



The RoHS alternative to cadmium

SOURIAU Zinc Nickel: the best in terms of price and performance for aerospace & defense equipment.



SOURIAU Zn Ni



A unique alternative plating process to cadmium.

RoHS compliant



A unique SOURIAU plating process compliant with RoHS regulations for cadmium and Cr6+.

The first QPL qualified



SOURIAU Zn Ni is the first product which has been qualified by US Defense standards organization (DLA Land and Maritime).

High corrosion resistance



500 hours salt spray.

Available in mass production



Available for 38999 Series I, II and III aluminum range.



38999 Series III

Black Zinc Nickel



The new SOURIAU RoHS Zinc Nickel: The first QPL qualified cadmium free plating

Various Environmental Directives impose requirements on the electrical and electronic equipment manufacturers: the RoHS (Restriction of use of certain Hazardous Substances) directive, part of the WEEE (Waste Electrical and Electronic Equipment) directive.

The MIL-DTL-38999 rev. L also provides guidance on the use of alternative plating of connectors with less hazardous or nonhazardous materials. In this regard, the specification defines the alternative plating finishes.

SOURIAU is proud to claim that the SOURIAU Zinc Nickel is the first QPL qualified to the most recent release of the standard (rev. L). See DSCC Information Sheet for Electronic QPL-D38999.

SOURIAU has more than 10 years of experience in producing Zn Ni with continuous improvements to comply with MilAero harsh environments conditions. As a result, SOURIAU Zn Ni provides customers with the most cost-effective solution for cadmium alternative finish. SOURIAU guarantees RoHS compliance.

Technical Characteristics

- Color: black non reflective
- Shell continuity: 2.5 mΩ
- Shielding: 90dB at 100MHz
- Temperature range: -65°C +200°C
- Fully meets the MIL specifications
- Meets the ASTM B841 in terms of dynamic 500h salt spray performance



38999 Series III Part number

Basic Series	D38999	20	Z	B	35	P	N	L
Shell style:								
20: Square flange receptacle								
24: Jam nut receptacle								
26: Plug with RFI shielding								
Plating:								
Z: Black zinc nickel								
Shell size: A - B - C - D - E - F - G - H - J								
Contact layout: Consult our catalogs or www.souriau.com								
Contact type:								
P: Pin A: Connector supplied without pin contact or with specific contacts (connector marking: A + orientation)								
S: Socket B: Connector supplied without socket contact or with specific contacts (connector marking: B + orientation)								
Orientation: N, A, B, C, D & E								
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S (without L)								

Note: Zinc Nickel plating also available for other SOURIAU part numbers (8D) and range extensions available on request.

38999 Series III Black Zinc Nickel



Comparison of plating codes available on the market

Requirement	Electroless Nickel	Cadmium	Zinc Nickel Black	Others		
				Nickel PTFE		Pure Electro Deposited Aluminum
				Thick	Thin	
Finish code class per MIL spec.	F	W	Z	T		P
RoHs Compliant	✓	No	✓ ⁽¹⁾	✓	_ ⁽⁸⁾	_ ⁽⁹⁾
Galvanic compatibility with cadmium	Poor	Very good	Good ⁽²⁾	Poor ⁽³⁾	Poor ⁽³⁾	Good
Easy to produce in mass production and with multi sourcing	✓	✓	✓	No ⁽⁴⁾ (10)	No ⁽⁴⁾ (10)	No ⁽⁵⁾
Finish according to standard	ASTM B733	ASTM B766	ASTM B841	No standard ⁽⁶⁾ (proprietary process)	No standard ⁽⁶⁾ (proprietary process)	No standard ⁽⁶⁾ (proprietary process)
Shell-to-Shell Continuity < 2.5 mΩ	✓ <1 mΩ	✓	✓	✓	✓	✓
Durability (500 mating cycles)	✓	✓	✓	✓	✓	_ ⁽⁷⁾
Dynamic salt spray resistance	48 hours	500 hours	500 hours	500 hours	500 hours ⁽⁸⁾	500 hours ⁽⁷⁾
Temperature rating	according to standard 175°C	✓	✓	✓	✓	✓
	200°C	✓	No	✓	✓	✓
Not Reflective	No	✓	✓	✓	✓	✓
Non-Magnetic	✓	✓	✓	✓	✓	✓
Cr6+ < 0.01 % (RoHS limit = 0.1 % max)	✓	No	✓	✓	_ ⁽⁸⁾	_ ⁽⁹⁾
Easy to check homogeneity / Thickness of layer	✓	✓	✓	No ⁽¹⁰⁾	No ⁽¹⁰⁾	✓
Environment friendly	Poor	Poor	Good	Poor ⁽¹¹⁾	Poor ⁽¹¹⁾	-
Human health and safety		Poor	✓	Poor ⁽¹²⁾	Poor ⁽¹²⁾	Poor ⁽¹³⁾
Compatibility with new de-icing fluid (with potassium acetate)	✓	✓	✓ ⁽¹⁴⁾	_ ⁽¹⁴⁾	_ ⁽¹⁴⁾	_ ⁽¹⁴⁾

See next page for notes explanation.

38999 Series III

Black Zinc Nickel



1 SOURIAU Zinc Nickel (Z code) and RoHS

A unique SOURIAU plating process compliant with RoHS regulation for Cadmium and Cr6+ restriction.

2 Electrical compatibility of Zinc Nickel (Z code) with Cadmium (W code)

Electrical potential of Zinc Nickel and Cadmium are very similar which removes the risk of galvanic corrosion and defects after 500 hours salt spray.

3 Electrical compatibility of Nickel PTFE (T code) with cadmium (W code)

PTFE is an inert polymer, therefore the galvanic potential of Nickel + PTFE will be the potential of the Nickel alone. It means that the electrical compatibility is not guaranteed between Nickel PTFE and Cadmium for long salt exposure, which is not the case for Zinc Nickel (electrical potential close to Cadmium).

4 Nickel PTFE (T code) production processes complex and expensive

Nickel PTFE requires specially manufactured high tolerance machined parts (special requirement on surface roughness) as the thicker plating is not compatible with standard machined parts.

- These special machined parts lead to a higher cost and quality risk (mixing very similar parts and special care in case of outsourcing).
- Therefore, the high thickness of nickel PTFE means a long deposit time and also a more expensive process.
- The lifetime of the chemical mixture is half than an electrolytic nickel or nickel alloy (Zinc Nickel) mixture.

5 Pure Electrodeposited Aluminum (P code) very complex and unique deposition process

Very complex and explosive process which requires a building with special containment facility and not available in standard plating shops. Main limitation are the following:

- Flammable and explosive solvent which requires inert atmosphere.
- Highly skilled worker (expertise and training)
- Specific care for handling and storage of mixture in a separate building.

6 ASTM standards

These standards are defined to allow a reliable quality level of plating process with multisourcing option. Nickel PTFE (T code) and Pure Electrodeposited Aluminum (P code) are not defined by ASTM industrial standards.

7 Cycles of durability, limitation for Pure Electrodeposited Aluminum (P code)

Performance limitation has been raised in 38999 dynamic salt spray by tests against Pure Electrodeposited Aluminum:

- Galling: abrasive wear of Ni-plated EMI band leads to generate conductive particles with a potential risk of short circuiting the contacts.
- Requires use of lubricants - limited effectiveness, risk of lower electrical continuity.

8 Thin Nickel PTFE (T code) salt spray resistance

Thin Nickel PTFE (T code) could require Cr VI to meet corrosion performance and consequently not comply with ROHS limit.

This is one way to heal pores at defect sites of the primary parts and to decrease the production cost of the thick Nickel PTFE plating (see note 4).

9 Pure Electrodeposited Aluminum (P code) and Chromium VI

Chromium VI is required to meet high corrosion performances.

10 Thickness control of Nickel PTFE layer (Thin and Thick Layer)

There is no standard in line equipment to control the homogeneity of PTFE concentration within the plating material and the only way to control the PTFE concentration is achieved with complex lab equipment such as Scanning Electron Microscope (PTFE is a non conductive material).

There is consequently a strong limitation for in line process control and ability to outsource. It means that the lack of control associated with the risk of non homogeneity of the PTFE concentration could lead to an uncontrolled dormant failure and a rapid corrosion.

11 Environment friendly, limitation for Nickel PTFE (T code)

The average bath lifetime of the chemical nickel PTFE is half that of electroless nickel and 10 times less than nickel alloy (zinc nickel) bath. This leads to a higher waste volume of nickel pollution. Furthermore, the waste toxicity of electroless nickel or nickel alloys is higher than the electrolytic process:

- Toxicity level ↑
- Cadmium
 - Nickel electroless
 - Nickel PTFE
 - Electrolytic zinc nickel

In addition, the PTFE material is toxic and indestructible. Some PTFE suppliers might stop their PTFE production after 2013 (ie. Dupont)

12 Nickel PTFE (T code) is potentially hazardous to human health

The Nickel PTFE material is recognized as toxic and indestructible. Most of the experts are considering PFOA (used in PTFE) a «likely human carcinogen». This was also proposed by the Environmental Protection Agency (EPA).

13 Pure Electrodeposited Aluminum (P code) process is very hazardous to safety

For Pure Electrodeposited Aluminum, production is a very high risk for human safety due to:

- Flammable and explosive solvent which requires inert atmosphere.
- High skilled of workers necessary (expertise and training).
- Specific care for handling and storage of mixture in a separate building.
- Pure Electrodeposited Aluminum is considered as a dangerous explosive process for people involved in the plating process.

14 De-icing fluid (contains potassium acetate)

SOURIAU Zinc Nickel is compatible with de-icing fluids containing potassium acetate.

No data found regarding Nickel PTFE or Pure Electrodeposited Aluminum.

For further information contact us
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or visit our web site www.souriau.com