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 accurately calibrate a wide range of working standards in terms of a 1404 Reference Standard Capacitor.

IET has expanded on the GenRad 1404 Series with the New 1404-5nF and 1404-10nF Standard Capacitors. These build on the outstanding time-tested performance and stability features of the classical design of the original GenRad 1404's.

Features:

- ***NEW*** 5 nF and 10 nF now available
- 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-A 10 nF and 1404-C 10 pF

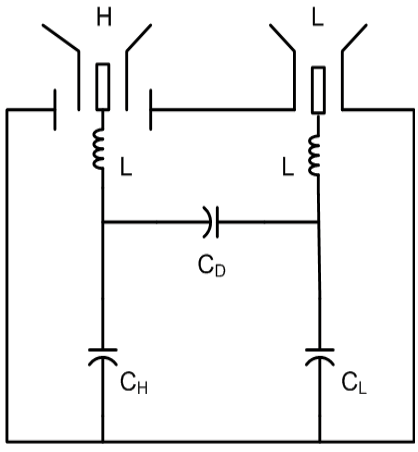

Figure 1
Equivalent circuit showing direct capacitance, C_D, and average values of residual inductance, L, and terminal capacitances, C_H and C_L. See specifications for values of residuals

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 external resistor as a dissipation -factor standard.

1404 Series

SPECIFICATIONS

Calibration: An A2LA certificate of calibration is supplied with each capacitor, giving the measured direct capacitance at 1 kHz, 30 Vac and 23° ±1°C.

Model	Calibration Uncertainty	Adjustment Accuracy	Short Term Drift	Long Term Drift	Max Change with Orientation	Maximum Voltage	Dissipation Factor
1404-A 1404-B 1404-C	< ±6 ppm	±5 ppm to a capacitance about 5 ppm above the nominal value	less than 2 ppm	less than 20 ppm per year	10 ppm and completely reversible	750 V peak	< 10^{-5} at 1 kHz
1404-5 nF 1404-10 nF	±100 ppm	±500 ppm	less than 12 ppm	less than 40 ppm per year	15 ppm and completely reversible	100V peak	< 10^{-5} at 1 kHz

Temperature Coefficient of Capacitance: A measured value with and accuracy of ±1 ppm/°C is given on the certificate.

Model	Temperature Coefficient
1404-A 1404-B	2 ±2 ppm/°C from -20°C to +65°C
1404-C	5 ±2 ppm/°C from -20°C to +65°C
1404-5 nF 1404-10 nF	4 ±6 ppm/°C from -20°C to +65°C

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

Residual Impedance:

Model	C_H	C_L	L
1404-A 1404-B 1404-C	30 pF	28 pF	0.05 µH
1404-5 nF 1404-10 nF	130 pF	127 pF	0.1 µH

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:

Model	Dimensions	Weight
1404-A 1404-B 1404-C	(16.9 cm H x 17.2 cm W x 20.4 cm D (6.63" x 6.75" x 8")	3.9 kg 8.5 lb 6.4 kg 14 lb Shipping
1404-5 nF 1404-10 nF	(23 cm W x 23 cm H x 22 cm D) 9" x 9" x 8.5"	16 kg 35 lb 18 kg 40 lb Shipping

ORDERING INFORMATION

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

1404-5nF 1404-A, 5 nF
1404-10nF 1404-A, 10 nF