

Protalloy®

For outstanding corrosion protection of steel

Protalloy® is:

- A total corrosion protection system for steel parts.
- Based on an electroplated zinc-nickel alloy with passivation and optional top coat.
- Free of any hexavalent chromium and complies with the latest RoHS II directives (2011/65/EU).

Special properties:

- Extremely thin layer for maximum corrosion protection: 5µm Protalloy® provides more than 1000 hours of protection against red rust (NSS)!
- Hard top coat (up to 550 HV *) to ensure better scratch and wear resistance compared to electroplated zinc and zinc-iron.
- Thermal stability up to 200°C.
- Corrodes sacrificially to steel (consistent stable corrosion behaviour).
- Stable and less voluminous corrosion by-products compared to zinc and zinc-iron.
- Excellent adhesive passivation layer and an optional top coat.
- Excellent adhesion and coverage on cast iron (for example GGG40 / GGG50).
- Good basis for applying a (optical) top coat like lacquer or powder coating.



Areas of application:

Protalloy® offers an effective solution for corrosion resistance under extreme conditions and is intended for use in the agricultural, offshore, automotive, aerospace and industrial sectors.

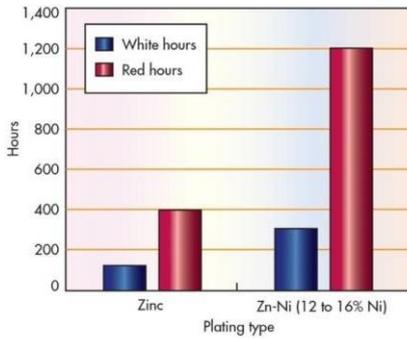
Some examples:

- Hydraulic components: manifolds, cylinders, screw-in cartridges
- Automotive components, tow hooks, mounting brackets, transmission parts
- Offshore components: strips, hooks, pins
- Machine components: casings, construction parts, gear wheels, pins, bushings

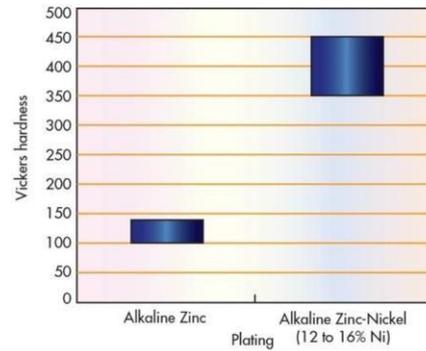
Protalloy® (zinc nickel) compared to standard zinc (iron) plating and electroless nickel			
Coating type:	Protalloy®	Zinc (or zinc-iron)	NiP (high phosphorus)
Process type	Electroplating	Electroplating	Electroless nickel plating
Composition (%)	Zn: 84-90 / Ni: 10-16	Zn: 99-100 / Fe: 0-1	Ni: 88-90 / P: 10-12
Passivation (Cr6 free)	Transparent + topcoat	Clear or yellow	No
Typical coating thickness (µm)	5-15	5-15	10-50
Coating thickness tolerance (%)	Min to +300%	Min to +300%	± 2µm
Attainability in the product	Exterior Interior very limited	Exterior Interior very limited	Wherever fluid and flow are present
Hardness (HV)	350-550 *)	100-150	500-600 **)
Density (kg/dm3)	7.40	7.10	7.90
Melting point (°C)	750 - 800	420	850 - 880
Weldability	Moderate	Poor	Moderate
Thermal stability	Excellent	Poor	Excellent
Base for paint adhesion	Good	Fair	Poor
Corrosion protection (***)			
Protection against WR (white rust)	120-240	120-240	NA
Protection against RR (red rust)	> 1000	240-480	100-500
Remarks:			
*) : Depending on the type of Zn-Ni process, alkaline Zn-Ni plating is harder than acid ZnNi plating. **) : As separated, harnesses of more than 900 HV can be attained with subsequent treatment. ***) : Testing hours of WR/RR on steel sample plate in Neutral Salt Spray test (NSS) according to ASTM B117. → WR = White Rust = zinc corrosion/ RR = Red Rust = metal base corrosion. → Coating thickness of at least 5 microns with Protalloy and zinc (iron) and at least 25 microns with NiP.			
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(Indicative comparison partly based on experience. No rights may be derived from this overview)			



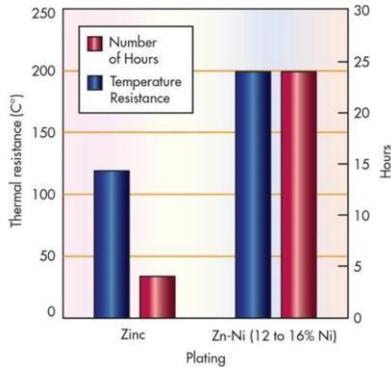
Comparing ZN-Ni and ZN coatings on corrosion resistance (Neutral Salt Spray (ASTM B117))



Comparing ZN-Ni and ZN coatings on hardness



Comparing ZN-Ni and ZN coatings on thermal resistance while maintaining corrosion performance



Source graphs: www.machinedesign.com

Comparing ZN-Ni and ZN coatings on cyclic corrosion performance (SAE J2334)

