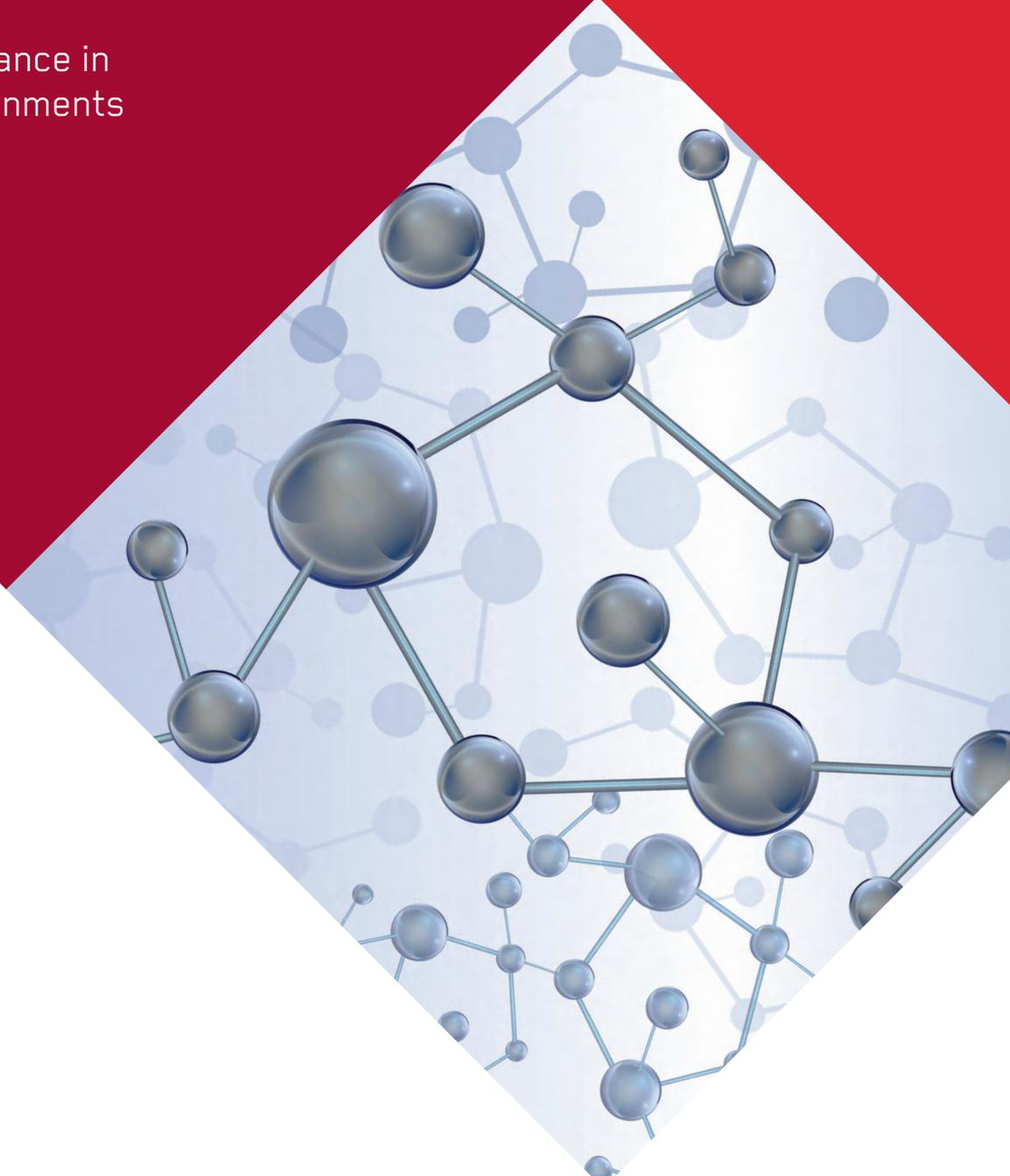


cannon veam

Plating Selection Guide

Optimizing Performance in
the Harshest Environments



ITT

ENGINEERED FOR LIFE

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 industry-leading and proprietary Blue Generation® plating for high-speed rail and industrial applications, to our innovative Black Zinc Nickel plating treatment for the Aerospace & Defense market, our high-performance plating treatments are both RoHS and REACH compliant. They also add an extra layer of 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 High-Speed Rail 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 high speed rail 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 typically 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, will be banned for production of connector finishes in Europe by September 2017. Exemptions

for markets as in RoHS will not be granted. Recent European legislation recommends replacing Chrome VI in any product used in the European Union. A continued use of products containing Chrome VI to a defined percentage shall be possible beyond 2017, but many companies have already adopted a zero tolerance strategy and will not allow continued usage.

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® 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



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 Nemesis Space Saver Connector Features Black Electroless Nickel Plating for Soldier Worn Applications

ITT Cannon's Black Electroless Nickel is a RoHS-compliant, cost-effective and sustainable plating alternative to Cadmium. It offers the same level of harsh environment protection, temperature ranges and electrical performance as Cadmium finishes. ITT Cannon's Black Electroless Nickel plating is non-reflective and remains functional for up to 500 hours of salt spray exposure.



Cannon Nemesis Space Saver with Black Electroless Nickel Plating

ITT recommended environmental platings

Zinc Nickel Blue Generation A240/T240

Best technical alternative to Cadmium 500 hours salt spray, excellent shielding

Recommended usage:



Zinc Cobalt Black A239

Fully approved and listed to VG95234

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 CA-COM / 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)	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	VG95234
	Zn Cobalt Black (A232)	yes	yes	200h	yes	undefined	black	-
	Zn Cobalt Green (A233)	yes	yes	200h	yes	< 5 mOhm	olive drab green	-
	Zn Cobalt Black (A239)	yes	yes	48h	yes	< 5 mOhm	black	VG95234
	Zn Nickel Blue (A240)	yes	yes	500h	yes	< 10 mOhm	grey-blue	-
CA-COM	Nickel	yes	yes	< 48h	yes	< 5 mOhm	silver	-
CGE (VG96929)	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	VG96929
	Zn Cobalt Black (A239)	yes	yes	48h	yes	< 5 mOhm	black	-
	Zn Nickel Blue (A240)	yes	yes	500h	yes	< 10mOhm	grey-blue	-
CGF	Zn Cobalt Green (A233)	yes	yes	200h	yes	< 5 mOhm	olive drab green	-
CGL	Nickel	yes	yes	< 48h	yes	< 5 mOhm	silver	-
	Zn Nickel Blue (A240)	yes	yes	500h	yes	< 10 mOhm	grey-blue	-
CGK (VG96912)	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	VG96912
KPSE (VG95328)	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	VG95328
	Nickel	yes	yes	< 48h	yes	< 5mOhm	silver	
	Zn Cobalt Black (A232)	yes	yes	200h	yes	undefined	black	
	Zn Cobalt Green (A233)	yes	yes	200h	yes	< 5 mOhm	olive drab green	
	Zn Nickel Blue (A240)	yes	yes	500h	no	not applicable	grey-blue	
KPT	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	VG95328
	Nickel	yes	yes	< 48h	yes	< 5mOhm	silver	
	Zn Cobalt Black (A232)	yes	yes	200h	yes	undefined	black	
	Zn Cobalt Green (A233)	yes	yes	200h	yes	< 5 mOhm	olive drab green	
	Zn Nickel Blue (A240)	yes	yes	500h	no	not applicable	grey-blue	
KPTC	Cadmium	no	no	500h	yes	< 5 mOhm	olive drab green	
	Nickel	yes	yes	< 48h	yes	< 5mOhm	silver	
	Zn Cobalt Black (A232)	yes	yes	200h	yes	undefined	black	
	Zn Cobalt Green (A233)	yes	yes	200h	yes	< 5 mOhm	olive drab green	
	Zn Nickel Blue (A240)	yes	yes	500h	no	not applicable	grey-blue	
KPTC NG	Nickel	yes	yes	< 48h	yes	< 5mOhm	silver	
CIR/FRCIR	Cadmium (T3)	no	no	500h	yes	< 5 mOhm	olive drab green	MIL/VG
VE-VS	Zn Cobalt Black (T108)	yes	yes	200h	yes	undefined	black	
VPT	Zn Cobalt Green (T100)	no	no	200h	yes	< 5 mOhm	olive drab green	
DS-DSH	Epoxyurethanic varnish (T39)	yes	yes	500h	no	not applicable	black	
Others Veam	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	< 5mOhm	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	

* "undefined" indicates that due to varying conductivity values a max shell to shell conductivity cannot be clearly defined

** all platings are cross compatible / backwards compatible with Cadmium platings (except for T89 & T39)

*** The Product Lines listed in this Plating Matrix are typically 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.

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	500 hours	Yes	2,5 mOhm	Gray	Commercial
	Black Zi-Ni	Yes	500 hours	Yes	2,5 mOhm	Black	Commercial
	Black Zi Cobalt (A296)	Yes	96 hours	Yes	5 mOhm	Black	Commercial
	Electroless Nickel	Yes	48 hours	Yes	2,5 mOhm	Silver	38999-Style
	Electroless Nickel Space Grade	Yes	48 hours	Yes	2,5 mOhm	Silver	38999-Style
	Olive Drab Cadmium over Electroless Nickel	No	500 hours	Yes	2,5 mOhm	Olive	38999-Style
BKA (ARINC 600)	Clear Trivalent Chromate (A297)	Yes	168 hours	No	5 mOhm	Silver	ARINC 600
	Electroless Nickel	Yes	48 hours	Yes	2,5 mOhm	Silver	ARINC 600
DPX (ARINC404)	Electroless Nickel	Yes	48 hours	Yes	2,5 mOhm	Silver	ARINC 404
DPK (M83733-Style)	Electroless Nickel	Yes	48 hours	Yes	2,5 mOhm	Silver	M83733-Style
KPT, KPSE (26482-Style)	Black Zi Cobalt (A206)	Yes	96 hours	Yes	2,5 mOhm	Black	Commercial
	Olive Drab Cadmium over Electroless Nickel	No	500 hours	Yes	2,5 mOhm	Olive	26482-Style
	Electroless Nickel (A71)	Yes	48 hours	Yes	2,5 mOhm	Silver	26482-Style
CA Threaded (5015)	Electroless Nickel (A71)	Yes	48 hours	No	2,5 mOhm	Silver	EIA-364-26
	Black Zinc Cobalt (A206)	Yes	48 hours	No	5 mOhm	Black	EIA-364-26
Nemesis	Black Electroless Ni	Yes	500 hours	Yes	2,5 mOhm	Black	EIA-364-26
	Electroless Nickel (A71)	Yes	48 hours	Yes	2,5 mOhm	Silver	EIA-364-26
MKJ	PTFE-Ni	Yes	500 hours	Yes	2,5 mOhm	Gray	EIA-364-26
	Black Zi-Ni	Yes	500 hours	Yes	2,5 mOhm	Black	EIA-364-26
	Black Anodize	Yes	48 hours	No	Non-Conductive	Black	EIA-364-26
	Electroless Nickel	Yes	48 hours	No	2,5 mOhm	Silver	EIA-364-26
Micro-D	Electroless Nickel	Yes	48 hours	No	2,5 mOhm	Silver	83513-Style
D-Sub	Yellow Chromate over Cadmium (A101)	No	48 hours	No	5 mOhm	Yellow	EIA-364-26
	Yellow Chromate over Zinc (A183)	No	48 hours	No	5 mOhm	Golden yellow	EIA-364-26
	Passivated Stainless Steel (F225)	Yes	48 hours	No	5 mOhm	Silver	EIA-364-26
	Pure Tin over Nickel (K87, Plugs only)	Yes	48 hours	Yes	2,5 mOhm	Silver	Commercial
	Pure Tin over Nickel (A197, Receptacles only)	Yes	48 hours	Yes	2,5 mOhm	Silver	Commercial

*** The Product Lines listed in this Plating Matrix are typically 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.

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

Connect with the experts

ITT's Cannon and Veam brands are world leaders in the design and manufacture of highly engineered connector solutions for multiple end markets.



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