Stainless Steels

In applications where extended corrosion protection is required, stainless steel Coiled Pins are available. There are two basic classifications of stainless steel used for manufacturing Coiled Pins; austenitic stainless and martensitic stainless.

Austenitic (Nickel) Stainless Steel (D)
Austenitic stainless steel provides the best corrosion protection against normal environmental conditions in both oxygenating and non-oxygenating atmospheres. It withstands fresh water and atmospheric marine conditions very well, and is suitable for many other industrial conditions including acidic environments. However, this material is not heat treated and therefore it is not as strong as the high carbon, alloy, and chrome stainless steels, and does not have the fatigue resistance of those materials. Austenitic stainless steel Coiled Pins are not recommended for high shock and vibration applications, and they should never be installed into hardened holes. Austenitic stainless steel Coiled Pins can be used in temperatures as low as -185ºC (-300ºF) and as high as 400ºC (750ºF).

Martensitic (Chrome) Stainless Steel (C)
Martensitic stainless steel provides both good corrosion resistance and excellent strength and fatigue properties. Martensitic stainless steel is not as corrosion resistant as austenitic stainless in non-oxygenating atmospheres, but it withstands the most common atmospheric and environmental conditions in the presence of free oxygen. The service temperatures for martensitic stainless steel Coiled Pins should be restricted to a minimum of -45ºC (-50ºF) and a maximum of 260ºC (500ºF). Martensitic stainless steel Coiled Pins are hardened and stress relieved per exacting standards, and are supplied with a dry to the touch rust preventative as standard.

Carbon and Alloy Steels

Carbon and alloy steels are the most cost effective and versatile materials available for use in Coiled Pins. These materials are readily available, easy to process, and have very uniform and predictable performance characteristics. The most noticeable limitation to these materials is corrosion protection. In most applications, the normal rust preventative oil is adequate for corrosion protection. In cases where extra protection is necessary, the benefits of coatings and stainless steel must be evaluated.

High Carbon Steel (B)
High carbon steel is one of the most versatile materials available. It provides very good shear strength and fatigue life suitable for most applications. This material is readily available, and is the most economical of all standard Coiled Pin materials in the absence of any plating or coating. The recommended service temperatures for high carbon steel Coiled Pins are between -45ºC (-50ºF) and 150ºC (300ºF). High carbon Coiled Pins are heat treated and have a dry to the touch rust preventative. Additional coatings and finishes can be applied to carbon steel to improve corrosion resistance, however for some applications, it may be more appropriate and cost beneficial to specify stainless steel when a high level of corrosion resistance is required.

Alloy Steel (W)
For Coiled Pins Ø16mm (Ø5/8") and larger, alloy steel is the standard material. This chrome vanadium alloy provides the same shear strength as high carbon steel, and has the same recommended service temperatures of -45ºC (-50ºF) to 150ºC (300ºF). Alloy steel Coiled Pins are also heat treated, and have a dry to the touch rust preventative applied as standard.

STANDARD MATERIALS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>GRADE</th>
<th>HARDNESS, VICKERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Carbon Steel</td>
<td>UNS G10700 / G10740 C67S (1.1231) / C75S (1.1248)</td>
<td>HV 420 – 545</td>
</tr>
<tr>
<td>Alloy Steel</td>
<td>UNS G61500 51CrV4 (1.8159)</td>
<td>HV 420 – 545</td>
</tr>
<tr>
<td>Stainless Steel, Austenitic (Nickel)</td>
<td>UNS S30200 / S30400 18-8 (1.4310)</td>
<td>Work Hardened</td>
</tr>
<tr>
<td>Stainless Steel, Martensitic (Chrome)</td>
<td>UNS S42000 X30Cr13 (1.4028)</td>
<td>HV 460 – 560</td>
</tr>
</tbody>
</table>

Other material types are available depending on the application requirements. SPIROL has extensive experience with special materials required for unique circumstances.
Coiled Pin Finishes

Protective finishes are generally used to improve the corrosion resistance of the base metal. There are many different coating types, such as electroplating, chemical conversion, immersion, and mechanical applications. Each of these processes has limitations when applied to Coiled Pins, and depending on the application there may be other concerns. SPIROL has extensive experience in recommending and selecting the right combination of material and finish for a variety of applications.

STANDARD FINISHES

Plain, Oiled (K)
This finish is a thin coating of dry-to-the-touch oil that provides corrosion resistance during storage and shipping. The lubrication reduces the coefficient of friction between the coils to facilitate insertion. Since this lubricating oil is suspended in a carrier which evaporates over time, the pins are dry-to-the-touch and conducive for automatic feeding and assembly.

Electroplated Zinc (T)
This finish consists of a minimum of 5µm (0.0002") thick electrodeposited zinc with a clear trivalent passivation topcoat. Zinc plate is primarily used for cosmetic purposes as this finish yields a bright, silvery appearance on the outside surfaces of the pin. Zinc plating is also commonly used to prevent galvanic corrosion. If atmospheric corrosion protection is required, a stainless steel pin should be considered. While hydrogen embrittlement relief measures are taken during production, designers should consider the risk associated with hydrogen embrittlement before specifying this finish.

AVAILABLE TO ORDER

Zinc Phosphate (R)
This zinc phosphate finish has a minimum coating weight of 11 g/m², and is used to provide a good surface on carbon steel for subsequent operations such as painting or oiling. On its own, zinc phosphate provides no corrosion protection. A dry-to-the-touch lubricating oil is added to phosphate coated pins to provide corrosion resistance during storage and shipping. This coating is mostly used for legacy applications, particularly in the firearms and military industries, and is rarely specified on new applications.

For military applications, a different protective oil is applied to the zinc phosphate than that used for commercial products. The more viscous oil is not suitable for automatic feeding.

Passivated (P)
While stainless steel pins are normally provided with a plain finish, passivation is available to meet application specific requirements. Passivation of Coiled Pins is a process whereby surface contaminates such as embedded tool steel and other free iron particles are removed. The sole purpose of passivation is to remove embedded iron; not to clean the part. SPIROL primarily uses carbide tooling that minimizes the occurrence of imbedded iron particulate, thereby often rendering the passivation process non-value added. In addition, many applications simply do not require passivation. Examples of critical applications where passivation is appropriate are medical devices, components used in the food or drug industry, fuel system applications, and any application requiring a clean environment.

Available only for stainless steel.

Oil Free (F)
Oil free pins undergo a special cleaning process to remove oil residues from the parts. This finish option is typically recommended for pins used in plastics that are incompatible with hydrocarbon based oils and thus susceptible to environmental stress corrosion cracking, as well as for medical or food processing applications.

Available only for stainless steel.

Additional special finishes are available upon request.
SPIROL Application Engineers will review your application needs and work with you to recommend the optimum solution. One way to start the process is to visit our Optimal Application Engineering portal at SPIROL.com.

Please refer to www.SPIROL.com for current specifications and standard product offerings.

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e-mail: info@spirol.com

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