

# Stainless Steel M24308-qualified D-sub Connectors

Technical Article



Positronic®



The D-subminiature (D-sub) is one of the most recognizable connectors in the world. With over 60 years of service, the humble D-sub connector has found uses in almost every sector of industry. Offering a combination of slim profile and high pin count, it should come as no surprise that the military industry was ready to embrace the D-sub as an alternative to larger, heavier connectors.

The 1960s were a time of rapid development in the fields of aerospace and defense as the world was in the grip of the Cold War. In addition, the promise of space exploration provided a huge boost to innovation in supremely challenging environments. There was a real need for a change.



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For many years, military connectors had been circular, from Cannon's AF connector used in the Douglas DC-3 during the 1930s, to the latest generation of military specification connectors. Circular connectors are robust and provide good protection from the environment. However, circular connectors are bulky, and not always suitable for the new generation of electronic systems that were coming into service in the 1960s. The D-sub connector has been providing excellent reliability since then and has logged over 50 years of high-performance flight time.



The features that made the D-sub connector so popular decades ago are still relevant today. Modern designers still value the low profile and high pin count of D-sub connectors, as they offer a real alternative to bulky circular connectors. With current ratings of up to 7.5 Amps per pin, D-sub connectors also provide superior power density that rival more modern designs. But in order to be adopted into military service, the D-subminiature needs to be held to the same standards as the connectors designed specifically for the purpose.

There are military specifications for all parts, components and systems that are intended for use in defense equipment. A military specification describes all aspects of the product, from physical design and materials to testing and performance. The military specification provides a kind of shorthand, allowing the engineer to be sure that a product selected will perform well in harsh environments, and makes it easier for the military to adopt components.



The military document that describes the D-sub connector is MIL-DTL-24308, often shortened to M24308. The specification describes not only the physical dimensions of the connector, but also the materials that are to be used in its construction. Materials are of particular importance to connectors, as they are often mounted in locations that are exposed to extreme temperatures and harsh environments.

The bodies of circular military connectors are usually machined from aluminium alloys. These provide the connector with good mechanical strength and electrical shielding, but aluminium is vulnerable to corrosion from exposure to water, especially saltwater. In order to provide a connector that can resist damage, the shell can either be plated to provide protection against the elements or replaced with one manufactured from an alternative metal that is not so susceptible to corrosion.

In contrast, the shells of D-sub connectors are not machined. Rather, they are pressed from sheet steel, a process that provides a strong shell, with the added advantage that the process is quicker than machining.



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However, just as aluminium is susceptible to corrosion, so is steel. The oxidation of steel is familiar to us all in the form of rust.

Therefore, it is necessary to protect steel from the elements in the same way we would protect aluminium. Standard plating materials for steel include tin, zinc chromate or even cadmium, all of which offer differing levels of protection. It is always important to remember that plating is vulnerable to damage from frequent use, and some of the materials that are commonly used are toxic and harmful to the environment.

There is an alternative, however. Stainless steel is a relatively new alloy, being a little over 100 years old. Despite its relatively recent invention, its mechanical, chemical and thermal properties have made stainless steel one of the most useful materials in the world. It is strong, resistant to corrosion, and does not need plating to protect it from damage during every-day use.

Even though stainless steel is naturally resistant to corrosion, its properties can be improved still further by the process of passivation. This is not plating, but rather a chemical process in which an acid is used to form a chromium oxide layer over the base material. This layer reduces the iron content at the surface, which discourages the formation of rust. This oxidation process continues once in use and serves to heal any scratches in the surface that penetrate to the base material.

In addition to the mechanical and chemical properties of stainless steel, it is also electrically conductive, making it extremely useful when constructing the shells of connectors. By making the outer shell from a conductive material, the connector is shielded from electromagnetic interference (EMI), sometimes known as radio frequency interference (RFI). This shielding protects the integrity of the electrical signals that are being transmitted through the connector and prevents harmful radiation from damaging sensitive electronic equipment.

Stainless steel is therefore ideally suited for the construction of D-sub connectors, and the aerospace and defense industry was quick to understand the benefits that it could offer. The M24308 standard includes specifications for connectors using stainless steel in the shells of D-sub connectors.

Positronic has been manufacturing Qualified Products Listed (QPL) D-sub connectors for more than 30 years. While connectors manufactured with cadmium-plated steel shells are still available, concerns over the environmental impact of cadmium, combined with superior performance of stainless steel in harsh conditions make stainless an increasingly popular choice for the modern designer.

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In response, Positronic has added a further 168 QPL listed D-sub connectors to its range, bringing its total offering to nearly 600 stainless steel parts. This is the widest selection of stainless steel D-sub connectors on the market today, and reflects the continued commitment Positronic has to provide customers with high performance connectors for the harshest environments.

In addition to the availability of M24308-qualified connectors, the in-house capability of Positronic means that stainless steel can be offered as an option for its commercial and industrial D-sub connectors. With tens of thousands of configurations, the range of Positronic D-sub connectors provides customers from a wide array of industries access to the performance advantages of stainless steel.

In addition, Positronic is committed to providing stainless steel M24308-qualified D-sub connectors to customers with pricing identical to other, less capable finishes.

With dedicated in-house expertise, a vertically integrated US manufacturing plant, and competitive pricing, Positronic is ideally placed to be your partner-of-choice for the supply of stainless steel D-sub connectors. Whether you work in the military market or design for industrial customers, contact the Positronic Technical Sales team to learn the benefits that stainless steel could bring to your application.