Metal Bellows Comparison

MW Components

Electrodeposited	vs.	Edge Welded	vs.	Formed
				
Measurements				
0.020" (0.5 mm)	**vs.**	**Smallest OD (Min OD)** 0.358" (9.1 mm)	**vs.**	0.38" (6.35 mm)
9" (228 mm)	**vs.**	**Largest OD (Max OD)** 22.20" (564 mm)	**vs.**	43" (1,092.2 mm)
10" (254 mm)	**vs.**	**Max Convolution Length** (One Section) 96" (2438 mm)	**vs.**	Varies by ID size and material Wall thickness.
Stroke				
35% free length (typical) up to 50% possible for certain applications.	**vs.**	Certain bellows designs can stroke as long as the free length. Typically with a max 20% of stroke in extension with 80% of stroke in compression. These percentages can be modified with heat treatment.	**vs.**	Typical 15% compression 10% extension free length. Special design up to 35% between compression and extension.
Sensitivity				
Very Sensitive. Can be designed to deflect with a force as low as 4 grams (0.14 oz.).	**vs.**	Varies with bellows size, material thickness, and length. Spring rates of 1 lb/in or less are easily achievable if desired.	**vs.**	Varies with material thickness and convolution design.
Minimum Wall Thickness				
0.0002" (0.005 mm)	**vs.**	0.002" (0.051 mm)	**vs.**	0.004" (0.1016 mm)
Leak Rate				
$1x10^{-6}$ cc He/sec @ 1 atm standard ($1x10^{-9}$ cc He/sec @ 1 atm as required)	**vs.**	$1x10^{-5}$ to $1x10^{-9}$ cc He/sec. (standard based on material)	**vs.**	$1x10^{-9}$ cc He/sec
Corrosion Resistance				
MW Components FlexNickel®Alloy suited for air and hydrocarbon environment. Not recommended for sea water or acidic enviro ments without Gold plate or Parylene coating to enhance corrosion resistance.	**vs.**	Wide material selection available for many applications including fuel, seawater, acidic, alkaline, and downhole environment.	**vs.**	Wide material selection available for many applications including seawater, acidic, alkaline, and downhole environment.

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Maximum Pressure (Differential)				
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).
Temperature Range				
MW Components FlexNickel®Alloy: 350°F (177°C): Copper Bellows: 200°F (93°C)	vs.	**High Temperature** 1500°F (815°C)	vs.	Stainless Steel – 900°F Inconel over 900° F (recommended)
-423°F (-253°C) or lower may be possible.	vs.	**Low Temperature** -420°F (-251°C)	vs.	-420°F (251°C)"
Tooling Cost				
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.	Tooling and NRE varies depending on the configuration. Typical range: $750 - $2,500
Material				
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	vs.	Nickel alloys, 321 SS, 316L SS, Inconel® 600, 625, 718, Hastelloy® C22, C276, Copper, Brass, Phosphorous Bronze, Titanium, Monel®.
Life Cycles				
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.

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