U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 1851

NDE Penetrant Test Block

(Matte Finish)

This Standard Reference Material (SRM) is intended for use in checking the sensitivity and performance of liquid dye penetrants and dye penetrant crack detection systems as well as other systems and devices for surface defect detection. Each SRM has been individually measured and bears an identification number.

The SRM 1851 test block (a cross section of a laminate of electrodeposited nickel and copper -- the copper being electro-etched to form the "cracks") is provided with a matte finish. The test block is about 1/2-cm wide and 2-cm long and is mounted in an epoxy-resin disk about 5 cm in diameter and 1 cm thick. Each block contains 4 cracks approximately 0.2, 0.5, 1 and 2 μm wide with a separation distance of about 1.5 mm (See Sketch). Crack depth is several times the width-beyond the critical depth for showing dye penetrants.

The widths of the cracks at the middle of the block were determined from measurements made on a metallographic microscope using a filar micrometer eyepiece at a mangification of 1200. The accuracy of these measurements was checked by measuring the cracks in several test blocks with a Scanning Electron Microscope (SEM), which had been calibrated for magnification accuracy with SRM 484a, SEM Magnification Standard. Agreement was within 0.1 μm for the widest cracks and within 0.06 μm for the narrowest.

Variation in the crack width over the length of the test block is within 50% or 0.1 μm. This estimate was obtained by making 9 measurements along the length of all 4 cracks in each of 3 typical test blocks measured 3 times.

The surface of the test block is relatively soft and should be protected from contacts that might scratch the surface or close the cracks. The test blocks should be thoroughly cleaned immediately after each use to minimize clogging of the cracks by the dye being checked. A light scrub with detergent and water using cotton, plus a rinse of 30 seconds or more in alcohol is effective. Harsh solvents, high temperatures, and prolonged (over 15 minutes) ultrasonic treatment must be avoided.

The preparation and certification of this SRM was performed by D.R. Kelley of the Electrodeposition Group of the NBS Metallurgy Division.

Overall direction and coordination of the efforts leading to certification was performed by C.E. Johnson and D.S. Lashmore.

The certification and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.W. Seward.

April 2, 1984
Washington, DC 20234

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

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