



# STAINLESS STEEL FOR BUTTERFLY VALVE STEMS

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**TECHNOLOGY UPDATE**

Stainless Steel is used in a variety of thermoplastic valves and piping system products where additional strength is needed. These applications include nuts, bolts, fasteners, reinforcements and special components such as Butterfly Valve stems. Selection of the appropriate Stainless Steel is critical in product design and development. For thermoplastic products, corrosion resistance is probably one of the most important characteristics.

Stainless Steel is a generic term that refers to a large group of iron-based alloys exhibiting superior resistance to rust and corrosion over plain carbon and low-alloy steels. Their improved corrosion resistance is due to relatively large amounts of Chromium (Cr). In general, corrosion resistance increases with Chromium content and can be further increased primarily by the addition of Nickel (Ni) and Molybdenum (Mo). Composition variations for these elements determines the different grades, more commonly referred to as "types", of stainless steel such as 316, 403, 416, 420, etc. Generally speaking, the "300" series stainless steels have higher corrosion resistance due to the addition of Nickel. Of these, type 316 exhibits among the highest in corrosion resistance from the addition of Molybdenum. Low Carbon (C) type 316 stainless steel - type 316L - gives additional resistance to potential for "sensitization" during heat processing, a situation that can set up intergranular corrosion.

Spears uses Type 316L Stainless Steel in Butterfly Valve Stems to provide the best in corrosion resistance. The following chart illustrates general resistance to a variety of corrosive environments for standard Butterfly Valve stem materials used by Spears and competitors.

Stainless Steel		Corrosive Environment							Butterfly Valve Stem Material			
Type	General Composition	Oxidizing Agents (Acids)	Reducing Agents (Bases)	Mild Chemicals	Fresh Water, Mild Atmosphere	Industrial Atmosphere	Marine Atmosphere	Salt Water	SPEARS®	Asahi	Chemtrol	Hayward
316L	C 16-18% Ni 10-14% Mo 2-3% C .03%	X	X	X	X	X	X	X	Std.			
316	Cr 16-18% Ni 10-14% Mo 2-3% C .08%	X	X	X	X	X	X	X		Option <sup>2</sup>	Option <sup>2</sup>	Option <sup>2</sup>
403	Cr 11.5-18% Ni 0% Mo 0% C .15%			X	X					Std.		
416	Cr 12-14% Ni 10-14% Mo .6% <sup>1</sup> C .15%				X							Std.
420	Cr 12-14% Ni 0% Mo 0% C .15%				X						Std.	

Notes: 1 - Inclusion of Molybdenum in type 416 is optional  
2 - Optional at additional cost

Due to variations in corrosive environments, testing and evaluation should be made prior to placing product into service. Information shown is believed to be accurate, however no recommendations of compatibility nor warranties of any kind are expressed or implied.



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