

# National Bureau of Standards

## Certificate

### Standard Reference Material 1399b

#### Certified Coating Weight Calibration Standard

#### (Gold on Nickel)

This Standard Reference Material (SRM) consists of four 15 x 15 gold coating plates that are designed for calibrating coating thickness gages of the beta-backscatter type and 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- $\mu\text{m}$  thick layer of Watts nickel electrodeposited on an AISI 1010 steel substrate.

The weight per unit area value of each plate is certified to be within 5% of the weight per unit area at its center and of 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  $\text{g}/\text{cm}^3$ .

The nominal weights per unit area for this SRM are:

Plate 1	1.5 $\text{mg}/\text{cm}^2$
Plate 2	3.0 $\text{mg}/\text{cm}^2$
Plate 3	6.0 $\text{mg}/\text{cm}^2$
Plate 4	14.0 $\text{mg}/\text{cm}^2$

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

NOTE: The thickness (micrometers) can easily be calculated by dividing the weight per unit area ( $\text{mg}/\text{cm}^2$ ) 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 an x-ray fluorescence or beta-backscatter technique using NBS master standards for which the average weights per unit area were determined by weight and area measurements. This SRM is 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 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The certified values are no longer valid when the gold coating is visibly worn.

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