Plasticity

Rapid Plastimeter Mk V (P14)

The Wallace Rapid Plastimeter measures the plasticity of unvulcanised rubbers using a simple, clean and fast testing procedure.

The instrument is used in conjunction with the Wallace Ageing Chamber (O14) to determine the Plasticity Retention Index (PRI) of raw natural rubbers.

Features

- **Accurate and repeatable measurements**
- **Available as 2 models - P14 or P14/VT (Variable Temperature)**
- **P14 is available in three different versions**
- **Supplied with additional top platens of 7.3mm and 14mm diameter for use with samples outside the normal plasticity range**
- **The platens are easily interchangeable**

The P14 Rapid Plastimeter provides powered zero calibration, eliminating the need for tedious manual set up. Aluminium castings are used throughout the design for rigidity and stability.

The variable temperature model (P14/VT) characterises the flow behaviour of synthetic rubber compounds as, unlike the other models, its platen temperatures can be varied between 50°C and 180°C.

Principle of Operation

A modified parallel plate compression principle is used with automatically timed 'conditioning' and 'load' periods. A sample is compressed between two circular platens which are maintained at a temperature of 100°C. The sample is conditioned for 15 seconds at a thickness of 1mm. A compressive force of 100N is then applied for 15 seconds. The final thickness of the test piece is expressed as a Rapid Plasticity Unit. One Wallace Plasticity Unit represents 0.01mm.

Test Procedure

The sample is prepared using the specimen cutter provided and is then enclosed between two pieces of test paper, as defined by international standards, before being placed between the heated platens. The test paper prevents the material sticking to the platens or sliding between them. The automatic test sequence is started when the operating handle is rotated. The reduction in thickness of the sample is displayed digitally and freezes on the display to show the plasticity number after completion of the 30 second test.

Plasticity Retention Index (PRI)

The PRI is a measure of the resistance of natural rubber to thermal oxidation. The procedure consists of a plasticity test (P_0) on a non-aged specimen, followed by a test (P_{30}) of a specimen that has been aged for 30 minutes at a temperature of 140°C ± 0.5°C using the O14 Ageing Chamber.

$$PRI = \left(\frac{P_{30}}{P_0}\right) X\ 100$$

P_{30} is the median value of the aged results
P_0 is the median of the non-aged results

Rapid Plastimeter Mk V (P14)

P14 versions available:

Rapid Plastimeter - Standard Version, P14/1

- Fully automatic operation
- Accurate and repeatable results
- Built in diagnostics
- LED platen temperature Indicator
- PC interface (RS 232) for data capture to PC

Rapid Plastimeter - Printer Version, P14/2

Same specification as P14/1 plus:

- Compact printer with high speed print capability
- 24 character column print output
- Date and time recorder
- Traceability of aborted tests
- Optional: Excel add-In software tool

Rapid Plastimeter - Data Terminal & Printer Version, P14/3

Same specification as P14/2 plus:

- A data input terminal with 16 character two line display and QWERTY keypad
- Continuous platen temperature display
- Variable load durations
- Sample and operator identification with automatically increasing suffix
- Calibration and service reminder
- PRI evaluation

Rapid Plastimeter - P14/VT Model

Same specification as P14/3 plus:

- Variable platen temperature control from 50ºC to 180ºC

Specifications

Wallace Rapid P14 Plastimeter		
Part Number	WAP14/1, WAP14/2, WAP14/3	WAP14/VT
Platen Temperature	100ºC ±0.5°C	50ºC to 180ºC ±0.5°C
Dimensions (mm)	420 (h) x 300 (w) x 360 (d)	
Weight	20kg	
Upper Platen Size	10mm diameter standard, 7.3mm &14mm diameter accessories	
Lower Platen Size	16mm	
Test Time	15 seconds conditioning + 15 seconds load	
Compression Force	100N	
Operating Temperature	5 to 40°C; Altitude 2000m maximum	
Humidity Range	10 to 80% RH non-condensing	

Included	
Specimen Cutter	1 off
1mm Slip Gauge	1 off
7.3mm & 14mm Anvils	1 off
Tools and Spares Set	1 off

Standards

BS ISO 2007, BS ISO 2930, ASTM D3194

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Accessories

Printer (P14/2 and P14/3 Model)

Includes: Power supply, mains lead, printer, 2 printer paper rolls and printer cable

The compact, high-speed, 24 character-width printer, provides a permanent record of results and instrument settings. Various parameters can be set including:

- Sample identification with auto-increasing suffix
- Date and time of test
- Traceability of aborted tests

WAX20 - Printer	
Dimensions (mm)	70 (h) x 125 (w) x 110 (d)
Weight	300g + PSU 450g

Data Input Terminal (P14/3 Model)

Includes: Data input terminal cable

The data input terminal contains a 16 character, two-line LCD display and QWERTY keypad. It supplies additional information on the operation of the Plastimeter and offers the user several new options. Test parameters are more easily set. Data for operator and sample identification can be entered.
Other features include:

- Date and time recording and traceability

WAX19 - Data Input Terminal	
Dimensions (mm)	40 (h) x 225 (w) x 165 (d)
Weight	800g

Volumetric Specimen Cutter

This Specimen Cutter, with its compact robust design, allows the user to easily cut multiple volumetric samples, in accordance with ISO and ASTM standards, for use with the P14 Plastimeter and O14 Ageing Oven. An easy to operate circular motion of the handle allows the cutting of consistent volumetric samples quickly and easily.

WAS2 - Volumetric Specimen Cutter	
Dimensions (mm)	170 (h) x 100 (w) x 115 (d)
Weight	3.8kg

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Accessories

Calibration Kits - Temperature & Linearity

Includes: Hand held meter, custom temperature probes and slip gauges

- No requirement to fit probe manually – probe pre-fixed in place on platen adaptors
- Calibrate both platens in one go – easy to use platen adaptors, dual input and easy readout on meter
- Better repeatability and accuracy – no offset calculation on meter required
- Easy plug and play replacement of platen adaptors (no need to recalibrate when replaced)
- Higher accuracy – PT100A probe accurate to within ±0.35°C
- Slip gauges for gap calibration and verification
- Better repeatability
- Easy to read dual readout

WAP14-CAL-01 - Calibration Kits - Temperature & Linearity	
Dimensions (mm)	70 (h) x 225 (w) x 200 (d)
Weight	350g