



# GUIDELINES FOR THE SELECTION AND USE OF STAINLESS STEEL FASTENERS

## FASTENING

Although fasteners are available in many materials, stainless fasteners are a good first choice, especially if the materials being joined are stainless. Stainless fasteners are easy to make, in both standard and special designs, and they are readily available. Since corrosion resistance is an important aspect of product reliability, inherent in any attempt to prevent corrosion is the careful selection of fastener materials. A common practice in industry is to use fasteners made of metals or alloys that are equal to or more corrosion resistant than the materials they join. This practice is justified because the fasteners may have to withstand higher loads with greater unit stress than the parts being held together, and they are usually considerably smaller in surface area than the material being joined. Also, corrosion-weakened fasteners may lead to a more immediate failure with more serious consequences than the same amount of corrosive attack elsewhere in the assembly. Corrosion protection for a fastened joint encompasses much more than a consideration of the corrosion resistance of the fastener itself. Required is an analysis of the entire assembled joint as a system. This system includes structural design, material stresses, product life expectancy and environmental conditions. Where two dissimilar metals are in contact in the presence of an electrolyte, a battery effect is created, current flows, and one of the metals corrodes. In considering a bimetallic couple, it is important to know which of the two metals is more anodic (less noble). Any metal in this series will tend to have corrosion accelerated when it is coupled, in the presence of an electrolyte, with a metal in a lower position on the chart. The corrosion of this lower metal will tend to be reduced, or even avoided. A very important factor to consider in evaluating the potential for galvanic corrosion is the relative surface area of the two different metals in contact. For example, carbon steel is located above stainless steel in the galvanic series and is accordingly subject to accelerated corrosion when a galvanic couple is established. But the extent of this galvanic action depends on the relative surface area on each material. For instance, if small steel fasteners, such as rivets, are used to join stainless steel plates, and the assembly is exposed to water, the steel rivets will corrode quickly. If, on the other hand stainless rivets are used to join steel plates in water, both rivets and plates will suffer negligible galvanic attack, even in the immediate vicinity of the rivets. When the designer has determined candidate fastener materials on the basis of the corrosion-resistant properties, the next concern probably will be the mechanical and physical properties of these materials. Once again, the group of stainless steels covers a wide choice. The choice need not be difficult if the designer uses the guidelines available to him, such as the specifications published by the Industrial Fasteners Institute (IFI). Data on stainless steel fasteners are available for the Specialty Steel Industry of North America in the booklet "Stainless Steel Fasteners, A Systematic Approach to Their Selection".

## CHOOSING STAINLESS STEEL FASTENERS

### AUSTENITIC STAINLESS STEELS (18-8 - 300 SERIES)

Are in the 18-8 family of austenitic stainless steels that have tensile strengths in the 80KSI (552 MPa) and up range. They cannot be heat treated but are hardenable by cold working, such as by heading and thread rolling. They are non-magnetic in the annealed condition and only slightly magnetic in the cold worked condition. (18-8, 18% chromium, 8% nickel) 300 series stainless steels are typically used to produce tapping screws, wood screws, bolts, but since they cannot be heat treated, 300 series are not used in the manufacture of self drill screws or hardened bolts.

### 410 STAINLESS STEEL

A magnetic stainless steel having less corrosion resistance than the 300 series types. Type 410 is hardened by heat treatment to 125 -180 KSI tensile (862-1241 MPa). Self drilling screws are commonly available in 410 stainless. Type 410 is from the 400 series family of martensitic (11.5% - 13.5%) stainless steels. Straight chromium, containing no nickel.

### MARTENSITIC STAINLESS STEELS

Includes 410 stainless steel, and has lower resistance to corrosion than the 18-8 materials. It will resist corrosion in mild atmospheres, fresh water, mine water, steam, carbonic acid, crude oil, gasoline, alcohol and ammonia. Type 410 is selected for highly stressed parts needing the combination of strength and corrosion resistance.

### FERRITIC STAINLESS STEEL

They are straight chromium 400 series types that cannot be hardened by heat treatment and only moderately hardened by cold working. They are magnetic, have good ductility and resistance to corrosion and oxidation. Type 430 is the general purpose stainless of the ferritic group, having lower alloy content than 18-8 - 300 series and is used for highly polished trim applications in mild atmospheres. It is also used in nitric acid environments and food processing. Ferritic steels contain approximately 12% chromium.

## LELAND INDUSTRIES PRODUCES MANY FASTENERS FROM STAINLESS STEEL. COMMONLY AVAILABLE FASTENERS ARE SHOWN BELOW:

**MASTER GRIPPERS** - 300 series high tensile stainless steel

**MASTER GRIPPERS MDP (Mini Drill Point)** - 410 case hardened stainless steel

**MASTER TAPPERS - A - AB - B** - 300 series high tensile stainless steel

**MASTER DRILLERS** - 410 case hardened stainless steel

**MASTER ONE STEPPERS** - 300 series high tensile stainless steel & 410 case hardened stainless steel

**MACHINE SCREWS** - 302 or 430 stainless steel

**LELAND INDUSTRIES HAVE THE CAPABILITY OF PRODUCING FASTENERS IN MANY TYPES OF STAINLESS STEEL.  
CALL 1-800-263-3393 FOR AVAILABILITY AND TO DISCUSS YOUR APPLICATION.**