



# Mid Phosphorous Electroless Nickel Specifications

TWR's Mid Phosphorous "Bright" 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 0.7-1.0 mil per hour, depositing a Nickel Phosphorus coating that is bright in appearance while maintaining the engineering properties of an Electroless Nickel plate. The deposit's corrosion resistance functions as a barrier coating. 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:** 91%-95%

**Phosphorus Content:** 5%-9%

**Internal Stress:** Slightly Tensile

**Tensile Strength:** > 420-1000 MPa

**Elongation:** .5%-1% permanent strain

**Modulus of Elasticity:** 50-65 GPa

**Density:** 8.1-8.4 g/cm<sup>3</sup>

**Melting Point:** 880 °C (1620 °F)

### Hardness:

- **As Plated:** 500-650 VHN100 (50-55 Rockwell C)

- **Heat Treated:** 85-1000 VHN100 (65-70 Rockwell C)

**Electrical Resistance:** 70-110 uohms/cm<sup>2</sup>

**Thermal Conductivity:** 0.012 cal/cm/sec/°C

**Coefficient of Thermal Expansion:** 10-16 um/m/°C

**Magnetic Properties:** Slightly Magnetic to Magnetic

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

### Taber Wear Resistance:

**As Plated:** 16-20 mg/1000 cycles

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

All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, user shall, before using, determine the suitability of the product for his intended use and user assumes all risk and liability whatsoever in connection therewith.



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