Stone 25Kg Bags (Ungraded)

CRT-APM-S882/201
Criggion Stone 25Kg Bags (Ungraded)

CRT-APM-S882/7
Road wheel assembly

CRT-APM-S882/1022
Corn Feeder 24 Volt

CRT-APM-S882/1023
Flour Feeder 24 Volt

CRT-APM-S882/0049
Weight BS EN 1097-8:2000

CRT-APM-S882/0049/ASTM
Weight American Standard

Calibration & Maintenance

Dispatched calibrated to EN 1097-8:2009 (accredited under ISO 9001:2000).

Calibration, Annual Service and Maintenance Contracts are available for this device. Please enquire for further details.

Note: This device should be checked annually.

Gyratory Compactor

CRT-GYR

A high quality machine with which the user can easily and safely obtain accurate, repeatable results day after day

BRIEF INTRODUCTION

Gyratory compaction is considered to be one of the best methods of laboratory compaction for the assessment of compactibility and the manufacture of test specimens.

Compaction is achieved by the application of a vertical stress (normally 600KPa) via end platens to a known mass of asphaltic mixture within a 100 or 150mm internal Ø mould. The longitudinal axis of the mould is rotated (gyrated) at a fixed angle to the vertical whilst the platens are kept parallel and horizontal. During compaction the height of the sample is automatically measured and both the mixture density and void content calculated. The compaction data is shown on-screen in graphical and tabular format as compaction progresses and it is also saved in Microsoft Excel™ compatible format. The operator can choose whether to compact for a certain number of gyrations or until a target mixture density or void content is achieved.

Problems with existing compactors are mainly related to build quality and ease of use. Unlike most compactors 100 and 150mm Ø moulds can be tested without changing machine parts. A filled gyratory compactor mould is heavy and often very hot. In many cases these moulds have to be lifted in and out of gyratory compactors. With the CRT-GYR no lifting of filled moulds is required. They are automatically lowered into position for compaction and then lifted up again for transfer to the integrated demoulding system.

KEY FEATURES

- Complies with EN 12697-10 and EN 12697-31
- Can be configured to comply with SHRP Superpave specifications
- Automatic mould insertion and retraction
- 150mm and 100mm internal Ø moulds can be tested without changing parts
- Cold mix (emulsion) materials can be compacted and the expelled fluid collected
- USB link with data acquisition and control system so that desktop can be used as host computer
- User friendly LabVIEW™ software displays results in real time
- Compaction data stored in Microsoft Excel™ compatible format
- Machine calibrated with traceable equipment
- Option for mould up to 300mm high

KEY USES

- Compaction of asphaltic paving material to a target mixture density or void content
- Assessment of mixture compactibility
- SHRP Superpave asphalt mixture design
- Preparation of cylindrical test specimens

STANDARDS

- EN 12697-10
- EN 12697-31
- ASTM D6925
- SHRP M-002
- AASHTO T312 (TP4)
- T 0736-2011

SYSTEM ELEMENTS

The CRT-GYR is comprised of:

- A highly rigid enclosed steel frame
- A 95mm bore pneumatic cylinder
- An integrated guard and specimen table
- A Precision pressure regulator for accurate stress control
- An eccentric at the base of the mould for to produce gyratory motion
- Mitsubishi™ inverter for accurate speed control
- 300mm stroke linear potentiometer for specimen height measurement
- Footmaster™ wheels for uncomplicated movement
- The PC is connected to the CRT-GYR through a high speed USB connection
- A highly accurate National Instruments™ 16bit card is used for control and data acquisition

Gyratory Compactor

CRT-GYR

SPECIFICATIONS

Speed	Normally 30 rpm
Stress	Normally 600 kPa, Maximum 1000 kPa
Actuator stroke mm	250
Internal Angle of Gyration	0.2 to > 2°
Electrical Supply	220-240 Volts 50Hz @ 16A (others available)
Specimen Ø	100mm and 150 mm
Compressed Air	7-10 bar @ 350 L/min
Mixtures	Wet or dry
Dimension mm (WxDxH)	780 x 1000 x 1920
Working space required mm (WxDxH)	2000 x 2000 x 2200
Estimated Weight Kg	508
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software allows 2 methods of compaction – no. of gyrations and target density
- The operator is guided through every step of the compaction
- Real-time display of current height, density and void content (percentage)
- Data is recorded to disk at regular intervals for further analysis
- Software communicates with the gyratory compactor via the USB interface
- Utilities are included for transducer check, diagnostic routines and calibration

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.
Note: This device should be checked and calibrated annually.

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-GYR-M300
Option for mould up to 300mm high

CRT-GYR-EXT
Specimen Extruder

CRT-GYR-ANG2
> 2 degree angle plate

CRT-GYR-SHEAR
Shear force display

CRT-GYR-CALANG
Calibration kit for internal angle lead

CRT-GYRM-150
150mm Internal Ø mould & platens

CRT-GYRM-100
100mm Internal Ø mould & platens

CRT-GYRMS-150
150mm Internal Ø mould & platens, slotted for emulsion mix

CRT-GYRMS-100
100mm Internal Ø mould & platens, slotted for emulsion mix

CRT-GYRM-150T
150mm Internal Ø mould & platens which includes feature for specimen temperature measurement

CRT-GYRM-100T
100mm Internal Ø mould & platens which includes feature for specimen temperature measurement

CRT-GYR-TEMP
Specimen Temperature Measurement

CRT-GYR-SP150_63
Spacer 150mm to compact 63mm height on CRT-GYR

CRT-GYR-SP100_63
Spacer 100mm to compact 63mm height on CRT-GYR

CRT-GYRCFP-150
150mm circle filter papers (pack of 100)

CRT-GYRCFP-100
100mm circle filter papers (pack of 100)

CRT-TGR-840
Small air compressor

European Standard Roller Compactors – Steel Roller

CRT-RC2S
CRT-RC2SV

The most popular Roller compactor worldwide is robust, reliable and the industry standard

BRIEF INTRODUCTION

The Roller Compactor is considered to be the method of laboratory specimen compaction that results in slabs of asphaltic paving materials with properties that most closely simulate those of materials in the highway. Slabs can be compacted to target mixture densities using loads that are equivalent to those of full-scale compaction equipment.

The CRT-RC2S and CRT-RC2SV are pneumatically powered and controlled by a programmable logic controller (PLC) connected to an HMI which the operator can use to select the number of passes and compaction load levels. Although the primary function is to produce slabs for wheel tracking tests, the slabs can be sawn into beams or cored to provide specimens for a variety of other tests. Users have compacted hot asphaltic materials over stress absorbing membrane interlayers (SAMIs) on a base of cracked concrete in order to assess the effectiveness of the SAMI by using shear or bending tests.

KEY FEATURES

- Steel wheeled roller segments
- Solid machine frame
- Model for compaction of 305 x 400mm and 305 x 305mm slabs
- Roller compactor moulds will fit Cooper Technology Wheel trackers so that compacted slabs can be wheel-tracked without de-moulding
- Maximum compaction load of 30kN per 305mm roll width (equivalent to largest on-site static rollers)
- Speed control
- HMI for operator selection of number of passes and compaction levels
- Vibrating roller option with adjustable frequency to simulate on-site vibratory rollers
- Safety enclosure with interlocked doors to prevent unguarded operation
- Slabs can be used as wheel-tracking specimens, cored to make indirect tensile test specimens or sawn into beam fatigue specimens

KEY USES

- Preparation of homogeneous asphalt slabs
- Wheel tracking tests
- Sawing into beams for bending tests
- Coring to produce specimens for indirect tensile and axial tests

STANDARDS

- EN 12697-33 Steel roller

SYSTEM ELEMENTS

The CRT-RC2S is comprised of:

- A robust flame cut steel frame with integral safety cabinet
- An HMI controlled pneumatic system designed together with SMC
- An alterable stroke mechanism
- Removable roller segments of different sizes

A vibrating roller on the V systems to simulate conditions in-situ.

European Standard Roller Compactors – Steel Roller

CRT-RC2S
CRT-RC2SV

SPECIFICATIONS

Maximum Roller Load	30kN over 305mm roll width @ 7bar, 38kN @ 9 bar
Trolley Travel mm	±150
Speed	Variable up to 10 cycles per minute
Slab Thickness mm	40-100
Electrical Supply	220–240 Volts 50-60 Hz @ 13A (others available)
Vibrating Frequency	0-50 Hz (CRT-RC2SV model only)
Compressed Air	7-10 bar @ 700 L/min
Dimensions mm (WxDxH)	1900 x 1100 x 1520
Working space required mm (WxDxH)	2900 x 1700 x 1700
Estimated Weight Kg	670
PC	N/A

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-50
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 50mm deep[1]

CRT-WTRCM-100
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 100mm deep[1]

CRT-RCM-50W
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 400 x 50mm deep[1]

CRT-RCM-100W
Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 400 x 100mm deep[1]

CRT-RCVIB
Vibration option to simulate conditions in-situ

CRT-RCHEIGHT
Specimen height measurement during compaction

CRT-RC2S-TEMP
Temperature in mould display

CRT-COMP-1210
Large Compressor (up to 10bar and 1200l/min) for supply of air to two pieces of large flow equipment such as Roller Compactors and Four Point Bending rigs

CRT-F12T-AIRDRYER
Air dryer with 43cfm flow rate and 3C dew point. 230/1/50

[1] Other sizes available, please enquire

Maintenance

Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.

Note: This device should be checked annually.

European Large Roller Compactor - Pneumatic Tyred Roller

CRT-RCENLD-III

Optimisation of repeatability and productivity through the automation of human interface

BRIEF INTRODUCTION

Roller compaction is the laboratory method that most closely simulates on-site compaction. The machine can be configured to operate with a single or twin wheels depending on the mould size. The wheels track the surface in overlapping wheel-paths using sequences specified in EN 12697-33 or custom sequences designed by the user. The base of the mould is incrementally raised by a precision jacking system and the system is tracked to keep it level with the top of the mould.

Compacted slabs can be from 50 to 150mm thick. 500 x 180mm slabs are usually wheel tracked in the Cooper Technology Large Wheel Tracker, whilst 600 x 400mm slabs are normally cut to produce trapezoidal or prismatic specimens for fatigue, modulus tests and Duriez test.

KEY FEATURES

- Compacts uniform slabs of asphaltic paving mixture
- Computer control for repeatable standard EN 12697-33 compaction patterns
- Option for customer defined compaction patterns to be programmed and saved
- Single or dual wheeled configuration
- Mould size (length x width) 500 x 180mm or 600 x 400mm
- Compacted slabs can be used in the large pneumatic tyred wheel tracker or cut into beams for bending tests
- Safety enclosure with optical laser sensors for user safety, easy access and excellent manoeuvrability
- Issued with UKAS certification of calibration

KEY USES

- Preparation of homogeneous asphalt slabs:
- Wheel tracking tests
- Sawing into beams for bending tests
- Coring to produce specimens for indirect tensile and axial tests

STANDARDS

- EN 12697-33 Pneumatic tyred roller
- NF P98-250-2

SYSTEM ELEMENTS

The CRT-RCENLD-III is comprised of:

- The machine with integrated steel safety enclosure
- An easy access open front guarded with a SmartScan™ laser light gate
- A hydraulic power pack sits to the side, or in a separate room
- Four synchronized screw jacks which are driven by an electric motor for vertical table movement with feedback through a calibrated displacement transducer
- One or two wheels which are loaded with a hydraulic actuator under force feed-back via a load cell
- A stepper motor for accurate control of the lateral wheel position
- A large electric motor which drives the wheel(s) in the longitudinal axis
- System control which is housed in a side mounted control box
- The screen and the keyboard which are installed on an arm with adjustable height and angle

European Large Roller Compactor - Pneumatic Tyred Roller

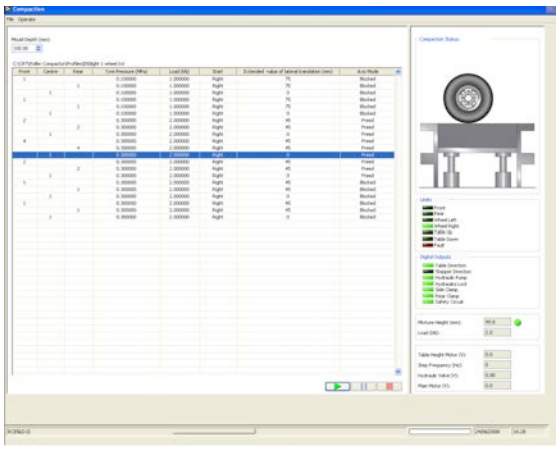
CRT-RCENLD-III

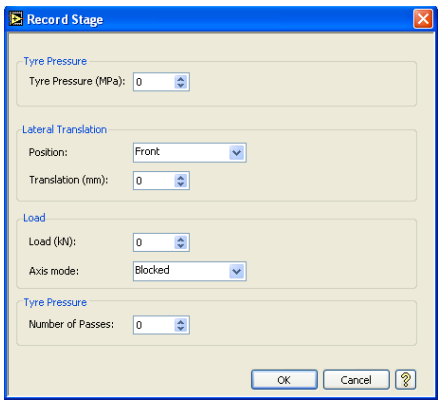
SPECIFICATIONS

Maximum Wheel Load	5kN Single wheel, 10kN Dual wheel
Mould Dimensions	500 x 180, 600 x 400 (others available)
Wheel Speed	200 to 500 mm/s
Slab Thickness	50, 100, 150 mm (others available)
Electrical Supply	3 Phase 415 Volts 50Hz @ 32A (others available)
Compressed Air	7-10 bar @ 100 L/min
Dimension mm (WxDxH)	Compactor 1600 x 1300 x 2150 Power Pack 550 x 600 x 700
Working space required mm (WxDxH)	2600 x 3300 x 2300
Estimated Weight Kg	1365 (including Power Pack)
PC	Included

SOFTWARE

- User friendly, intuitive and reliable Windows™ software developed using LabVIEW™
- Software is designed to perform EN 12697-33 (Large Scale Device)
- The user interface can be translated into the user's preferred language – please enquire
- Real time display of current compaction height and diagnostic indicators
- EN compaction routines are included as standard
- User can design and save custom compaction routines





Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WTRCM-100LD
Mould - Large Device Wheel Tracker/Roller Compactor 500 x 180 x 100mm deep

CRT-INSERT-50LD
Mould - Insert 500 x 180 x 50mm deep

CRT-RCM-600LD
Mould - Large Device Roller Compactor 600 x 400 x 100mm deep

CRT-RCM-150LD
Mould - Large Device Roller Compactor 600 x 400 x 150mm deep

CRT-RCLD-500SR
Light weight steel roller to level surface of compacted samples 500 x 180mm

CRT-RCLD-600SR
Light weight steel roller to level surface of compacted samples 600 x 400mm

CRT-WTRCLD-FK
Lifting trolley specifically designed for use with the Roller Compactor And Wheel Tracker Large Device

CRT-WTRCLD-TREP
Replacement pneumatic tyre for Large Device Wheel Tracker/ Roller Compactor

CRT-WTRCLD-IREP
Replacement inner tube for Large Device Wheel Tracker/ Roller Compactor

Calibration & Maintenance

Calibration, Annual Service and Maintenance Contracts are available for this device.
UKAS accreditation to satisfy typed testing as described in EN 13108.
Please enquire for further details.

Note: This device should be checked and calibrated annually.

Hydraulic Standard Roller Compactor Dual size

CRT-RC-H2

Advanced integrated hydraulic control, precision and reliability guaranteed

BRIEF INTRODUCTION

The Roller Compactor is considered to be the method of laboratory specimen compaction that results in slabs of asphaltic paving materials with properties that most closely simulate those of materials in the highway. Slabs can be compacted to target mixture densities using loads that are equivalent to those of full-scale compaction equipment.

The CRT-RC-H2 is hydraulically powered and controlled by a programmable logic controller (PLC) connected to an HMI which the operator can use to select the number of passes. A manual pressure control is adjusted to set the required load.
Its main function is to produce slabs for wheel tracking tests. Users have compacted hot asphaltic materials over stress absorbing membrane interlayers (SAMIs) on a base of cracked concrete in order to assess the effectiveness of the SAMI by using shear or bending tests.

KEY FEATURES

- Steel wheeled roller segments
- Solid machine frame
- Optional heated head for reducing mixture sticking to roller during compaction
- Model for compaction of 305 x 305mm and 305 x 400mm slabs
- Slab depth from 40 to 135 mm
- Roller compactor moulds will fit Cooper Technology Wheel trackers so that compacted slabs can be wheel-tracked without de-moulding
- Maximum compaction load of 30kN per 305mm roll width (equivalent to largest on-site static rollers)
- Speed control
- HMI for operator selection of number of passes
- Slabs can be used as wheel-tracking specimens, and cored to make indirect tensile test specimens or cut into beams for 4 Point Bending Test
- Vibrating roller option with adjustable frequency to simulate on-site vibratory rollers
- CE marked

KEY USES

Preparation of homogeneous asphalt slabs :

- Wheel tracking tests
- Coring to produce specimens for indirect tensile and axial tests
- 4 Point Bending Test Beams

STANDARDS

- EN 12697-33 Steel roller

SYSTEM ELEMENTS

The CRT-RC-H2 is comprised of :

- A robust flame cut steel frame
- An in-house designed HMI controlled hydraulic system
- Integral hydraulic power unit for standalone use
- Safety Guard

Hydraulic Standard Roller Compactor Dual size

CRT-RC-H2

SPECIFICATIONS

Maximum Roller Load	30kN over 305 mm roll width
Trolley Travel	±150 mm or ±200 mm
Speed	Variable up to 10 cycles per minute
Slab Thickness mm	40-135
Electrical Supply	220–240 Volts 50 Hz @ 16A (others available)
Dimension mm (WxDxH)	600 x 1450 x 1900
Working space required mm (WxDxH)	1600 x 1700 x 2000
Estimated Weight Kg	270
PC	Not Required

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

	CRT-RC-HH Heated head option to avoid sticky mixtures to impact on compaction results
	CRT-RC-HVIB Vibration option to simulate conditions in-situ
	CRT-WTRCM-50 Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 50mm deep[1]
	CRT-WTRCM-100 Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 305 x 100mm deep[1]
	CRT-RCM-50W Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 400 x 50mm deep[1]
	CRT-RCM-100W Steel and aluminium quick release mould for roller compactor or wheel tracker, 305 x 400 x 100mm deep[1]

[1] Please enquire for any other depths

Calibration & Maintenance

Annual Service and Maintenance Contracts are available for this device.

Please enquire for further details.

Note: This device should be checked annually.

One Man On-Site Core Drilling Machine

CRT-SCM

This fixing free core drill stand is your solution to core drill 60 holes within 2 hours with only one man operation & will fit into a small van or even an estate car

BRIEF INTRODUCTION

Cooper One-Man on site coring machine CRT-SCM is self contained and provides a rigid and stable drill platform for all types of coring in a wide variety of asphalt & concrete surfaces for medium duty.
To carry out any form of testing requires straight & clean sided core samples.
Vibration of a diamond core drill during the coring process will result in a badly finished core that will need to be 'dressed' before any meaningful testing can be carried out. In addition vibration of a core drill will also quickly damage the diamond cutting face by erosion of the individual diamonds resulting in rapid wear rates.

Coring should always be carried out using a rigid, stable & vibration free operating platforms to ensure the integrity of core samples.

Cooper One-Man Coring Machines CRT-SCM are self contained and provide a rigid and stable drill platform for all types of coring in a wide variety of asphalt & concrete surfaces.

The manually operated drill feed control provides for a rapid but safe drill penetration with minimum core bit wear rate.

KEY FEATURES

- Petrol engine 5.0KW
- Drill diameters up to 160mm
- Drill depths up to 450mm
- Wide variety of drill motor options
- Electrically operated water feed system
- Water capacity 25 or 50 litres
- Platform is operator stabilized
- Power pack can also power an additional hydraulic breaker/ tamper

KEY USES

- Medium duty coring in both asphalt & concrete surfaces. Ideal for taking occasional test samples in road surfaces or airfield runways.
- One man operation keeps costs to a minimum

SYSTEM ELEMENTS

Cooper One-Man Simple Coring machines CRT-SCM use an engine to generate hydraulic power which is then delivered to a hydraulic drill motor to drive the core drill.

Hydraulic operation allows the drill motor to rotate at the optimum speed for the particular surface material. Manually operating the drill feed into the surface with a constant applied load achieves optimum feed rate and maximum drill life.

During the coring process water is pumped through the core bit to provide cooling at the drill face and to flush away the loose material. The engine & hydraulic system are both air cooled to allow for continuous operation in the most arduous environments.

One Man On-Site Core Drilling Machine

CRT-SCM

SPECIFICATIONS

Prime mover(s)	Honda 5.0kW Petrol engine
Electric Start	Yes
Charging System	On board engine charging
Water pump	12 V DC submersible
Water tank	25 or 50 litres capacity
Hydraulic reservoir	6.2 litres capacity
Hydraulic outputs	20 litres /min @ 90 bar
Hydraulic Filtration	Return line filter 25 micron
Drill Motors	4 displacements of single speed motors
Speed ranges from 600 to 2400 rpm	Not required
Drill Capacity	162 mm standard
Drill Depth	450 mm maximum
Drill Speed	Infinitely variable control valve at the motor
Wheels	Solid rubber
Dimension mm (WxDxH)	450 x 1250 x 1070
Estimated Weight Kg	97

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-DRIL-611
Extension bar 100mm[1]

CRT-DRIL-612
Extension bar 200mm[1]

CRT-DRIL-613
Extension bar 300mm[1]

CRT-DRIL-997
Selection of 5 'asphalt' coring barrels 107mm to 162mm diameter

Please enquire for other sizes.

CRT-DRIL-642
10 Metre hydraulic extension hose kit c/w snap couplings Steel

CRT-DRIL-643
15 Metre hydraulic extension hose kit c/w snap couplings Steel

CRT-DRIL-662
10 Metre water extension hose c/w snap couplings

CRT-DRIL-663
15 Metre water extension hose c/w snap couplings

Calibration & Maintenance

Annual Service and Maintenance Contracts are available for this device.

Please enquire for further details.

Note: This device should be checked annually.

Medium Duty Core Drilling Trailers

CRT-MCT

Single or two-speed infinitely variable hydraulic drill motors available with wide choice of sizes to suit the particular application. Hydraulic drive always provides the best control and results in clean straight core samples

BRIEF INTRODUCTION

CRT-MCT Medium Duty Coring Trailers:

Option 1 - Honda 15HP Petrol engine P12-400
Option 2 - Honda 12HP Petrol engine P10-250
Option 3 - Hatz 12HP Diesel engine D10-250

To carry out any form of testing requires straight & clean sided core samples.
Vibration of a diamond core drill during the coring process will result in a badly finished core that will need to be 'dressed' before any meaningful testing can be carried out. In addition, vibration of a core drill will also quickly damage the diamond cutting face by erosion of the individual diamonds resulting in rapid wear rates. Coring should always be carried out using a rigid, stable & vibration free operating platforms to ensure the integrity of core samples.

CRT-MCT Medium Duty Core Drilling Trailers are self contained and provide a rigid and stable drill platform for all types of coring in a wide variety of asphalt & concrete surfaces. The manually operated drill feed control provides for a rapid but safe drill penetration with minimum core bit wear rate.

KEY FEATURES

- Drill diameters up to 350mm
- Drill depths up to 600mm
- Wide variety of drill motor options
- Water capacity of 300 litres
- Manually operated drill feed
- Manually operated stabilizer legs
- Power take-off facility for breaker/tamper.

KEY USES

- Medium duty coring in both asphalt & concrete surfaces.
- Ideal for taking occasional test samples in road surfaces or airfield runways.

SYSTEM ELEMENTS

The Cooper Medium Duty Core Drilling Trailer CRT-MCT uses an engine to generate hydraulic power which is then delivered to a hydraulic drill motor to drive the core drill.

Hydraulic operation allows the drill motor to rotate at the optimum speed for the particular surface material. Manually operating the drill feed into the surface with a constant applied load achieves optimum feed rate and maximum drill life. During the coring process water is pumped through the core bit to provide cooling at the drill face and to flush away the loose material. The engine is air cooled to allow for continuous operation in the most arduous environments.

The drill carriage is also demountable from the CRT-MCT, so that off-trailer drilling can be carried out if required.

Medium Duty Core Drilling Trailers

CRT-MCT

SPECIFICATIONS

Prime mover(s)	Honda 11kW Petrol engine P12-400 Honda 9kW Petrol engine P10-250 Hatz 9kW Diesel engine D10-250
Electric Start	Yes
Charging System	On board engine charging
Water pump	12 V DC submersible
Water tank	300 litres capacity
Hydraulic reservoir	35 litres capacity
Hydraulic outputs	20-30 litres /min @ 140 bar
Hydraulic Filtration	Return line filter 25 micron
Drill Motors	11 displacements of single speed motors - Speed ranges from 55 to 1100 rpm
Drill Capacity	350 mm standard
Drill Depth	600 mm maximum
Drill Speed	Infinitely variable control valve at the motor
Tyres	Type 145 Radial
Suspension	Torsion bar to EEC specifications
Brakes	Overun brakes
Dimension mm (WxDxH)	3600 x 1400 x 1250
Tow hitch mm	50 to EEC Specification
Estimated Weight Kg	490 Unladen dry 790 Laden

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

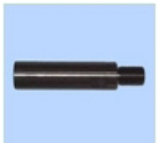
CRT-DRIL-508
Breaker Take off kit 20 litres/min (excludes breaker)

CRT-DRIL-509
Breaker Take off kit 30 litres/min (excludes breaker)

CRT-DRIL-812
Spacers for large diameter drilling c/w studs & keys, up to 450mm

CRT-DRIL-999
Selection of 7 'asphalt' coring barrels 107mm to 212mm diameter.

Please enquire for other sizes.



CRT-DRIL-611
Extension bar 100mm[1]

CRT-DRIL-612
Extension bar 200mm[1]

CRT-DRIL-613
Extension bar 300mm[1]

CRT-DRIL-810
Mast Mounted Amber Beacon for CRT-MCT

CRT-DRIL-809
Spare wheel for CRT-MCT

Calibration & Maintenance

Full maintenance & instruction manuals supplied with each coring trailer.

Heavy Duty Core Drilling Trailers

CRT-HCT

> Hydraulic proportional drill feed mechanism ‘automatically’ ensures the fastest drill feed at optimum cutting speed

BRIEF INTRODUCTION

CRT-HCT Heavy Duty Coring Trailers:

Option 1 - Honda 17.5HP Petrol engine P15-400
Option 2 - Lister 17.5HP Diesel engine D-15-400
Option 3 - Lister 27HP Diesel engine D20-600

To carry out any form of testing requires straight & clean sided core samples.
Vibration of a diamond core drill during the coring process will result in a badly finished core that will need to be 'dressed' before any meaningful testing can be carried out. In addition, vibration of a core drill will also quickly damage the diamond cutting face by erosion of the individual diamonds resulting in rapid wear rates.

Coring should always be carried out using a rigid, stable & vibration free operating platforms to ensure the integrity of core samples.

Cooper Heavy Duty Core Drilling Trailers CRT-HCT are self contained coring machines that provide a rigid and stable drill platform for all types of coring in a wide variety of asphalt & concrete surfaces. The proportional hydraulic feed system provides for a rapid but safe drill penetration with minimum core bit wear rate.

KEY FEATURES

- Drill diameters up to 600mm
- Drill depths up to 700mm
- Wide variety of variable speed drill motors
- Single or two speed hydraulic drill motors
- Proportional hydraulic drill feed system
- Water capacity of 500 litres
- Hydraulic or manual stabilizer legs
- Power take-off facility for breaker/tamper.

KEY USES

- Medium duty coring in both asphalt & concrete surfaces.
- Heavy duty coring in both asphalt & concrete surfaces
- Ideal for taking regular test samples in road surfaces or airfield runways.
- Ideal for drilling large numbers of holes to precise standards.

SYSTEM ELEMENTS

CRT-HCT Cooper Heavy Duty Core Drilling Trailers use an engine to generate hydraulic power which is then delivered to a hydraulic drill motor to drive the core drill.

Hydraulic operation allows the drill motor to rotate at the optimum speed for the particular surface material. Hydraulic pressure is also used to feed the core bit into the surface with a constant applied load that achieves optimum feed rate and maximum drill life. During the coring process water is pumped through the core bit to provide cooling at the drill face and to flush away the loose material. The engine and hydraulic system are both air cooled to allow for continuous s operation in the most arduous environments.

SPECIFICATIONS

Prime mover(s)	Honda 13kW Petrol engine P15-400 Lister 13kW Diesel engine D-15-400 Lister 20KW Diesel engine D20-600
Electric Start	Yes
Charging System	On board engine charging
Water pump	12 V DC submersible
Water tank	500 litres capacity
Hydraulic reservoir	70 litres capacity
Hydraulic outputs	22-40 litres /min @ 140bar (13.5KW engine) 22-40 litres /min @ 200bar (20KW engine)
Hydraulic Filtration	Return line filter 25 micron
Drill Motors	11 displacements of single speed motors - Speed ranges from 55 to 1100 rpm 4 displacements of two speed motors - Speed ranges from 125 to 1000 rpm
Drill Capacity	300mm standard (600mm with additional spacer blocks)
Drill Depth	700mm standard (can be extended to 1000mm using spacer bars)
Drill Speed	Infinitely variable control valve at the motor
Tyres	Type 175 Radial 14C
Suspension	Torsion bar to EEC specifications
Brakes	Overun & gas assisted brakes
Dimension mm (LxWxH)	3300 x 1750 x 1830 for Std Mast (Height for Long Mast =2880mm)
Tow hitch mm	50 to EEC Specification (75 Kg Nose Weight – Fully Laden)
Estimated Weight Kg	960 Unladen dry 1500 Laden

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-HCT-001
Electrically operated wheel movers for exact trailer positioning

CRT-DRIL-807
Breaker Take off kit 20 litres/min (excludes breaker)

CRT-DRIL-808
Breaker Take off kit 30 litres/min (excludes breaker)

CRT-DRIL-812
Spacers for large diameter drilling c/w studs & keys, up to 450mm

CRT-DRIL-813
Spacers for large diameter drilling c/w studs & keys, up to 600mm

CRT-DRIL-999
Selection of 7 'asphalt' coring barrels 107mm to 212mm diameter.

Please enquire for other sizes.

CRT-DRIL-611
Extension bar 100mm[1]

CRT-DRIL-612
Extension bar 200mm[1]

CRT-DRIL-613
Extension bar 300mm[1]

CRT-DRIL-810
Mast Mounted Amber Beacon for CRT-HCT

CRT-DRIL-809
Spare wheel for CRT-HCT

Calibration & Maintenance

Full maintenance & instruction manuals supplied with each coring trailer.

Electric Laboratory Core Drill Stand

CRT-LABDRIL-E

Hydraulic Laboratory Core Drill Stand

CRT-LABDRIL-H

> Rigid floor fixing and water swivel that ensures flow of coolant to drill tips

BRIEF INTRODUCTION

Laboratory Core Drilling Stands

To carry out any form of testing requires straight & clean sided core samples.

Vibration of a diamond core drill during the coring process will result in a badly finished core that will need to be 'dressed' before any meaningful testing can be carried out. In addition vibration of a core drill will also quickly damage the diamond cutting face by erosion of the individual diamonds resulting in rapid wear rates. Coring should always be carried out using a rigid, stable & vibration free operating platforms to ensure the integrity of core samples.

The drill stand is a steel framed unit manufactured in mild steel with a high quality powder coated and oven baked paint finish giving a quality appearance and long lasting protection. Its rigid drill platform can be permanently fastened to the floor and is therefore ideally suited for use in a test environment. It can drill cores from a sample of asphalt or concrete material held by a clamp mechanism situated within the water tank. The drill stand is complete with a water swivel that allows connection to a water supply thus providing a coolant to the drill bit face.

Manually operating the drill feed into the surface with a constant applied load achieves optimum feed rate and maximum drill life. During the coring process water is pumped through the core bit to provide cooling at the drill face and to flush away any loose material. The rubber lined water tank allows for collection and drainage of the cooling water.

Hydraulic operation allows the drill motor to rotate at the optimum speed for the particular surface material. Manually operating the drill feed into the surface with a constant applied load achieves optimum feed rate and maximum drill life.

The unit can be supplied with a hydraulic drill motor CRT-LABDRIL-H or an electric drill motor CRT-LABDRIL-E to suit. The manually operated drill feed control provides for a rapid but safe drill penetration with minimum core bit wear rate.

KEY FEATURES

- Petrol engine 5.2KW hydraulic version, 2KW Electrical version
- Drill diameters up to 110mm
- Drill depths up to 450mm
- Wide variety of hydraulic or electrical drill motor options
- Electrically pumped water feed is available when using a hydraulic drill motor
- All units supplied with water swivel
- Platform allows for rigid floor mounting

KEY USES

- Medium duty coring in both asphalt, concrete or rock samples
- Ideal for drilling test cores in a laboratory environment from small samples

SYSTEM ELEMENTS

Laboratory drill CRT-LABDRIL-E and CRT-LABDRIL-H stands can use an engine to generate hydraulic power which is then delivered to a hydraulic drill motor to drive the core drill. Hydraulic operation allows the drill motor to rotate at the optimum speed for the particular surface material.

Electric drill motors are also available in a variety of voltages to suit requirements.

During the coring process water is pumped through the core bit to provide cooling at the drill face and to flush away the loose material. The engine & hydraulic system are both air cooled to allow for continuous operation in the most arduous environments.

SPECIFICATIONS

Electric Drill Supply	110-120 Volt or 220-240 Volt frequency supply 50-60Hz available
Hydraulic Drill Supply	20 litres per minute @ 90 bars (5.2KW supply)
Hydraulic Drill Motor	Hydraulic drill motor can be powered using an Electra 7 (see accessories)
Water swivel	Adjustable water feed control
Drill Bit Capacity	110 mm maximum
Drill Bit Length	450 mm maximum
Water Supply	Adjustable water tap c/w input hose
Tank Size mm (WxDxH)	400 x 420 x 300 tank
Tank Drain	BSP connection for water drain facility
Dimension mm (WxDxH)	460x470x1016
Estimated Weight Kg	50 (110 lbs)

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-DRIL-305
Electra 7 5.2KW hydraulic power unit supplying 20 lpm @ 90 bars (Also includes an electrically driven water pump)

CRT-DRIL-998
Selection of 5 ‘asphalt’ coring barrels 52mm to 107mm diameter

Please enquire for other sizes

CRT-DRIL-642
10 Metre hydraulic extension hose kit c/w snap couplings Steel

CRT-DRIL-662
10 Metre water extension hose c/w snap couplings

Calibration & Maintenance

Full maintenance & instruction manuals supplied with each drill stand.

Core and Beam Saws

CRT-SAW100, CRT-SAW150, CRT-SAW200

CRT-SAW100

CRT-SAW150

CRT-SAW200

Easy-to-use, fast and accurate sawing systems
Best in class, safety features

BRIEF INTRODUCTION

Cooper Technology has developed easy-to-use sawing systems for fast, accurate cutting of beams for asphalt prisms (prepared in Cooper Technology's Roller Compactors – small and large models) to be used for Four Point Bending Beam Testing in CRT-SA4PT-BB and CRT-LH4PT-BB, for Two Point Bending Beam testing in CRT-2PT, and cutting & dressing round cores and large & small wheel tracked slabs.

KEY FEATURES

- Precision machines linear guide to provide optimium cutting accuracy and performance- best in class
- Suitable for natural and artifical slabs, asphalt, concrete, tile, marble, granite
- Four point beam testing jigs supplied as standards
- Variable speed and electromotive feed available as options
- CE marked

KEY USES

- Cutting of prisms to be used in Four Point Beam Bending testing according to EN123697-24/26 and AASHTO T321
- Cutting of trapezoidal specimens to be used in Two Point Beam Bending testing according to EN12697-24/26
- Cutting and dressing of round cores up to 200mm depending on model
- Cutting and dressing of wheel tracking slabs

SPECIFICATIONS

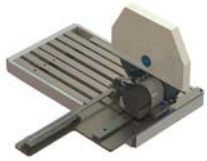
	CRT-SAW100	CRT-SAW150	CRT-SAW200
Diamond disk mm	250-350	250-500	250-600
Depth of cut	100mm max with 350mm blade fitted as standard	150mm max with 450mm blade fitted as standard	200mm max with 600mm blade fitted as standard
Cutting length mm	750	750	750
Water cooled cutting	✓	✓	✓
Four Point Bending Beams	✓	✓	✓
Trapezoidal specimens	x	✓	✓
Wheel tracker slabs 305x305mm, 260x305mm and 500x180mm	✓	✓	✓
Cores up to mm	100	150	200
Speed rpm	1000 - 2800	2800	1400
Electrical supply*	230 Volts 50Hz Single Phase	415 Volts 50Hz 3 Phase	415 Volts 50Hz 3 Phase
Power	1.8kW	3.75kW	5.6kW
Dimensions (LxWxH) mm (Without legs) (With legs)	 1320 x 650 x 850 1320 x 650 x 1350	 1320 x 650 x 950 1320 x 650 x 1500	 1320 x 700 x 850 1320 x 700 x 1800
Estimated weight Kg	125	150	175

* variable options available upon request.

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-SAW-CJRC
Cutting jigs for round cores



CRT-SAW-PNJIG
Pneumatic core jigs

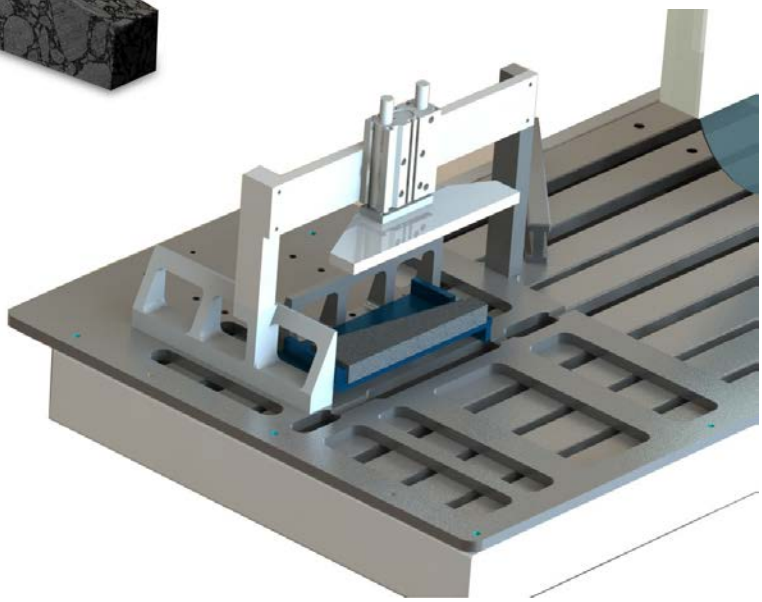
CRT-SAW-CJ2PT
Cutting jigs for trapezoidal two point bending testing specimens

CRT-SAW-EF
Electromotive feed option

CRT-SAW-VS
Variable speed option for electromotive feed

Calibration & Maintenance

Annual Service and Maintenance Contracts are available for this device.
Please enquire for further details.
Note: This device should be checked annually.



notes...

Thermo-regulated Floor Standing Mixers

CRT-MIXER30, CRT-MIXER60, CRT-MIXER100

The most user-friendly, durable mixers on the market with safe discharge to secured area and exceptional build quality

BRIEF INTRODUCTION

The range of mixers on offer from Cooper Technology have been specifically designed to satisfy mixing requirements for bituminous materials. Innovative features provide faster, improved mixing and cleansing. Mixers can be supplied with a choice of blade designs including interrupted spiral, contra flow or back paddle blade to suit your mixing requirements. The mixing vessel is electronically controlled via thermocouples ensuring targeted temperatures are achieved. The machines are manufactured from selected grade stainless steel designed to last a lifetime. Material is dispensed via a flow valve situated at the base of the mixer, this alleviates the need to turn the vessel when emptying, hence removing any potential health and safety concerns. Material is discharged into a container of your choice that sits underneath the mixing vessel. Cooper offer a unique and valuable additional service, Cooper have access to a full size testing facility equipped with comprehensive facilities to carry out mixing trials and analysis on new product mixes. Upon receipt of your order a full trial facility can be arranged free of charge to confirm you have chosen the correct specification to fully meet all your mixing needs.

KEY FEATURES

- Discharge via outlet into a secure Safety Guarded area below
- Pivoting slide valve empties into 20 litre trays
- Full stainless steel-corrosion resistance
- Inverter control blade speed adjustment
- Mix temperature monitoring via trough thermocouple
- Compact, space saving design takes up less floor space
- Simulates full scale mixing
- Minimises segregation
- C E marked and UK made

SPECIFICATIONS

- Electric heating jacket with insulated stainless steel cover. (240v/single phase)
- Variable Speed Control Panel - IP55 rated with frequency inverter, key operated power interlocking switch.
- Digital temperature indicator/controller and heater controls

	CRT-MIXER30	CRT-MIXER60	CRT-MIXER100
Dimension mm (WxDxH)	1200 x 600 x 735	1200 x 600 x 735	1500 x 750 x 1250
Weight (approx.) Kg	150	375	435
Capacity (litres)	30	60	100

The capacity in kilos is dependent on the density of material. Please ask for information.
We can supply mixers of all capacities upon request.

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-MIX-TRAY
Trays standard size 540x270x200mm (others available on request)

CRT-MIX-BLADE
Spare mixer blade

CRT-MIX-PAD
Padle to user bespoke design

CRT-MIX-TROLL
Trolley mounted for portability

Inside view CRT-MIXER60
* various paddle options available

Maintenance

Annual Service and Maintenance Contracts are available for this device. Please enquire for further details.
Note: This device should be checked annually.

Ovens/Drying Equipment

Asphalt Binder Analyser

The Asphalt Binder Analyser CRT-ABA has user friendly design and is fully compliant with the latest standards.
The Asphalt Binder Analyser combines a sophisticated furnace and weighing system to continous measure the weight loss of a bituminous mixtures during combustion and automatically calculates its binder content at the end of the test.
It comes with automatic door locking during the testing which cannot be disabled by the interrup of the power supply once the test commenced. Also, independently controlled afterburner significantly reduces furnace emissions, as specified by the test standards.

KEY FEATURES

- The ability to automatically calculate and use calibration factors based on both asphalt mixes and dry aggregates.
- Unique automatic input of sample start weight via an optional second external Ohaus balance, which eliminates operator error
- Rapid heat up rates permit the unit to be switched off between tests, resulting in reduced power consumption and eliminating the need for a 24-hour timer
- Customisation of test parameters and ability to save named test setups in a library.
- Choice of print format: either continuously throughout the test showing the results at minute intervals or a final end of test analysis
- Permits large sample sizes (up to 4.5kg) to be tested
- Precise measurement - weights measured to 0.1g
- Cost savings due to reduction in testing time and elimination of costly chemicals
- User friendly design

STANDARDS

- EN 126797-39:2004
- ASTM D6307-98
- AASHTO T308-99

Asphalt Rolling Thin Film Oven

Special oven for testing the effect of heat and air on asphalt as described in ASTM D2872-97 Cooper Technology offers high quality Rolling Thin Film Oven CRT-RTF. Rolling Thin Film Oven Test was developed to simulate the bitumen ageing that occurs in an asphalt mixing plant. In this test eight cylindrical glass containers each with 35g of bitumen are fixed in a vertically rotating shelf. During the test the bitumen flows continuously around the inner surface of each container in a relatively thin film with pre-heated air periodically blown into each container. The test temperature is normally 163°C for a period of 85 minutes.

KEY FEATURES

- All controls mounted in a control cabnet on the side of the oven
- Eurotherm 2132 digital on/off controller and separate safety contactor
- Single side hinged door at the front fitted with double glazed window
- Mineral insulated metal sheathed elements
- Forced air circulation by top mounted fan and air guide system.

STANDARDS

- ASTM D2872-97
- EN 12607-1

Convection and Industrial Ovens

Economical and high specification ovens, suitable for general laboratory heating and drying applications yet with the versatility and optional accessories for more complex and demanding applications. We offer a wide range of ovens of 30 to 13820 litres of chamber capacities*

* ovens with other chamber capacities available availbale upon request

UKAS Temperature Calibration

We are UKAS accredited for Temperature Calibration, (from -25°C to 150°C). Please enquire for further information on our temperature calibration services.

Sample Grading

Sieves

We offer a wide range of high quality Woven Wire-Mesh, Perforated Plate and ASTM testing sieves compliant to ISO 3310-1/2 and ASTM-E11.

All our sieves are manufactured in United Kingdom to the highest standards and supplied with certificate of conformity as standard.
Our prices are very competitive, please enquire for immediate quotation.

Woven Wire Mesh Sieves

Our woven wire mesh sieve range covers 100mm, 200mm, 300mm, 400mm and 450 mm diameter sieves. Half height and extra deep sieves are also available.

Perforated Plate Sieves

Our perforated plate sieves are made on CNC punch press, which gives total quality control ensures the sieves that we offer are manufactured with their exact appertures, right in the middle of the correct tolerance band.

Our range covers 200mm, 300mm, 400mm and 450mm diameter sieves.

ASTM Sieves

We offer wide range of high quality 8” and 12” diameter american standard testing sieves

Cooper Technology is proud to offer 100% Lifetime Guarantee* on all sieves

*100% Lifetime guarantee against future failure due to faulty workmanship

Sieve Shaker SQ Digital

Sieve shaker SQ digital is an advanced high quality sieve shaker with remote digital control meter.
Cooper’s Sieve Shaker is economical, high quality high quality sieve shaker recommended to perform sieveing tests. It comes with solid cast aluminium base plate and is designed to accept 8 x 300 diameter sieves and 10 x 200 diameter sieves (full height). It comes with 99 minute digital control meter, remote from the machine to allow fixing to an adjacent wall.

KEY FEATURES

- **99 minute remote digital control meter**
- **Solid cast almunium base plate**
- **Accepts 8x300 dia sieves and 10x200 dia sieves (full height).**
- **Powerful and reliable electric motor**

Sieve Shaker SQ Digital

Riffle Boxes

These sample dividers are constructed of heavy guage sheet metal finished in an easy clean powder coated paint and are supplied in a range to meet the require-ments of BS 1377, 1924, 812 and ASTM C136. Each riffle is supplied complete with divider and three containers.

Lids and Receivers

We offer a wide range of high quality lids and recievers. Our range covers 100, 200, 300, 400 and 450 mm diameter lids, intermediate recievers and recievers.

Sieve Brushes

Nylon or brass double ended brushes available.

Sample Weighing

Weighing in Air and Water Frame

The Weighing in Air and Water Frame is designed to allow test specimens to be weighed in both air and water.
We offer two models of weighing in air and water frame, CRT-WAWF-1 and CRT-WAWF-2
Both consist of a rigid frame, water tank, raise & lower platform and a cradle. The platform is raised and lowered by means of a mechanical winch, thus enabling the user to weigh the specimen in air and water without double handling. The balance is not included in the apparatus and must be ordered separately.

KEY USES

- To determine the density of EME wheel tracking slabs.
- To determine specific gravity of fresh and hardened concrete and aggregates.

SPECIFICATIONS

	CRT-WAWF-1	CRT-WAWF-2
Dimension Frame (WxDxH) mm	700x525x1020	600x445x1020
Dimension Tank (WxDxH) mm	600x425x425	400x270x305

STANDARDS

- EN 12697-5/6/8
- EN 12390-70
- BS 812:2, 1881:114

Accessories

Accessories are not included in the price of the main device and may be purchased separately if required.

CRT-WAWF-CRADLE-1
Cradle for holding large wheel tracking slabs (500x180mm) (with under weigh option)

CRT-WAWF-CRADLE-2
Cradle for holding concrete and aggregate specimen (with under weigh option)

Balances

We offer a wide range of balances specially designed for asphalt, soil, aggregates, cement and concrete testing.
We offer electronic analytical balances electronic precision top loading balances battery operated top pan and platform balances, mechanical balances, spring balances, and high capacity laboratory balances.

CRT-BAL4.5
Digital pan balance 4.5 Kg

CRT-BAL15
Digital pan balance 15 Kg

CRT-BAL30
Digital pan balance 30 Kg

UKAS Calibrated Weights

We offer a wide range of UKAS calibrated weights. Please enquire for the details of calibration services we offer.

cooper

buyer's guide

COMPLEX MODULUS

Using strains within the elastic limit of the materials a sinusoidal load is applied to a beam in either the two point or four point bending test configuration. The determination of complex modulus takes into account the energy dissipated as heat during the test.

EN12697-26 B; AASHTO T321-03/TP8

OPTION 1

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-4PT-BB

more accessories page 13-15

or

CRT-SA4PT-BB
Stand Alone Four Point Bending Machine

⊕ CRT-TCC

more accessories page 27

+

CRT-RC2S/V
European Standard Roller Compactors – Steel Roller

⊕ CRT-RCM-50W
⊕ CRT-COMP-1210

more accessories page 91

or

CRT-RC-H2
Hydraulic Standard Roller Compactor- Dual Size

⊕ CRT-RCM-50W

more accessories page 99

OPTION 2

CRT-LH4PT-BB
Large Hydraulic Four Point Bending Machine

accessories page 31

+

CRT-RC2S/V
European Standard Roller Compactors

⊕ CRT-RCM-50W
⊕ CRT-COMP-1210

more accessories page 91

or

CRT-RC-H2
Hydraulic Standard Roller Compactor- Dual Size

⊕ CRT-RCM-50W

more accessories page 99

or

CRT-RCENLD-III
European Large Roller Compactor

⊕ CRT-RCM-600LD

more accessories page 95

EN12697-26 A; NF P98-260-2

CRT-2PT
Two Point Trapezoidal Bending Beam Machine

⊕ CRT-2PT-MODULUS
⊕ 6 x CRT-2PT-CAPEND25
⊕ CRT-2PT-GLUE
⊕ CRT-2PT-MEAS

more accessories page 35

+

CRT-RCENLD-III
European Large Roller Compactor

⊕ CRT-RCM-600LD

more accessories page 95

FATIGUE TESTS

Bending or flexural tests are the most widely used methods for assessing the fatigue resistance of asphaltic materials. Four point bending is included in both CEN and AASHTO specifications. The specimen is a prismatic beam, which is subjected to sinusoidal loading in the controlled strain mode. In Europe the principal alternative is two-point bending using trapezoidal specimens, a test which was developed at LCPC in France.

EN12697-24 E

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

- CRT-TCC
- CRT-FAT-SET or CRT-ITSMFAT-SET

more accessories pages 13-15

CRT-GYR
Gyratory Compactor

- CRT-GYR-EXT
- CRT-GYRM-100

more accessories page 84

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

- CRT-FAT-SET

more accessories pages 13-15

CRT-GYR
Gyratory Compactor

- CRT-GYR-EXT
- CRT-GYRM-100

more accessories page 87

EN12697-24 D; AASHTO T321-03/TP8

OPTION 1

CRT-SA4PT-BB
Stand Alone Four Point Bending Machine

- CRT-TCC

more accessories page 27

CRT-RC2S/V
European Standard Roller Compactors – Steel Roller

- CRT-RCM-50W

more accessories page 91

OPTION 2

CRT-LH4PT-BB
Large Hydraulic Four Point Bending Machine

accessories page 31

CRT-RC2S/V
European Standard Roller Compactors

- CRT-RCM-50W

more accessories page 91

or

CRT-RCENLD-III
European Large Roller Compactor

- CRT-RCM-600LD

more accessories page 95

EN12697-24 A; NF P98-260-2

CRT-2PT
Two Point Trapezoidal Bending Beam Machine

- 6 x CRT-2PT-CAPEND25
- CRT-2PT-GLUE
- CRT-2PT-MEAS

accessories page 35

CRT-RCENLD-III
European Large Roller Compactor

- CRT-RCM-600LD

more accessories page 95

STATIC AND DYNAMIC CREEP TESTS

A static axial stress is applied to a cylindrical specimen for a fixed period of time during which axial strain is continuously monitored. The axial stress is then removed and both the permanent and recovered strain determined.

A dynamic axial stress is applied to a specimen for a specified number of load cycles while axial strain is monitored. Investigations have shown that dynamic creep correlates better with in-service pavement rutting measurements than static creep. Correlation can be enhanced with the application of confining stress.

Static creep is not included in the latest European standard and does not feature in current American standards.

EN12697-25 A

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

⊕ CRT-PD-SET

more accessories page 13-15

+

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-PD-SET

more accessories page 13-15

+

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

EN12697-25 B

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

⊕ CRT-TCC
⊕ CRT-PRESTRIAX-SET

more accessories page 13-15

+

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-PRESTRIAX-SET

more accessories page 13-15

+

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

notes...

DYNAMIC MODULUS TESTS

A sinusoidally varying axial stress is applied, at a range of frequencies, to a specimen measuring 100mm in Ø by 150mm high. The specimen is cored from a 150mm Ø sample prepared by gyratory compaction. Recoverable (dynamic) and permanent strains are measured using on-specimen transducers and the phase lag between stress and strain is determined for the various test conditions providing information on the visco-elastic properties of the material. Dynamic modulus tests form part of the Simple Performance suite of tests and are detailed in AASHTO TP62.

AASTHO TP62; SPT NCHRP9-19; SPT NCHRP9-29

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

⊕ CRT-TCC ⊕ CRT-SPTLV

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-150

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-SPTLV

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-150

more accessories page 87

INDIRECT TENSILE MODULUS / RESILIENT MODULUS TESTS

A repeated load is applied along the vertical Ø of a cored or laboratory moulded specimen at various frequencies and magnitudes. The resultant horizontal (indirect) deformations are measured and used to provide a measure of stiffness. In Europe the test is mainly used as a rapid method of quality control but it can also be used for a variety of other purposes including failure investigation. Similar tests to measure resilient modulus were detailed in ASTM and AASHTO standards, but they have now been withdrawn.

EN12697-26 C; EN 12697- 26 D&E

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

⊕ CRT-TCC ⊕ CRT-DTC-UTM14
⊕ CRT-ITMFAT-SET

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-DTC-UTM25
⊕ CRT-ITMFAT-SET

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100

more accessories page 87

AASTHO TP31; ASTM D4123 / ASTM D7369

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

⊕ CRT-TCC ⊕ CRT-IT-RESMOD
⊕ CRT-D7369

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100
⊕ CRT-GYRM-150

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

⊕ CRT-IT-RESMOD
⊕ CRT-D7369

more accessories page 13-15

CRT-GYR
Gyratory Compactor

⊕ CRT-GYR-EXT
⊕ CRT-GYRM-100
⊕ CRT-GYRM-150

more accessories page 87

WHEEL TRACKING

A cored or laboratory compacted slab of hot mix asphalt is subjected to repeated passes of a loaded wheel while the resultant rut depth is monitored. Wheel tracking is popular because it is more simulative than other laboratory methods of assessing resistance to permanent deformation and results have been shown to correlate well with in-service pavement rutting. There are two widely used wheel tracking test methods in Europe: one was developed at LCPC in France and the other is based upon the method developed at the TRL in the United Kingdom. Less widely used, the Hamburg wheel tracker tests specimens submerged in water and provides a measure of durability as well as resistance to rutting. There is no national standard for wheel tracking in the United States.

EN12697-22 SMALL DEVICE; AST 01:2004; BS 598-110:1998

CRT-WTECO-A
Auto Lift Arm Eco
Wheel Tracker
accessories page 43

or

CRT-WTEN1
Wheel Tracker
Small Device 1 Arm

⊕ CRT-WTRCM-50
more accessories page 47

or

CRT-WTEN2
Wheel Tracker
Small Device 2 Arms

⊕ 2 x CRT-WTRCM-50
more accessories page 47

+

CRT-RC2S/V
European Standard
Roller Compactors
accessories page 91

or

CRT-RC-H2
Hydraulic Standard Roller
Compactor- Dual Size
accessories page 99

EN12697-22 LARGE DEVICE; NF P98-253-1

CRT-WTENLD
Wheel Tracker
Large Device

⊕ 2 x CRT-WTRCM-50LD
more accessories page 51

+

CRT-RCENLD-III
European Large
Roller Compactor
accessories page 95

EN12697-22; AASHTO-T324

CRT-WTIM
Hamburg (Immersion)
Wheel Tracker

⊕ 2 x CRT-WTRCM-50SS
⊕ 2 x CRT-WTIM-WHSS
or 2 x CRT-WTIM-WHR
more accessories page 39

+

CRT-RC2S/V
European Standard
Roller Compactors
accessories page 91

or

CRT-RC-H2
Hydraulic Standard Roller
Compactor- Dual Size
accessories page 99

COMPACTION

In order to produce materials in the laboratory with properties which most closely simulate those in the pavement, gyratory compactors and roller compactors are used. In gyratory compaction a 150 or 100mm cylindrical sample is subjected to a vertical compressive stress while the mould is subjected to a gyratory motion, at a specified angle to the vertical, that generates interparticle movement within the material. A slightly larger angle of compaction is specified in the USA and other non-European countries. Roller compaction is considered to be the laboratory method that produces materials which are most simulative of those laid in the highway. The most common type uses a steel faced roller to compact 305mm square slabs. A vibrating roller is an option used to increase compactive effort. The roller compactor developed at the LCPC in France uses single or twin pneumatic tyres that compact the mixture as it is incrementally pushed up inside the mould. The use of pneumatic tyres generates a kneading action and ensures that the aggregate is not damaged during compaction.

EN12697-10; EN12697-31; ASTM D6307; SHRP M-002; AASHTO T321/TP4; T 0737-2011	EN12697-22 STEEL ROLLER		EN12697-22 PNEUMATIC TYRED ROLLER; NF P98-250-2
		or 	
CRT-GYR Gyratory Compactor ⊕ CRT-GYR-EXT ⊕ CRT-GYRM-100 more accessories page 87	**CRT-RC2S/V** European Standard Roller Compactors ⊕ CRT-WTRCM-50 more accessories page 91	**CRT-RC-H2** Hydraulic Standard Roller Compactor- Dual Size ⊕ CRT-WTRCM-50 more accessories page 99	**CRT-RCENLD-III** European Large Roller Compactor ⊕ CRT-WTRCM-50LD more accessories page 95

STRENGTH TESTS

Generally performed in compression for convenience, strength tests measure the maximum stress a specimen can sustain in the controlled rate of deformation mode. In the Marshall stability test the specimen is loaded in a pseudo-diametral mode. In the Duriez test a cylindrical specimen is loaded axially and compressive strength is calculated as the ratio of maximum load to the initial cross-sectional area of the specimen.

EN12697-12; NF P98-251-1/4 DURIEZ		EN12697-23
 +		
CRT-CTM250-II Compression Testing Machine ⊕ 6 x CRT-DURM-80 ⊕ 6 x CRT-DURM-120 ⊕ 6 x CRT-DURMS-80 ⊕ 6 x CRT-DURMS-120 ⊕ 6 x CRT-DURMBT-80 ⊕ 6 x CRT-DURMBT-120 more accessories page 23	**CRT-RCENLD-III** European Large Roller Compactor ⊕ CRT-RCM-600LD more accessories page 95	**CRT-CTM250-II** Compression Testing Machine ⊕ CRT-MARSH-SM ⊕ CRT-MARSH-IT more accessories page 23

UNBOUND MATERIALS TESTS

The mechanical properties of unbound materials are normally generally assessed using the AASHTO triaxial test. A cored or laboratory prepared specimen is subjected to repeated haversine loading. The axial and confining stress are varied during the test, the stresses and resulted axial deformation. From this the resilient modulus and permanent deformation is calculated. The test is normally performed using specified sequences of axial and confining stress combinations laid out in AASHTO T307. Another method is EN13286-7, cyclic load test for unbound mixtures. In this test the radial deformation is also measured. The test is more complicated to set up and suitable only for use in research labs. Difficulties in preparing representative specimens can limit the use of the triaxial testing. Recently attempts have been made to find more repeatable, reproducible and user-friendly alternatives. The Springbox and K-Mould are notable examples. NTEC and Cooper Technology have designed an apparatus known as the PUMA (Precision Unbound Materials Apparatus). This is easy to use and produces stress conditions similar to those found in situ. Consequently the modulus values given are closer to true values than often found in triaxial tests.

EN 13286-7; AASHTO T307; NCHRP 1-28A

OPTION 1

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

- CRT-TCC
- CRT-T307

more accessories page 12-16

CRT-GYR
Gyratory Compactor

- CRT-GYR-EXT
- CRT-GYRM-100

more accessories page 87

OPTION 2

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

- CRT-T307+
- CRT-EN13286-7

more accessories page 12-16

CRT-GYR
Gyratory Compactor

- CRT-GYR-EXT
- CRT-GYRM-100
- CRT-GYRM-150

more accessories page 87

IAN 73/06 - DESIGN GUIDANCE FOR ROAD PAVEMENT FOUNDATIONS

OPTION 1

CRT-PUMA
Precision Unbound Material Analyser

see page 16

CRT-UTM-NU
Servo-Pneumatic Universal Testing Machine

- CRT-TCC

more accessories page 12-16

OPTION 2

CRT-PUMA
Precision Unbound Material Analyser

see page 16

CRT-UTM-HYD
Servo-Hydraulic Universal Testing Machine

accessories page 12-16

list of standards

AASHTO

ASTM

BS

EN

NF

Other Standards

Notes...

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