



Thin Cylinder Apparatus

Overview

The Thin Cylinder Apparatus is a benchtop machine designed for educational use, allowing students to perform stress and strain tests on a thin-walled cylinder. It introduces key mechanical engineering concepts such as Mohr's Circle and Poisson's Ratio and supports practical studies in materials testing and mechanical properties.

Key Features

- Compact, self-contained bench-top unit
- Enables practical investigation of stress and strain
- Measures hoop, longitudinal, and radial strain
- Supports both open-end and closed-end loading conditions
- Equipped with strain gauges and a manual hydraulic pressure system
- Includes integrated display for pressure and strain measurements
- Supplied with a comprehensive user guide

Learning Objectives

Students develop understanding of:

- Longitudinal, hoop (circumferential), radial, and biaxial stresses
- Behaviour of a thin-walled cylinder under open and closed-end conditions
- Use and interpretation of strain gauge measurements

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.



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- Stress-strain relationship and determination of Young’s Modulus
- Evaluation of Poisson’s Ratio
- Application of Mohr’s Circle for shear strain analysis
- Use of superposition to calculate principal strains
- Influence of biaxial stress systems
- Identification of experimental error sources

Experiment Description

The apparatus includes an oil-filled aluminium cylinder mounted within a robust frame. A manual hydraulic hand pump applies internal pressure to the cylinder. Strain gauges attached to the cylinder surface measure strain, while an integrated pressure gauge monitors the applied pressure.

The apparatus allows testing under two conditions:

- **Open-End Condition:** No axial load; direct axial stress is absent.
- **Closed-End Condition:** Axial load present; direct axial stress is applied.

Testing Procedure:

1. Select the end condition.
2. Zero the strain and pressure gauges.
3. Incrementally apply pressure using the hand pump.
4. Record strain and pressure readings at each stage.

Results are collected manually and can be used for plotting stress-strain relationships and comparing with theoretical calculations.

Specifications

- **Power Supply:** 90–250 VAC, 50/60 Hz, Single phase, 1A
- **Required Bench Space:** 1.0 m × 0.5 m

Environmental Conditions

Condition	Specification
Operating Temperature	+5°C to +40°C
Storage Temperature (packed)	-25°C to +55°C
Operating Relative Humidity	Up to 80% at 31°C, decreasing to 50% at 40°C
Operating Environment	Laboratory
Sound Pressure Level	< 70 dB(A)

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