

National Bureau of Standards

Certificate

Standard Reference Material 1398a

Certified Coating Weight Calibration Standard

(Gold on Fe-Ni-Co Alloy)

This Standard Reference Material (SRM) consists of four 15 x 15 mm gold coating plates that are designed for calibrating coating thickness gages of the beta-backscatter type and for calibrating x-ray fluorescence instruments for the measurement of the weight per unit area of gold coating. The gold coating on each plate is at least 99.9% gold and is electrodeposited over a 50%-iron, 29%-nickel, and 17%-cobalt glass-sealing alloy (ASTM F15) substrate.

The weight per unit area value given for each plate is certified to be within 5% of the weight per unit area at its center and the average weight per unit area over its surface. The thickness in micrometers was estimated by using the formula:

$$\text{Thickness } (\mu\text{m}) = \frac{\text{Weight per unit area } (\text{mg}/\text{cm}^2)}{\text{Density } (\text{g}/\text{cm}^3)} \cdot 10$$

assuming the density of the gold to be 19.3 g/cm³.

The nominal weights per unit area for this SRM are:

Plate 1	1.5 mg/cm ²
Plate 2	3.0 mg/cm ²
Plate 3	6.0 mg/cm ²
Plate 4	14.0 mg/cm ²

The certified values, which are within 10% of the nominal weights per unit area, are printed on the cards.

NOTE: The thickness (micrometers) can easily be calculated by dividing the weight per unit area (mg/cm²) by 1.93. This factor accounts for the conversion of the various dimensions, i.e., grams to milligrams and centimeters to micrometers.

The gold coatings were measured by beta-backscatter or an x-ray fluorescence technique using NBS master standards for which the average weights per unit area were determined by weight and area measurements. They are suitable for the direct calibration of equipment used to measure weight per unit area of gold coating. This is done in terms of the thickness of the gold coating by dividing the certified weight per unit area values by the density of the gold to be measured and converting to the desired thickness units.

The certified values are no longer valid when the gold coating is visibly worn.