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## Bellows Design Data Form

Please use this Guide to detail your bellows requirement. If you have any questions, please contact us.

Application Description:

Application (Check One):  Defense  Commercial  Other (Explain): \_\_\_\_\_

Quantities Required: \_\_\_\_\_ Date Required: \_\_\_\_\_

Target Price at Quantity: \_\_\_\_\_

### Dimensional Requirements (See Page 2 for explanation of the Data Form Terminology)

Please enter bellows characteristics below. If a characteristic is unknown (UK), not applicable (N/A), or to be determined (TBD), please enter to clarify design requirements.

Bellows OD: Max: \_\_\_\_\_ Min: \_\_\_\_\_ Effective Area: \_\_\_\_\_

Bellows ID: Max: \_\_\_\_\_ Min: \_\_\_\_\_

Bellows Free Length: \_\_\_\_\_

Assembly required:  No  Yes (Please Provide Drawing or Sketch to detail concept and/or end pieces if applicable)

### Environmental Background

Bellows Material: \_\_\_\_\_

Temperature: Max: \_\_\_\_\_ Min: \_\_\_\_\_ Operating: \_\_\_\_\_

Media / Environment:

### Performance Requirements

Pressure Responsive:

No  Yes

If Yes, please explain:

Leak Test Required:  No  Yes Leak Rate \_\_\_\_\_

Operating Pressure: \_\_\_\_\_

Max. Internal Pressure: \_\_\_\_\_ Max. External Pressure: \_\_\_\_\_

Total Stroke: \_\_\_\_\_ Compression: \_\_\_\_\_ Extension: \_\_\_\_\_

Lateral Offset: \_\_\_\_\_ Angular Offset: \_\_\_\_\_

Spring Rate: \_\_\_\_\_ Life Cycle: \_\_\_\_\_

Cycle Rate: \_\_\_\_\_

# Servometer®/PMG, LLC

## Explanation of Design Data Form Terms

**Application Description:** This gives a description on how the bellows will be used.

**Application:** This relates whether the application is for a commercial, defense, or other application, and assists in determining what, if any, Export Controls would apply to the bellows or bellows assembly.

### Dimensional Requirements

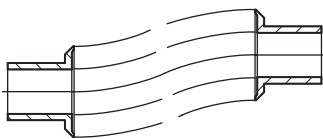
- **Bellows OD, max. /min:** This is the bellows acceptable outside diameter range for the application. This helps to define the acceptable size envelope for the bellows. It is critical for tool selection to optimize performance.
- **Bellows ID, max. /min:** This is the bellows acceptable inside diameter range for the application. This helps to define the acceptable size envelope for the bellows.
- **Effective Area:** This is the equivalent piston surface area of the bellows, as defined by the bellows OD and ID.
- **Bellows Free Length:** This is the as manufactured length of the bellows convolutions, with the bellows at a neutral at rest position with no applied forces acting on it.
- **Assembly Required:** This lets the design engineer know if assembly of the bellows to end pieces is required.

### Environmental Background

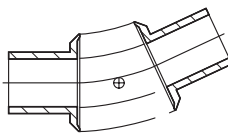
- **Bellows Material:** This is the bellows material required for the application, if known.
- **Temperature, Max/Min :** This is the potential range of temperatures that the bellows or bellows assemblies might be exposed to in the application.
- **Operating Temperature:** This the temperature that the bellows or bellows assembly will experience during normal operation.
- **Media / Environment:** This is the type of environment or substances (gas, liquids, and materials) that the bellows would be exposed to in the application.

### Performance Requirements

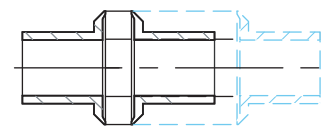
- **Pressure responsive:** Will the bellows or bellows assembly need to respond to changes in pressure in the application?
- **Leak Test Required:** Determines whether the application requires that the bellows or bellows assembly be leak tight.
- **Leak Rate:** If the bellows or bellows assembly is required to be leak tested, if known, give the required leak rate. The achievable leak rate will vary as a function of the bellows material.
- **Operating Pressure:** If the bellows needs to be leak tight, this is the differential pressure the bellows will be subjected to in the application. It is important to specify if the pressure will be applied internally or externally to the bellows.
- **Maximum Internal Pressure:** If the bellows needs to be leak tight, this is the maximum differential applied internally to the bellows, in the application.
- **Maximum External Pressure:** If the bellows needs to be leak tight, this is the maximum differential applied externally to the bellows, in the application.
- **Total Stroke:** This is the total axial deflection that the bellows will see in the application. This represents the total of the axial deflections of the bellows, from its nominal at rest length, in compression and extension.
- **Compression:** In the application, this is the axial deflection, from its nominal at rest length, that the bellows will see in compression.
- **Extension:** In the application, this is the axial deflection from its nominal at rest length that the bellows will see in extension.
- **Lateral Offset:** This the distance between the centerlines of the ends of the bellows that are parallel but not on the same line.
- **Angular Offset:** This is the angle between the centerlines of the ends of the bellows.
- **Spring Rate:** If known or required for performance, this the spring rate (force per linear deflection), of the bellows.
- **Life Cycle:** This is the expected life expectancy of the bellows, as required by the application, considering the loads and deflections that the bellows will be subjected to in the application.
- **Cycle Rate:** This is the rate or speed (cycles per unit time) that the bellows will experience in the application.



Lateral Offset



Angular Offset



Axial Compression and Extension