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Primary Standard Capacitor

1404 Series

These capacitors have been designed as primary reference standards of capacitance with which working standards can be compared. IET's 1620A and 1621 Precision Capacitance Measuring Systems are particularly well suited for this purpose and can be conveniently used to calibrate accurately a wide range of working standards in terms of a 1404 Reference Standard Capacitor.

- A national laboratory standard
- For calibrating working standards
- Standard for dissipation factor
- Available in 10, 100 and 1000 pF
- 20 ppm/year stability, typically better
- Hermetically sealed in dry nitrogen



Model 1404 Standard Capacitor

In combination with an accurately known external resistor, this capacitor also becomes a standard of dissipation factor.

All critical parts of the plate assembly are made of invar for stability and low temperature coefficient. After heat cycling and adjustment the assembly is mounted in a heavy brass container, which after evacuation, is filled with dry nitrogen under pressure slightly above atmospheric and sealed. The container is mounted on an aluminum panel and protected by an outer aluminum case. Each capacitor is subjected to a series of temperature cycles to determine hysteresis and temperature coefficients and to stabilize the capacitance.

Two locking bnc coaxial connectors are used as terminals (other connectors such as 874 type are available as options). The outer shell of one is connected to the case, but the outer shell of the other is left unconnected to permit the capacitor to be used with an

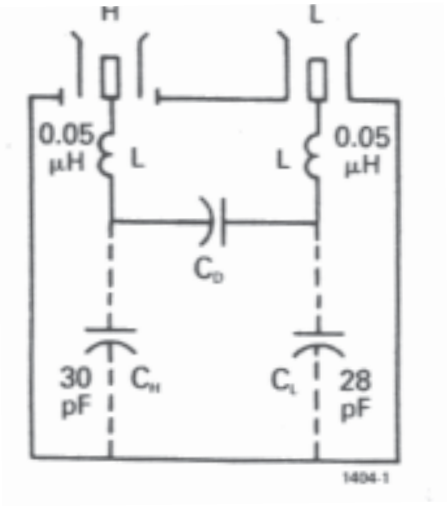


Figure 1
Equivalent circuit showing direct capacitance, C_D, and average values of residual inductance, L, and terminal capacitances, C_H and C_L.
C_D = 1000 pF for 1404-A,
100 pF for 1404-B, and
10 pF for 1404-C.

IET LABS, INC. in the GenRad Tradition
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TEL: (516) 334-5959 • (800) 899-8438 • FAX: (516) 334-5988

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SPECIFICATIONS

Calibration: A certificate of calibration is supplied with each capacitor, giving the measured direct capacitance at 1 kHz and 23° ±1°C. The measured value is obtained by a comparison to a precision better than ±1 ppm with working standards whose absolute values are known to an accuracy of ±5 ppm, determined and maintained in terms of reference standards periodically measured by the National Institute of Standards and Technology.

Adjustment Accuracy: The capacitance is adjusted before calibration with an accuracy of ±5 ppm to a capacitance about 5 ppm above the nominal value relative to the capacitance unit maintained by the reference standards.

Stability: Long term drift is less than 20 ppm per year. Maximum change with orientation is 10 ppm and is completely reversible.

Temperature Coefficient of Capacitance: 2 ±2 ppm/°C for 1404-A and -B, 5 ±2 ppm/°C for 1404-C, from -20°C to +65°C. A measured value with and accuracy of ±1 ppm/°C is given on the certificate.

Temperature Cycling: For temperature cycling over range from -20°C to +65°C , hysteresis (retraceable) is less than 20 ppm at 23°C.

Dissipation Factor: Less than 10^{-5} at 1 kHz.

Residual Impedance: See Figure 1 for typical values of internal series inductance and terminal capacitance.

Max Voltage: 750 V.

Terminals: Two BNC coaxial connectors (legacy locking G874 coaxial connectors are available). Outer shell of one connector is ungrounded to permit capacitor to be used with external resistor as a dissipation factor standard.

Mechanical: Lab-bench cabinet.

Dimensions: 16.9 cm H x 17.2 cm W x 20.4 cm D (6.63" x 6.75" x 8").

Weight: 3.9 kg (8.5 lb.) net, 6.4 kg (14 lb.) shipping.

ORDERING INFORMATION

1404-9701	1404-A, 1000 pF
1404-9702	1404-B, 100 pF
1404-9703	1404-C, 10 pF

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