

INTRODUCTION

Connectors for
**DEFENCE • AEROSPACE •
MARINE • MOTORSPORT •
INDUSTRIAL**

Innovative Connector Solutions

Niche Connector Design Services

We specialise in providing harsh environment connectors and by working closely with our customers, bring value added benefits to the partnership by presenting totally niche designs or customisation of existing MIL-Spec and high performance products.

Our service helps to free our customers up, by taking the lead in the provision of design driven solutions to their challenges whilst paying great attention to the physical detail, durability, chemical resistance and hermetic sealing capability as well as addressing any temperature, vibration and EMI envelopes.

Hermetic Pressurised & severe conditions.

Environmental Harsh & demanding Applications.

Filter EMI & EMP protection.

MIL Series Connectors

In addition working closely with suppliers and manufacturers worldwide we offer a comprehensive range of other high performance connectors and associated products for harsh environments. These include but not limited to: MIL-DTL-38999, MIL-DTL-26482, MIL-DTL-5015, Industrial Environmental

Data and Commercial Connectors

Also included on these pages is a brief overview of the specialist data connectors and products designed for tough industrial applications that we can offer from our broad range of partners worldwide



Material and Finishes

Options

Overview of Common Variations

**Black is the Latest Green**

Military connectors are getting a 'green' make-over with an eco-friendly, cadmium-free black (non-reflective) plating. Having eliminated lead from virtually all electronic components, the directive on the Restriction of Hazardous Substances (RoHS) focusses attention on cadmium. Unlike lead, however, where defence, aeronautical and other critical equipment was exempt, the Ministry of Defence is set to phase out cadmium plating on military connectors. It will be replaced with a new, and more environmentally-friendly, black zinc nickel plating.

Material and Plating Attributes

| Plating Finish | Cadmium | Electroless Nickel | Black Zinc Nickel | Black Zinc Cobalt | Green Zinc Cobalt |
|--------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Colour | Olive Drab | Shiny Silver | Black | Black | Dark Green |
| Shell Continuity | 2.5 mΩ | 1 mΩ | 2.5 mΩ | 2.5 mΩ | 2.5 mΩ |
| Durability | 500 cycles | 500 cycles | 500 cycles | 500 cycles | 500 cycles |
| Temp. Range | -65°C to +175°C | -65°C to +200°C | -65°C to +175°C | -55°C to +125°C | -55°C to +125°C |
| EMI Shielding | >90dB @ 100 MHz >50dB @ 10GHz | >90dB @ 100 MHz >65dB @ 10GHz | >90dB @ 100 MHz >50dB @ 10GHz | >80dB @ 100 MHz >45dB @ 10GHz | >80dB @ 100 MHz >45dB @ 10GHz |
| Shell Conductivity | 2.5mV max | 1.0mV max | 2.5mV max | 5.0mV max | 5.0mV max |
| Salt Spray | 500 hours | 48 hours | 500 hours | 48 hours | 96 hours |
| RoHS Compliant | NO | YES | YES | YES | NO |

| Un-Plated Material | Nickel Alu Bronze | Stainless Steel | Composite |
|--------------------|-------------------|-----------------|-------------|
| Salt Spray | 500 hours | 2,000 hours | 2,000 hours |

Up to recently, Cadmium was the most widely used surface coating and industry preference for connectors and accessories complying with standard MIL-DTL-38999 in defence and aeronautical applications. To replace it with more environmentally friendly solutions a number of manufacturers have now industrialised and qualified their Electrolytic Zinc Nickel plating process to reduce or eliminate the use of Cadmium.

IS-Rayfast are pleased to offer a range of products with RoHS compliant plating alternative to Cadmium. Black Zinc Nickel plating is now available on a wide range of connectors and accessories including proprietary MIL-DTL-38999 and MIL-DTL-26482. This

conductive and non reflective black finish is approved for 500hrs salt spray endurance and is fast becoming the defence industry standard.

Black Zinc Nickel plating is compatible with other platings, without corrosion or electrochemical erosion with Cadmium, Zinc Cobalt or Electroless Nickel plated parts.

Electrical compatibility of Zinc Nickel with Cadmium

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

Niche Connectors

Innovative Solutions

Custom Design Service



Hermetic

Pressurised and Severe Conditions

Custom designed to match existing or specialist mounting requirements and meet the most stringent demands, including military standards.

Examples

- High Density & Light Weight. Titanium grade 4 circular connector with 56 Beryllium copper alloy contacts.
- Feed Through Connector. 316 Stainless steel body with gold plated alloy 52 contacts
- Ceramic D38999 Series III. Laser weld mount connector, available in aluminium, titanium and stainless steel.



Environmental

Harsh and Demanding Applications

Environmentally sealed connectors for defence and industrial applications where extra features or ruggedisation is required.

Examples

- Card Reader. Ruggedised Sim Card and SD card reader, with sealed dustcaps, PCB flex interfaces.
- Four-Way RJ45. Ruggedised 40GB high bandwidth, 5015 derived.
- Hybrid Fibre Optic & Copper Connector. Optical expanding beam contacts, single mode or multi-mode combined with power pin options.



Filter

EMI and EMP Protection

Designs may be optimised for use in a wide range of environments. Common electrical customisations include unique capacitance values on individual lines, electrostatic discharge designs and specific filter architectures including Pi, C, L-C and T configurations.

Examples

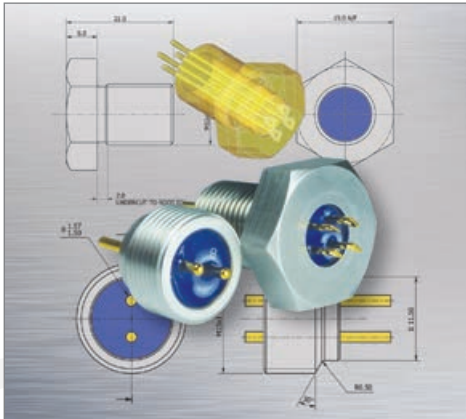
- Filtered Micro-D connector. Designs offer EMI solutions in miniaturised M83513 type, PCB pins.
- Filtered Power. MIL-DTL-5015 type reverse bayonet power and signal connector.
- Defence D38999 Filter Connector. Stainless steel dual flange shell.



Niche Connectors

Concept to Production

Project Examples

**Hermetic****Customer Requirement**

To replace an existing pyrotechnic ignition system with an electronic version with a need to separate the propellant from the electronics.

Features and Benefits

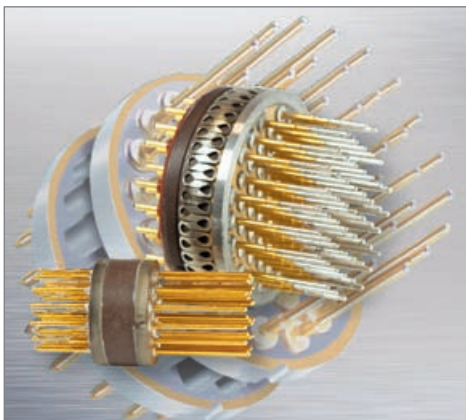
- Glass to metal seal provides hermetic seal isolating electronics from flammable fuel.
- High grade 316 stainless steel chosen for superior corrosion resistance and proven hermetic sealing properties.
- Gold plated alloy 52 contacts proving robust compression bonding to glass, capable of withstanding pressures in excess of 6000psi.

**Environmental****Customer Requirement**

To replace a legacy push-pull, pin and socket connector with a quicker and easier mate and de-mate capability.

Features and Benefits

- Magnetic orientation provides easy blind mating capability.
- Low insertion force provides simple and minimal wear.
- Magnetic coupling provides 2kg of break force preventing accidental dis-connect.
- Interface seal provides protection in harsh environments.

**Filter****Customer Requirement**

To filter out all potential electromagnetic interference on a control panel, whilst reducing size and weight.

Features and Benefits

- Ceramic planar filters embedded within the connectors to provide size and weight reduction over other solutions, such as separate PCB mounted filters.
- Different Pi filters provide wide range of EMI protection.
- Diodes incorporated, provide lightning protection capability to DO-160 levels.

Connectors

Data Connectors

Fibre Optic, RJ45, USB, Quadrax

Ruggedised and Standard



Fibre Optic

Singleway and multiway connectors for single-mode and multi-mode applications. Materials include Aluminium, Composite and Aluminium Bronze. With the most popular products including:

- Ruggedised singleway
- JN1055 (J62.710)
- 38999 Series III
- Multiway



Micro Communication

A miniature series of circular push-pull connectors intended for harsh environment applications and used extensively in soldier communications. Rugged shells, offering superior EMC performance and high environmental sealing to IP68. Features optional locking mechanism, typical shell sizes of 06, 07 and 08 with up to 37 contacts and suitability for overmoulding.



Ruggedised Micro-USB and HDMI

New generation of Micro-USB interface designed for harsh environment communication systems. Supports the current USB ON-The-Go (OTG) supplement. Includes backshell for strain relief and screen termination, 2000 mating cycles and miniature footprint with <16mm diameter. Please contact us regards this and other projects including ruggedised MIL-spec HDMI connectors.



Ethernet RJ45

Data interconnect for both defence and industrial applications. There is an extensive selection of high performance Ethernet connectors and cable assemblies capable of supporting up to 10G, offering 360° EMC, IP68 sealing and mechanical protection. A typical Industrial connector has IP67 sealed, Metal or Plastic shell ODVA-Compliant, plus IEC 61076-3-106 Variant 1 bayonet coupling system.



Quadrax

Hundreds of unique Quadrax high-speed connector options. We can offer through our partners probably the largest range of Quadrax connectors available, with very attractive minimum order quantities and lead times. Typical shell materials available include Aluminium, Composite, Stainless Steel, Bronze and Titanium.



Commercial Environmental Miniature Circular Standard



C16-1 / C16-3 Series and C091 Series

The C16 series are designed to meet the requirements of industrial applications under harsh environments. Ruggedised, screw coupling, plastic bodied housing. Whilst the C91 series are designed and produced in conformity with the low voltage directive (73/23/EWG) and DIN EN 61984 (VDE 0627); IEC 60664-1 (VDE 0110-1) and IEC 60529.

Snap-in

A wide range of snap-in connectors are available in various configurations, offering from IP40 up to IP67 protection, internal strain relief, easy assembly and choice of optional colours. Typical characteristics:

- Mechanical operation >500 mating cycles.
- Temperature range -40°C to +85°C.
- Resistance $\leq 3 \text{ m}\Omega$.
- Contacts 3,5,8 or 12

Watertight Miniature

Innovative solution for industrial applications that includes a connector that is always watertight, even when un-mated, with no need for a protective cap. Ideal for all types of portable or hand held equipment and has a product life in excess of 5,000 mating cycles. With eight contacts, rated to 2A and 175V in solder and dip-solder versions catering for cable sizes from 2.5mm to 8.0mm \varnothing .

Circular Push-Pull

Precision modular connectors suitable for challenging environments including military, medical, industrial control, test and measurement, audio-video and telecommunications.

- Type B - Standard, IP50
- Type S - Standard, stepped inserts, IP50
- Type K - Rugged, IP66/68
- Type E - Rugged, stepped inserts, IP66/68

PowerLock

High current single pole connectors, for field installable power distribution systems, three phase motors, generators and distribution panels.

- 400A and 600A, continuous current ratings
- Colour coded and keyed
- Sealed to IP67 when mated ratings
- IP2X finger protected contacts