



# High Phos Electroless Nickel Specifications

TWR's High Phosphorus Electroless Nickel is designed by the manufacturer to provide a high quality electroless nickel deposit from a highly stable plating solution at an economical cost. The bath plates at approximately 0.3-0.5 mil per hour, depositing nickel phosphorus coating that provides the optimum in corrosion protection and engineering properties. The deposit's corrosion resistance functions as a barrier coating. It is resistant to attack by any but the most severely oxidizing environments. The deposit is completely amorphous (no crystal or phase structure). If the deposit is heat treated, particles of Ni<sub>3</sub>P will precipitate and the coating crystallizes, resulting in a significant increase in the hardness and wear resistance.

## PROPERTIES

**Nickel Content:** 87%-89%

**Phosphorus Content:** 10% 13%

**Internal Stress:** neutral to compressive

**Tensile Strength:** > 700 MPa

**Elongation:** 2% permanent strain

**Modulus of Elasticity:** 200 GPa (2.8 X 10<sup>8</sup> psi)

**Density:** 7.75 g/cm<sup>3</sup>

**Melting Point:** 880 oC (1620 oF)

**Adhesion Strength:** 140 400 MPa (20 60 kpsi), depending on substrate

**Hardness As Plated:** 490 515 VHN100 (49 50 Rockwell C)

**Heat Treated:** 1000 1100 VHN100 (65 70 Rockwell C)

**Electrical Resistance:** 90 100 uohms/cm<sup>2</sup>

**Thermal Conductivity:** 0.02 cal/cm/sec/oC

**Coefficient of Thermal Expansion:** 8-10 um/m/oC

**Magnetic Properties:** Nonmagnetic

**Coefficient of Friction vs. Steel:** 0.40 non lubr. to 0.13 lubr.

**Taber Wear Resistance:**

**As Plated:** 22-24 mg/1000 cycles

**Heat Treated (400 degrees C/1 hr):** 10 12 mg/1000 cycles

**Salt Spray Testing:** .0002/200 hours, .001/1000hours (all depending on base material quality/porosity)

**RoHS & ELV requirements for cadmium <100ppm, no mercury and lead <1000ppm are met by this coating**

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