




# Metal Bellows Comparison

Electrodeposited	vs.	Edge Welded	vs.	Hydroformed
				
<b>Measurements</b>				
0.020 inches (0.5 mm)	<b>vs.</b>	<b>Smallest OD (Min OD)</b> 0.358 inches (9.1 mm)	<b>vs.</b>	0.25 inches (6.35 mm)
9 inches (228 mm)	<b>vs.</b>	<b>Largest OD (Max OD)</b> 26 inches (660 mm)	<b>vs.</b>	43" (tooled) 50" max (not tooled)
10 inches (254 mm)	<b>vs.</b>	<b>Max Convolution Length (One Section)</b> 96 inches (2438 mm)	<b>vs.</b>	Varies by ID size and material Wall thickness 3" - 200 ft.
<b>Stroke</b>				
35% free length (typical) up to 50% possible for certain applications.	<b>vs.</b>	Certain bellows designs can stroke as long as the free length. Typically with a max 25% of stroke in extension with 75% of stroke in compression. These percentages can be modified with heat treatment.	<b>vs.</b>	Typical 15% compression 10% extension free length. Special design up to 35% between compression and extension.
<b>Sensitivity</b>				
Very Sensitive. Can be designed to deflect with a force as low as 4 grams (0.14 oz.).	<b>vs.</b>	Varies with bellows size, material thickness, and length. Spring rates of 1 pound/inch or less are easily achievable if desired.	<b>vs.</b>	Varies with material thickness and convolution design.
<b>Minimum Wall Thickness</b>				
0.0002 inch (0.005 mm)	<b>vs.</b>	0.002 inch (0.051 mm)	<b>vs.</b>	0.002 inch (0.051 mm)
<b>Leak Rate</b>				
1x10 <sup>-6</sup> cc He/sec @ 1 atm standard (1x10 <sup>-9</sup> cc He/sec @ 1 atm as required)	<b>vs.</b>	1x10 <sup>-5</sup> to 1x10 <sup>-9</sup> cc He/sec. (standard based on material)	<b>vs.</b>	1x10 <sup>-9</sup> cc He/sec
<b>Corrosion Resistance</b>				
MW Components FlexNickel® Alloy suited for air and hydrocarbon environment. Not recommended for sea water or acidic environments without Gold plate or Parylene coating to enhance corrosion resistance.	<b>vs.</b>	Wide material selection available for many applications including seawater, acidic, alkaline, and downhole environment.	<b>vs.</b>	SS 300 Series - appropriate for basic corrosion protection; Hastelloy® C22, C276 - corrosive resistant; Monel™ - seawater; Inconel® - heat & corrosion resistant.

# Metal Bellows Comparison

Electrodeposited	vs.	Edge Welded	vs.	Hydroformed
<b>Maximum Pressure (Differential)</b>				
Depending on design, up to 10,000 psi.	vs.	Certain designs can withstand up to 2,500 psi (external). We have achieved over 15,000 psi (external) with an oil filled (internal design).	vs.	Varies based on wall thickness of material with braid (1,000 - 3500 PSI).
<b>Temperature Range</b>				
MW Components FlexNickel®Alloy: 350°F (177°C) Copper Bellows: 200°F (93°C)	vs.	<b>High Temperature</b> 1500°F (815°C)	vs.	Stainless Steel – 900°F Inconel over 900° F (recommended)
-423°F (-253°C) or lower may be possible.	vs.	<b>Low Temperature</b> -420°F (-251°C)	vs.	-420°F (251°C)”
<b>Tooling Cost</b>				
Bellows typically have no tooling cost. NRE charges for Leak Test, Spring Rate, and Assembly fixtures may apply.	vs.	For a complete set of new bellows tooling, for OD's between 0.5” and 10”, typically ranges between \$4500 to \$8000.	vs.	\$500 - \$2500
<b>Material</b>				
MW Components FlexNickel®Alloy and Copper. Coatings Available: Gold, Silver, Tin, Parylene.	vs.	AM350, 304L SS, 316L SS, 321 SS, 347 SS, Titanium Gr 2, Haynes 242, Hastelloy® C276, Inconel® 600, 625, 718 Aluminum.	vs.	Nickel alloys, 321 SS, 316L SS, Inconel® 600, 625, 718, Hastelloy® C22, C276, Copper, Brass, Phosphorous Bronze, Titanium, Monel®.
<b>Life Cycles</b>				
Up to 1,000,000,000 cycles (Theoretical “Infinite” Life).	vs.	Many designs guaranteed up to 3,000,000 with even greater cycles achieved in use.	vs.	Varies: 1,000,000 - 30,000,000 or more.

These variables represent guidelines for typical user applications and designs. Consult a technical support engineer for parameters outside these industry best practices.



**MW Components**

To learn more visit [MWComponents.com](http://MWComponents.com) or contact us at 704.280.8875 | [sales@mwcomponents.com](mailto:sales@mwcomponents.com)

Copyright MW Components.