ENGINEERING SYSTEMS (NOTTM) LTD

C53 Tablet Hardness & Compression Tester

The Engineering Systems C53 is a horizontal loading mechanical strength testing machine with a standard loading capacity of 53 kg. Easy to use, it has been specifically designed for tablet hardness testing on the factory floor. A weigh balance and / or calliper can be connected to measure tablet weight and thickness. Test results and statistical analysis can be printed on the internal printer or displayed on a PC via a USB or RS232 interface.

C53 with powder coated steel case & keyboard

Features

Whilst the C53 is designed for ease of use, a number of advanced functions make it very versatile and suitable for use in a wide range of applications including research and development. A passcode protected setup menu allows the C53 operation to be fully customised to cater for all uses. The setup menu also allows settings such as test speed and displayed units to be changed.

Principle features:

- **Automatic sizing** of new batches of specimens or tablets
- **Maximum load (Hardness) 53 kg**, with a resolution of 0.001kg (0.1N).
- **Weigh balance & Calliper interfaces** for weight & thickness measurement
- 20x4 character LCD displaying load, weight, thickness, tablet count & other information
- **USB and RS232** interfaces are provided as standard
- **Optional QWERTY keyboard** gives access to advanced functions & setup menus
- **Integral 30 Column printer** with easy to change paper roll
- **Statistical analysis of load, weight & thickness**, including Min, Max, Mean & Standard Deviation with time & date stamp
- **A choice of 8 test speeds:** 4, 6, 10, 16, 20, 25, 30 or 50 mm/min
- **Choice of units:** kg, kp, N, lb.
- Maximum specimen size 36mm.
- Test can be started using TEST button or by closing guard
- Fully portable (weighs only 8.5 kg)

Advanced Features:

- Fracture detect point adjustable from 30 - 90%
- Batch mode: Automatic statistical analysis after a set number of tests
- Measurement of tablet diameter during automatic sizing or during each test
- Batch details entry at the start of each batch or after automatic sizing
- Storage & recall of test results & statistics
- Passcode protected calibration routine including calibration certificate

C53 with polished stainless steel casing

printing & restoration of previous calibration values

- Adjustable power-down time of LCD backlight to save power
- Firmware upgradeable via USB or RS232 interfaces

Operation

In use the tablet is placed in the loading area between two jaws (platen and plunger). The left hand stationary platen is attached to a precision strain gauged load cell. The right hand plunger is motorised and crushes the tablet between the jaws. Tablet fracture is automatically detected and the fracture load (hardness) is displayed on the LCD.

Meanwhile the plunger returns to its preset position ready for another test and the internal printer prints the hardness, along with the weight and thickness if a weigh balance and / or calliper are connected. Results are also displayed on a connected PC if desired. The tablet fragments are collected in a tray situated underneath the loading platform. When testing of the batch is complete the STATISTICS button can be pressed to print statistical data for the batch.

New tablet sizes are set by pressing the NEW SIZE button, inserting a tablet, and then pressing the TEST button. The new size is automatically detected and the machine is ready to test the new batch. If desired the tablet diameter is measured and printed, along with product details & operator ID.

The plunger operates at two speeds, test speed and full speed. Test speed is adjustable and can be set between 4 and 50mm/min. Full speed is approx. 130mm/min. When testing, full forward speed is applied to the plunger until the tablet diameter is reached, test speed is then applied until tablet fracture is detected, full reverse speed is then applied to the plunger and it returns to its preset position. If desired the test can be started by closing the safety guard rather than pressing the TEST button.

Results Output & Statistical Analysis

After each test is complete the test results are printed on the internal printer and sent to the USB or RS232 port. If a weigh balance and / or calliper are connected, weight and thickness are printed along with the hardness, as shown in the example on the right.

If required the results of the last test can be cancelled. This erases the results for the last test, the next test then replacing these results. In the example here the third result was cancelled.

When a batch is complete statistics can be calculated. Min, Max, Mean & Sample Standard Deviation can be printed for the current batch, along with the batch number & size and a time / date stamp. Optionally, statistics for thickness and / or weight can also be calculated and printed. Again the statistics are also sent to the USB or RS232 interface.

```
Tab  Weight  Thick   Hard
No.  (mg)    (mm)    (kg)

1    379     4.73    1.04
2    381     4.74    1.63
3    380     4.74    1.82
LAST RESULT CANCELLED
3    378     4.71    1.43
4    380     4.72    1.86

      ---------------
      BATCH STATISTICS
      ---------------

Batch No: 3
Batch Size: 4
Min: 1.04 kg
Max: 1.86 kg
Mean: 1.49 kg
Std Dev: 0.35
Time: 15:10:23 MON 01/08/11
Serial No: C53-105
Calibration No: 0004
```

Storage & Recall of Test Results & Statistics

Test results and batch details are stored to internal memory. With a keyboard connected to the C53, results & statistics for a particular batch, or for all stored batches, can be re-printed or sent to a PC.

Calibration

Absolute calibration is easily carried out by dead weight loading. Using a purpose-designed calibration cradle the machine is placed on its side near to the edge of the bench. A specially shaped hanger is placed onto the load cell platen to enable deadweight loading to be achieved.

A passcode protected calibration routine guides users through the calibration procedure and prints a calibration certificate using the internal printer. Previous calibrations can be restored in case the machine is calibrated

accidentally, and a calibration number is printed on statistical analysis data to check the correct calibration values are in use.

We recommend calibration every 6-12 months. If preferred, machines can be returned to us for calibration; our turn-around time for this is normally 1-2 days.

C53 Calibration

Additional Information

The C53 is designed to provide a strong, robust and compact mechanical strength testing machine which is conservatively rated on performance. The precision made mechanical loading system loads the specimen (tablet) at a constant speed regardless of applied load.

The machine has been designed with reliability and ease of maintenance in mind. Circuitry is included to protect the machine from overload and over-travel. During a test the loading plunger will automatically reverse and the test will be cancelled should the load cell be overloaded or if the plunger has travelled too far.

The integral printer is flush mounted on the front panel of the main casing and the paper roll can be easily changed via a door in the base of the machine.

The operating firmware in the C53 can be updated using a PC via either the USB or RS232 interface. Specific customer requirements such as special test or statistics routines or output formats can be accommodated through custom written firmware – contact Engineering Systems for more details.

During a test, fracture is detected when the instantaneous load detected by the load cell falls to a set % of the maximum (peak) load which has been reached during a particular test. This is typically set to 70% but can be adjusted between 10 and 90% if the tablet or specimen characteristics are unusual.

Standard Specifications

- **Choice of 4 output units:** Kilogram (kg), Kilopond (kp), Newton (N) or Pound (lb)
- **Maximum loads (Hardness):** 53 kg, 53 kp, 520 N or 116 lb respectively
- **Linearity:** Better than +/- 0.2% of FSR. Typically +/- 0.05% of FSR
- **Load resolutions:** 0.01 kg, 0.01 kp, 0.1 N or 0.01 lb respectively
- **Minimum detectable fracture load:** 0.3 kg
- **Load indication:** 20x4 character LCD display, internal printer, USB & RS232 interfaces
- **Choice of 8 test speeds:** 4, 6, 10, 16, 20, 25, 30, 50 mm/min
- **Fast forward and fast return speed:** 130 mm/min
- **Maximum specimen (tablet) diameter:** 36 mm
- **Calibration:** Dead weights in kg.
- **Power requirements:** 110/120 VAC 2.0A or 220/240 VAC 1.0A (external selection via fuse holder)
- **Machine dimensions:** Width 283 mm, Depth 235 mm, Height 160 mm
- **Machine weight:** 8.5 kg

ILLUSTRATIONS & SPECIFICATION NOT BINDING TO DETAIL AS CHANGES AND IMPROVEMENTS MAY BE INCORPORATED FROM TIME TO TIME.

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