

Plasticity

Wallace Rapid Plastimeter Mk V (P14)

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

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

Features:

- Accurate and repeatable measurements
- Supplied in five different versions including the variable temperature P14/VT
- Includes its own specimen cutter.
- Supplied with additional top platens of 7.3 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. For some applications the P14/VT offers a quick, low cost alternative to a Mooney Viscosity test.

Principle

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 tissue paper, as defined by international standards, before being placed between the heated platens. The tissue 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: Wallace Rapid Plastimeter Mk V - P14

Five versions are available:

Rapid Plastimeter - Basic Model, P14/1

- Fully automatic operation
- Accurate and repeatable results
- Built in diagnostics
- LED platen temperature Indicator

Rapid Plastimeter - Printer Model, 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

Rapid Plastimeter - Basic Model, P14/PC

- Same specification as P14/1 plus:
- PC interface (RS 232) for data capture to PC
- Optional: Excel add-In software tool

Rapid Plastimeter - Data Terminal & Printer Model, 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 - Printer Model, P14/VT

- Same specification as P14/3 plus:
- Variable platen temperature control from 50°C to 180°C

Accessories:

Standard: Specimen Cutters, 1mm Slip Gauge, 7.3mm & 14mm anvils, Tool & spares set

Specifications

Wallace Rapid P14 Plastimeter	
Weight	25 Kg
Dimensions	420mm (h) x 300mm (w) x 360mm (d)
Upper platen size	10mm diameter standard, 7.3mm and 14mm diameter accessories
Lower Platen Size	16mm
Platen temperature P14/1,2,3,PC P14VT	100°C ±0.5 °C 50°C to 180°C ±0.5 °C
Test Time	15 seconds conditioning + 15 seconds load
Compression force	100N
Standards	BS ISO 2007, BS ISO 2930, ASTM D3194
Printer (P14/2 and P14/3 Model)	
Weight	500g + PSU 200g
Dimensions	95mm (h) x 125mm (w) x 195mm(d)
Data Input Terminal (P14/3 Model)	
Weight	800g
Dimensions	40mm (h) x 225mm (w) x 165mm (d)
Specimen Cutter (All Models)	
Weight	4Kg
Dimensions	260mm (h) x 80mm (w) x 335mm (d)

Plasticity Retention Index (PRI)

PRI is a measure of the resistance of raw natural rubber to oxidation. The oxidation effect is assessed by measuring the plasticity before ageing (P0) and after ageing for 30mins (P30) in the Wallace - MRPRA ageing oven at 140°C.

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