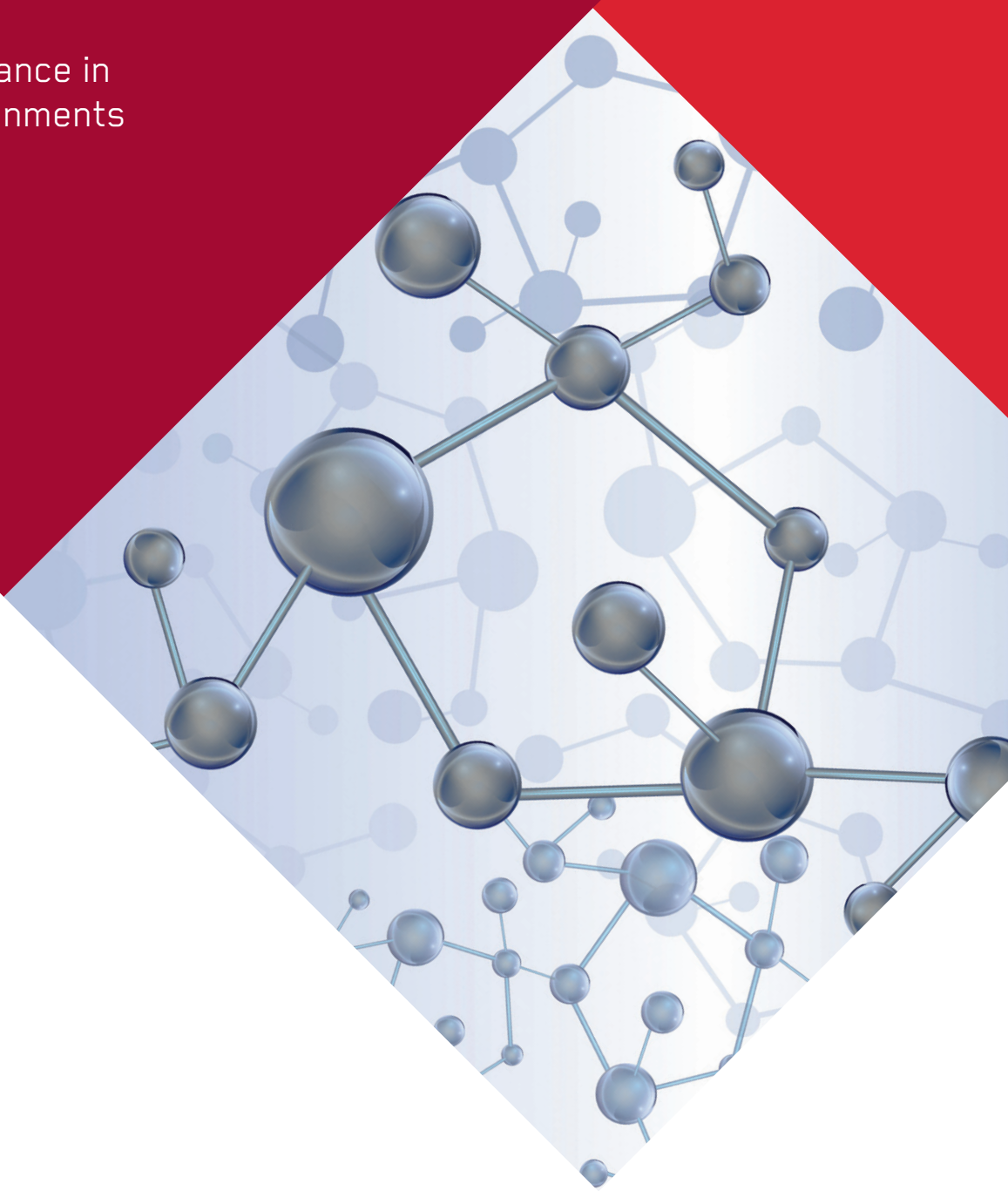
cannon veam

# Plating Selection Guide

## Optimizing Performance in the Harshest Environments



ITT

# Safe, sustainable & durable plating solutions that enhance connector performance and reliability, even in the harshest environments

## ITT's Cannon and Veam brands offer sustainable and cost-effective plating alternatives that reduce the use of Cadmium and other toxic substances while enhancing the durability, conductivity and performance of a broad range of interconnect solutions.

From our latest Tin Zinc J plating for harsh environment military applications (a 1:1 replacement of Cadmium under VG standards) to our high-performance, proprietary Blue Generation® plating for industrial applications, our ultra-ruggedized plating treatments are both RoHS and REACH compliant. They add an extra layer of extreme protection, making Cannon and Veam connectors more robust, corrosion-resistant, and sustainable.

Driven by environmental trends, customer needs and regulatory mandates, our breadth and depth of environmental plating options is designed to meet the needs of an evolving and dynamic marketplace. Our new plating treatments offer alternatives that help reduce or eliminate substances restricted by RoHS and REACH regulations, without sacrificing quality and performance.

This comprehensive Plating Selection Guide is designed to help our customers sort through the wide range of plating choices and materials to get the best plating treatments possible. It includes:

- An overview of our most popular plating treatments, along with recommended uses and applications
- Key features and benefits of our innovative RoHS & REACH compliant plating treatment
- A full list of available plating options and properties for ITT's key metal product lines

### Proprietary Blue Generation® Plating for the Toughest Industrial Applications

Our engineers developed Blue Generation® zinc nickel plating, which delivers both RoHS and REACH compliance and outstanding performance. Blue Generation® plating protects against the severe environments of extreme industrial applications, providing resistance to 500 hours of salt spray and withstanding temperatures from -55°C to +125°C.

Veam VBN Connector with Blue Generation® Plating

# Plating solutions for when it matters most

## Why surface plating is used

Aluminum is the market standard material used to manufacture metal connectors because of its low cost and processability. To achieve required mechanical robustness and corrosion resistance, connector platings are applied. For added dimension and visual appearance, ITT Cannon and Veam brand plating treatments also come in a variety of color options.

## How plating performance is defined

Plating performance is defined by two criteria:

1 **The level of salt spray resistance measured in "hours"** - During testing, our connectors are exposed to a concentrated salt atmosphere. Criteria is the corrosion of the base aluminum material.

2 **Shielding effectiveness measured in attenuation tests and defined in "decibels"** - Because this measurement is complex, shell-to-shell conductivity in mOhm is used as an indication of shielding performance.

## Environmental & sustainability trends

For many decades, industry relied on Cadmium product finishes because of its superior electrical performance, as well as the protection it provides in harsh environments. But growing concerns about Cadmium's toxicity and carcinogenic effects have prompted mass reductions, bans and/or regulation of its use.

Since 2003, RoHS regulations throughout Europe have limited the use of Cadmium, Chrome VI and other hazardous substances. While most consumer industries are banned from using these toxic substances altogether, some products manufactured for specific industry sectors or applications are out of scope of the RoHS regulations and, therefore, do not have any constraints on the amount of restricted substances they contain, e.g., military, heavy industry and heavy off-road vehicle markets.

All of the Product Lines listed in the Plating Matrix of this Guide are typcially out of scope of the RoHS regulation. Nevertheless, ITT is committed to reducing or eliminating hazardous substances by using suitable substitutes as they become available.

REACH addresses the use of chemicals in production and products. Chrome VI, an essential component of Cadmium and other platings, was banned for production of connector finishes in Europe in September 2017.

Exemptions for markets as in RoHS will not be granted. However, ITT Cannon applied for and was granted an extension on the usage of Chrome VI until September 2024, for non-cadmium platings, and September 2029 for cadmium platings.

### ITT's Cannon & Veam brands:

We are world leaders in the design and manufacture of highly engineered connector solutions and sustainable plating alternatives for multiple end markets.

We bring more than a century of innovation and expertise to every customer engagement and are committed to offering a wide range of RoHS and REACH compliant plating solutions that contribute to a more sustainable world.

### Why ITT plating solutions:

- We offer customers one of the widest ranges of RoHS and REACH compliant plating alternatives available, including our proprietary Blue Generation® and our Tin Zinc J cadmium replacement plating
- We offer environmental plating and surfacing options, as well as unique customization capabilities
- We are committed to developing plating options that are safe, sustainable and reliable

RoHS COMPLIANT PART NUMBERS

REACH COMPLIANT PART NUMBERS

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# Plating performance

## While plating performance is defined by the same two criteria - salt spray resistance and shielding effectiveness - testing standards are very different and the results cannot be used interchangeably.

During the course of several decades, a variety of independent standards for connectors have been developed worldwide. Commercial standards are often derived from non-commercial uses and typically show regional differences. Each standard is dedicated to a defined set of applications or market segments. It describes mandatory product design rules and test methods to achieve a defined performance, as well as intermateability between manufacturers.

Metal connectors typically use platings for protection of the base materials as described earlier. While each plating chemistry by itself has a certain defined characteristic, the key criteria "salt spray resistance" and "shielding effectiveness" can show very different performance values using the same plating chemistry. In these cases we typically see the use of different test methods that result in performance variations.

As a rule of thumb, users of platings should adhere to the following rules when comparing performance results of salt spray resistance or shielding performance:

1. Understand which standard and related test method are used to define the performance of the respective product / plating; and
2. Do not conclude that a plating used and tested under one standard will have a similar performance when used under a different standard.

**Note: The plating matrices on the following pages show performance values for each plating and product in reference to the respective base standards.**

### Cannon's Tin Zinc J Plating is the VG Approved (German Army) 1:1 Replacement for Cadmium Olive Drab

ITT Cannon's Tin Zinc J Plating is an ultra-harsh environment formulation that meets or exceeds the VG performance requirements of cadmium. It is a highly conductive (< 5m ohm) and corrosion-resistant (500 hours static / 5 days cyclic salt spray) matt grey, non-reflective solution.

Available on all ITT Cannon VG connector series and their commercial equivalents, Tin Zinc J plating is backward compatible with cadmium and other ITT Cannon and Veam platings.

Cannon VG95234 (CA Bayonet) with Tin Zinc J Plating

# ITT recommended environmental platings

## Tin Zinc J Matt Grey A241, T245/T246

Fully approved and listed to VG95234

Recommended usage:

## Zinc Nickel Blue Generation A240, T240/T241

High performance industrial alternative to cadmium,
500 hours salt spray, excellent shielding

Recommended usage:

## Zinc Cobalt Black A232, T108

Outdoor solution for harsh environments,
black 200 hours salt spray, shielded

Recommended usage:

## Epoxyurethanic Varnish Black T39

Unshielded outdoor applications with high corrosion
requirements, 500 hours salt spray

Recommended usage:

## Nickel A34, T29

Industrial standard for indoor applications with
excellent shielding performance

Recommended usage:

# Plating matrix

The matrix below provides an overview of all ITT European metal circular product lines.
Each product line includes a list of available platings and properties.

**IMPORTANT:** European product lines are tested based on VG test procedures. Salt spray resistance and shell to shell conductivity values are a result of these tests.

| Product line | Plating type** | RoHS *** | REACH | Salt spray resistance **** | Available for shielded versions | Shell to shell conductivity * | Color | Military approvals |
|---|---|---|---|---|---|---|---|---|
| **CA Bayonet (VG95234)** | Tin Zinc J (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | VG95234 |
| | Cadmium | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | VG95234 |
| | Zn Cobalt Black (A232) | yes | yes | 200h | yes | undefined | black | - |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |
| **CA-COM** | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| **CGE (VG96929)** | Tin Zinc J (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | VG96929 |
| | Cadmium | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | VG96929 |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |
| **CGF** | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |
| | Tin Zinc (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | - |
| **CGL** | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |
| **KPSE (VG95328)** | Tin Zinc J (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | VG95328 |
| | Cadmium | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | VG95328 |
| | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| | Zn Cobalt Black (A232) | yes | yes | 200h | yes | undefined | black | - |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 20 mOhm | grey-blue | - |
| **KPT** | Tin Zinc J (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | VG95328 |
| | Cadmium | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | VG95328 |
| | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| | Zn Cobalt Black (A232) | yes | yes | 200h | yes | undefined | black | - |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 20 mOhm | grey-blue | - |
| **KPTC** | Tin Zinc J (A241) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | - |
| | Cadmium | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | - |
| | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| | Zn Cobalt Black (A232) | yes | yes | 200h | yes | undefined | black | - |
| | Zn Nickel Blue (A240) | yes | yes | 500h | yes | < 20 mOhm | grey-blue | - |
| **KPTC NG** | Nickel | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| **CIR/FRCIR VE-VS VPT DS-DSH Others Veam** | Tin Zinc J (T245/T246) | yes | yes | 500h / 5 days cyclic | yes | < 5 mOhm | matt grey | - |
| | Cadmium (T3) | no | no | 500h / 5 days cyclic | yes | < 5 mOhm | olive drab green | MIL/VG |
| | Zn Cobalt Black (T108) | yes | yes | 200h | yes | undefined | black | - |
| | Zn Cobalt Green (T100) | no | no | 200h | yes | < 5 mOhm | olive drab green | - |
| | Epoxyurethanic varnish (T39) | yes | yes | 500h | no | not applicable | black | - |
| | Zn Nickel Blue (T240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |
| | Black Hard anodize coating (T89) | yes | yes | >1000h | no | not applicable | black | - |
| | Nickel (T29) | yes | yes | < 48h | yes | < 5 mOhm | silver | - |
| | Stainless steel | yes | yes | >1000h | yes | undefined | | - |
| | Marine Bronze | yes | yes | >1000h | yes | undefined | | - |
| **VBN** | Zn Cobalt Black (T108) | yes | yes | 200h | yes | undefined | black | - |
| | Epoxyurethanic varnish (T39) | yes | yes | 500h | no | not applicable | black | - |
| | Zn Nickel Blue (T240) | yes | yes | 500h | yes | < 10 mOhm | grey-blue | - |

* a) "undefined" indicates that due to varying conductivity values a max shell to shell conductivity cannot be clearly defined: b) values represent typical shell to shell conductivity
** all platings are cross compatible / backwards compatible with Cadmium platings (except for T89 & T39)
*** The Product Lines listed in this Plating Matrix are typcially out of scope of the RoHS regulation. However, for convenience of reference, the Plating Matrix indicates whether the specific Plating Type is a hazardous substance under the RoHS regulation, regardless of the Product Line's out-of-scope application.
**** All values are static salt spray unless otherwise stated.

# Plating matrix

The matrix below provides an overview of key U.S. metal product lines.
Each product line includes a list of available platings and properties.

**IMPORTANT:** U.S. product lines are tested based on procedures as shown in the table below. Salt spray resistance and shell to shell conductivity values result from the respective tests.

| Product line | Plating type | RoHS*** | Salt spray resistance **** | Available for shielded versions | Shell to shell conductivity | Color | Test method |
|---|---|---|---|---|---|---|---|
| **KJA, KJB, KJ, KJL (38999-Style)** | PTFE-Ni | Yes | 500h | Yes | 2,5 mOhm | Gray | Commercial |
| | Black Zi-Ni | Yes | 500h | Yes | 2,5 mOhm | Black | Commercial |
| | Black Zi Cobalt (A296) | Yes | 96h | Yes | 5 mOhm | Black | Commercial |
| | Electroless Nickel | Yes | 48h | Yes | 2,5 mOhm | Silver | 38999-Style |
| | Electroless Nickel Space Grade | Yes | 48h | Yes | 2,5 mOhm | Silver | 38999-Style |
| | Olive Drab Cadmium over Electroless Nickel | No | 500h | Yes | 2,5 mOhm | Olive | 38999-Style |
| **BKA (ARINC 600)** | Clear Trivalent Chromate (A297) | Yes | 168h | No | 5 mOhm | Silver | ARINC 600 |
| | Electroless Nickel | Yes | 48h | Yes | 2,5 mOhm | Silver | ARINC 600 |
| **DPX (ARINC404)** | Electroless Nickel | Yes | 48h | Yes | 2,5 mOhm | Silver | ARINC 404 |
| **DPK (M83733-Style)** | Electroless Nickel | Yes | 48h | Yes | 2,5 mOhm | Silver | M83733-Style |
| **KPT, KPSE (26482-Style)** | Black Zi Cobalt (A206) | Yes | 96h | Yes | 2,5 mOhm | Black | Commercial |
| | Olive Drab Cadmium over Electroless Nickel | No | 500h | Yes | 2,5 mOhm | Olive | 26482-Style |
| | Electroless Nickel (A71) | Yes | 48h | Yes | 2,5 mOhm | Silver | 26482-Style |
| **CA Threaded (5015)** | Electroless Nickel (A71) | Yes | 48h | No | 2,5 mOhm | Silver | EIA-364-26 |
| | Black Zinc Cobalt (A206) | Yes | 48h | No | 5 mOhm | Black | EIA-364-26 |
| **Nemesis** | Black Electroless Ni | Yes | 500h | Yes | 2,5 mOhm | Black | EIA-364-26 |
| | Electroless Nickel (A71) | Yes | 48h | Yes | 2,5 mOhm | Silver | EIA-364-26 |
| **MKJ** | PTFE-Ni | Yes | 500h | Yes | 2,5 mOhm | Gray | EIA-364-26 |
| | Black Zi-Ni | Yes | 500h | Yes | 2,5 mOhm | Black | EIA-364-26 |
| | Black Anodize | Yes | 48h | No | Non-Conductive | Black | EIA-364-26 |
| | Electroless Nickel | Yes | 48h | No | 2,5 mOhm | Silver | EIA-364-26 |
| **Micro-D** | Electroless Nickel | Yes | 48h | No | 2,5 mOhm | Silver | 83513-Style |
| **D-Sub** | Yellow Chromate o\Lver Cadmium (A101) | No | 48h | No | 5 mOhm | Yellow | EIA-364-26 |
| | Yellow Chromate over Zinc (A183) | No | 48h | No | 5 mOhm | Golden yellow | EIA-364-26 |
| | Passivated Stainless Steel (F225) | Yes | 48h | No | 5 mOhm | Silver | EIA-364-26 |
| | Pure Tin over Nickel (K87, Plugs only) | Yes | 48h | Yes | 2,5 mOhm | Silver | Commercial |
| | Pure Tin over Nickel (A197, Receptacles only) | Yes | 48h | Yes | 2,5 mOhm | Silver | Commercial |

*** The Product Lines listed in this Plating Matrix are typcially out of scope of the RoHS regulation. However, for convenience of reference, the Plating Matrix indicates whether the specific Plating Type is a hazardous substance under the RoHS regulation, regardless of the Product Line's out-of-scope application.
**** All values are static salt spray unless otherwise stated.

## CA-COM Series Connectors Feature RoHS-Compliant Electroless Nickel Plating

Heavy equipment requires heavy duty connectors that take on harsh conditions and extreme weather. This nickel plated, cost-effective circular series delivers exceptional ruggedness and vibration protection. In addition to heavy equipment, CA-COM connectors are used for a range of applications in the industrial, transportation and medical markets. CA-COM circular connector series feature Nickel plating for RoHS compliance.

CA-COM Series Connectors with RoHS Electroless Nickel Plating

# Connect with the experts

ITT's Cannon brand is a world leader in the design and manufacture of highly engineered connector solutions for multiple end markets.

## Why ITT

ITT is a focused multi-industrial company that designs and manufactures highly engineered critical components and customized technology solutions. ITT's Cannon brand is a leading global manufacturer of connector products serving international customers in aerospace, defense, medical, industrial and transportation end markets. ITT's Connector business, which also includes the Veam and BIW Connector Systems brand, manufactures and supplies a variety of connectors and interconnects that make it possible to transfer data, signal and power in an increasingly connected world.

Connect with your ITT Cannon representative today or visit us at ittcannon.com

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