ITT

Air Spring Technologies



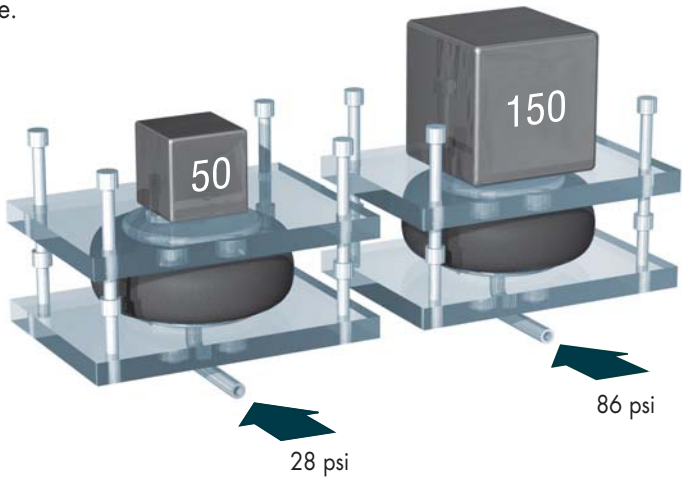


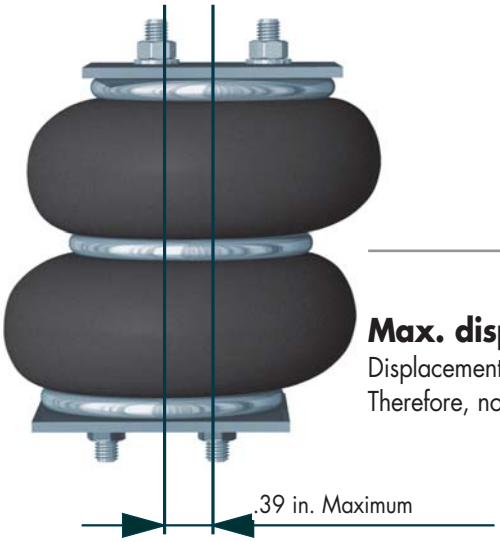
Engineered for life

Advantages of Enidine Air Springs

Simple construction

Varying loads can be supported by one Air Spring size.
Therefore, no re-design is necessary for varying loads.



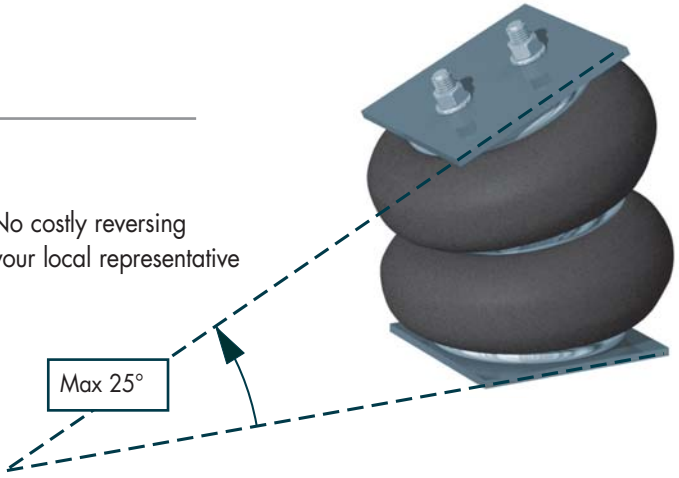


Max. displacement .39 in.

Displacement permissible between upper and lower end plate.
Therefore, no costly machining of mounting holes is necessary.

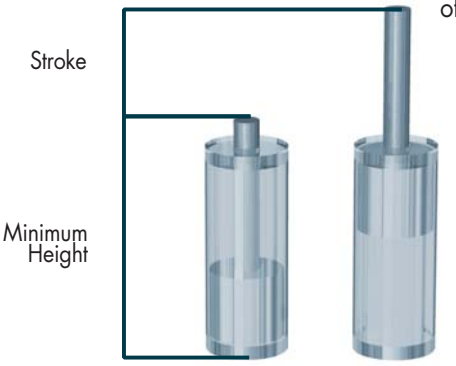
Maximum tilt angle of 25°

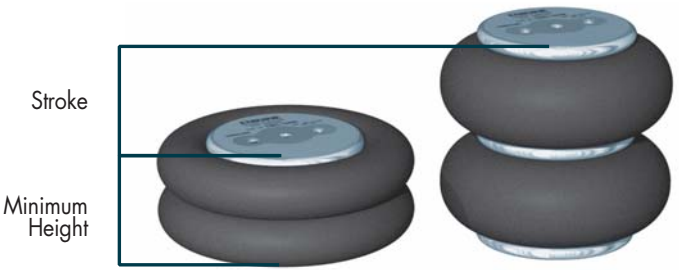
A maximum tilt angle of 25° is allowable. No costly reversing devices are necessary. Contact Enidine or your local representative for technical help.



Little space required, no sealing required

Compared to conventional pneumatic cylinders, the minimum height of the Enidine Air Spring is significantly lower at the same stroke.





Standard Materials

Flex Members: Fabric-reinforced Neoprene
Fabric-reinforced natural rubber

End Retainers: Forged steel
Cast zinc alloy
Cast aluminum

Operating Temperature Range

Fabric-reinforced Neoprene: -40°F to 150°F (-40°C to 65°C)

Fabric-reinforced Natural Rubber: -76°F to 150°F (-60°C to 65°C)

NOTE: See temperature range guidelines on page 4, for details.

Environmental Considerations

Good for most industrial applications. Can be affected by certain chemicals. Contact Enidine or your Local Representative for specific information.

Ordering Information

EXAMPLE:

100 **YI-1B6** - **535**

1. *Select Quantity*

2. *Select Product Description Number from Selection Chart*

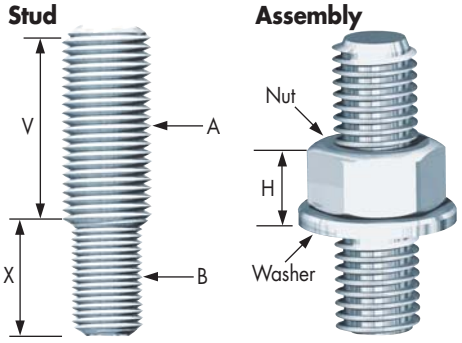
3. *Select Assembly Number from Selection Chart*

Model Number

Accessories

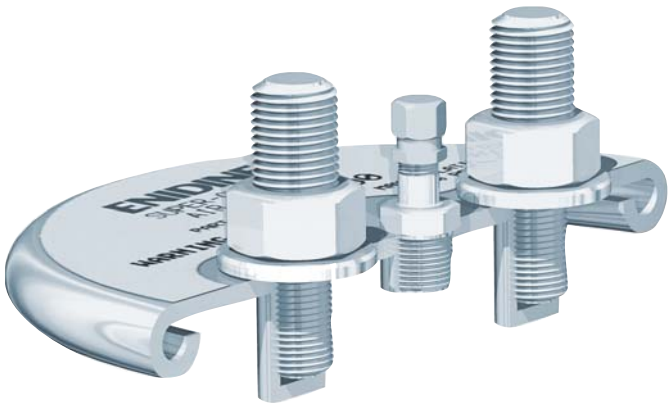
Assembly (Stud + Nut + Washer)

Part Number	A	B	H in.	V in.	X in.
YI-578-9-056	1/2″ UNC	3/8″ UNC	.53	2.50	.56

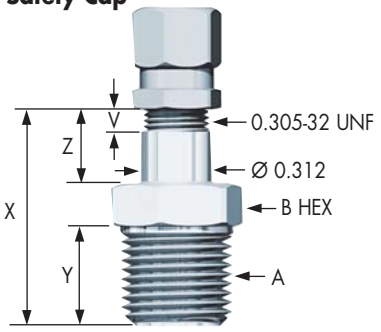


Tank Valves Including Safety Cap

Part Number	A	B in.	V in.	X in.	Y in.	Z in.
YI-579-08-9-033	1/8″ NPTF	.44	.31	1.31	.38	.75
YI-578-92-9-122	1/4″ NPTF	.56	.31	1.31	.56	.56
YI-579-08-9-033M	1/8″ BSP	.51	.31	1.66	.51	.87
YI-578-92-9-122M	1/4″ BSP	.91	.31	1.66	.51	.87

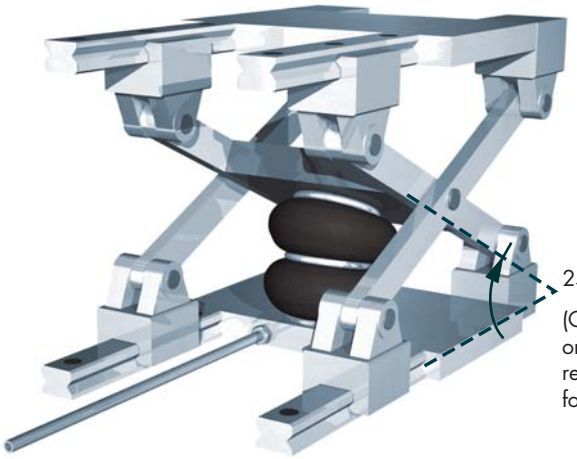


Tank Valve Including Safety Cap



Typical Applications for Actuation

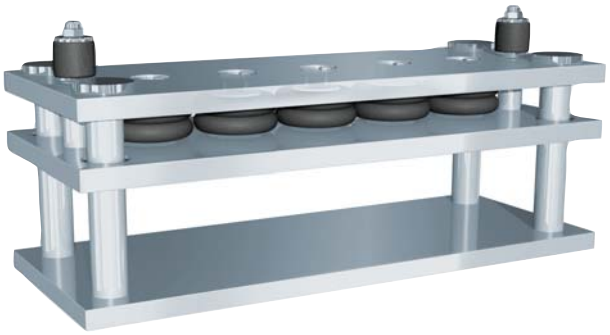
Scissor Lifts



- Scissor lifts
- Injection or ejection of parts in manufacturing equipment
- Vertical lift force for platforms and rotating tables
- Conveyor or transfer systems
- Rotary shaft actuators

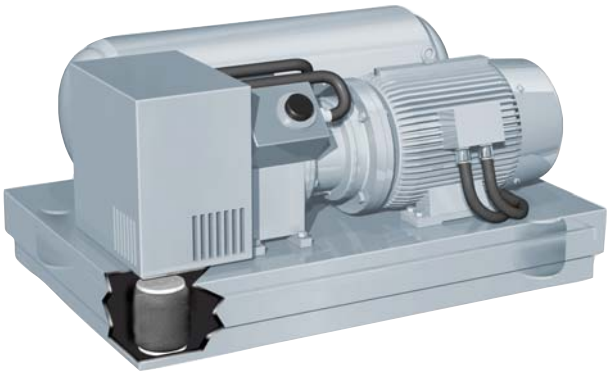
Presses

- Bin-tilting devices
- Palletizers, label applicators in packaging equipment
- Amusement park rides
- Clutch and brake systems



Typical Applications for Vibration Isolation

Compressors



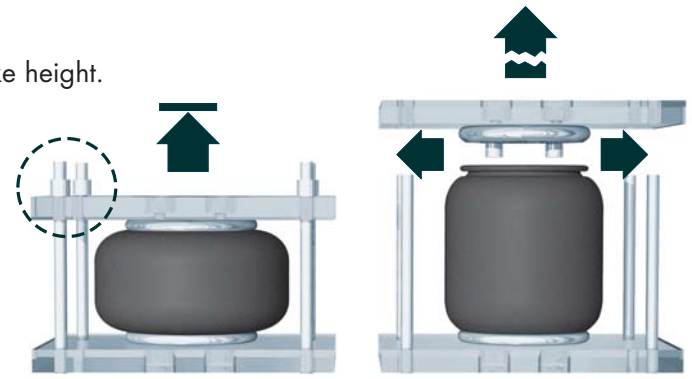
- Vibratory conveyors
- Large drying machines
- Centrifugal separators
- Coordinate measuring tables and machinery
- Commercial laundry machines

Electronic Equipment

- Textile looms
- Conveyor loading points
- Compressors
- Electronic equipment

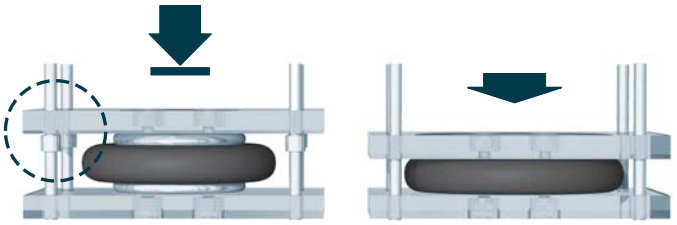


Provide stroke limitations,
to prevent exceeding the maximum allowable stroke height.



Correct | Incorrect

Provide stops for minimal height,
or use Air Springs with, optional Internal Bumper.



Correct | Incorrect

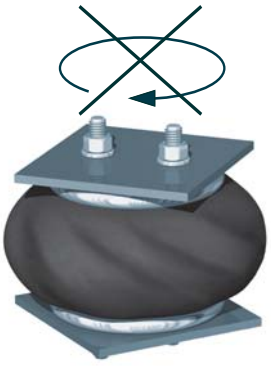
Max. allowable pressure: 100 psi (7 bar).



up to 100 psi (7 bar)
Correct

above 100 psi (7 bar)
Incorrect

Never use Air Springs in torsion.



Incorrect

Sizing Air Springs for Actuation

Selecting an Enidine Air Spring for Actuation

Application Worksheet: Actuation

The following data should be given:	Symbol	Unit
1. Total force required for actuation	F_t	_____ lbs.
2. Number of actuators	n	_____
3. Stroke required	s	_____ in.
4. Available air pressure at the point of installation	p	_____ psi
5. Working temperature range	t	_____ °F

6. An internal bumper will be required if any of the following conditions occur:

- External compression stops are not provided
- Severe impacting at the compressed height of the Air Spring.

☐ Internal Bumper
☐ No Bumper

7. Is a constant actuation force required for this application?

☐ Yes - only Sleeve and Rolling Lobe Type Air Springs
☐ No - all type Air Springs
☐ Yes

Calculation:

Force per Air Spring

$F = \frac{F_t}{n}$ lbs.

F = _____ lbs.

Example:

F_t = 4,400 lbs.

n = 4

$F = \frac{4{,}400 \text{ lbs.}}{4}$

F = 1,100 lbs.

Corrected Force [F_c]:*

$F_c = \frac{F \times 100 \text{ psi}}{p}$

F_c = _____ lbs.

Example:

p = 50 psi

$F_c = \frac{1{,}100 \times 100}{50}$

F_c = 2,200 lbs.

**All Force values in the Selection Chart are based on a maximum operating pressure of 100 psi. Actual force capabilities of the Air Spring depends on the air pressure available. The Corrected Force calculation compensates for available air pressure.*

Sizing Instructions

Step 1: Fill out the Application Worksheet.

Step 2: In most applications, a constant actuation force over the stroke is not required and sizing should begin with Single Convolute Bellows Type Air Springs. However, if a constant actuation force over the stroke is required, consider only the Sleeve and Rolling Lobe Type Air Springs.

Step 3: Refer to the Selection Chart under ***Actuation Specifications***. In the ***Force lbs. @ 100 psi @ A Stroke Of:*** Data Table choose the column that is equal to or exceeds the Stroke Required (S) (i.e., if a stroke of 2.5 in. is required, refer to the ***3.0 in.*** column). Identify the first Air Spring model that will generate a force equal to or greater than the Corrected Force (F_C) required. This is the Enidine Air Spring that will best serve your application. Select a model that includes an internal bumper if one is needed in the application. Availability of internal bumpers can be found under the ***Features*** table for each Air Spring.

Step 4: Verify the ***Envelope Dimensions*** of the selected Enidine Air Spring to ensure that the Air Spring will fit the application. Allow a 2 in. clearance on the diameter to prevent abrasion of the flex member. Select the ***Model Number*** that provides the ***Features*** and ***Mounting Dimensions*** required for the application.

Installation Considerations

- External extension stops are required to limit the extension of the Air Spring(s).
- The path of motion must be guided, as Air Springs provide little lateral stability.

Sizing Example

A 3,200 lb. conveyor carrying an 1,200 lb. package needs to be lifted 1.8 in. to transfer the package to another conveyor. There will be four Actuators utilized and the warehouse has air lines with 50 psi. A constant actuation force is not required. Ambient temperature is 68°F. There is a 12 in. square space to house each Air Spring. Compression and extension stops are provided. Any ***Air Fitting Port*** and ***End Retainer Style*** would be acceptable.

Step 1: From the completed Application Worksheet, we know:

- Corrected force per actuator is 2,200 lbs.
- Stroke required is 1.8 inches
- An internal bumper is not required
- A constant actuation force is not required
- Working temperature is 68°F

Step 2: A constant force is not needed. Therefore, all Air Spring types are considered, beginning with Single Convolute Bellows.

Step 3: In the ***2.0 in.*** column under the ***Force lbs. @ 100 psi @ A Stroke Of:*** Data Table, identify an Air Spring that can generate 2,200 lbs. of force. No internal bumper is required. Model YI-1B8-550 is selected.

Step 4: The maximum diameter of a YI-1B8-550 is 8.7 in. Therefore, we need a 10.7 in. diameter space to house the Air Spring. A 12 in. square space will easily house the Air Spring. Any ***Air Fitting Port*** and ***End Retainer Style*** would be acceptable. Model YI-1B8-550 is selected.

Application Worksheet: Vibration Isolation

The following data should be given:	Symbol	Unit
1. Total load	W_t	_____ lbs.
2. Number of isolators	n	_____
3. Input excitation frequency	*fi*	CPM or RPM/60 = Hz _____ Hz
4. Available air pressure at the point of Installation	p	_____ psi **
5. Working temperature range	t	_____ °F
6. Required isolation	I	☐ 80 % ☐ 90 %
7. An internal bumper will be required if any of the following conditions occur: - External compression stops are not provided. - Severe impacting at the compressed height of the Air Spring. - Operation of vibrating equipment on a deflated Air Spring.		☐ Internal Bumper ☐ No Bumper ☐ Yes

Calculation:

Load per Air Spring:

$W = \frac{W_t}{n} =$ _____ lbs.

Example:

W_t = 8,500 lbs.
n = 4

$W = \frac{8,500}{4}$

W= 2,125 lbs.

Corrected Load [W_c]:

$W_c = \frac{W \times 100 \text{ psi}^*}{p}$

$W_c =$ _____ lbs.

Example:

p = 100 psi

$W_c = \frac{2,125 \times 100}{100}$

W_c = 2,125 lbs.

**All Load values in the Selection Charts are based on a maximum operating pressure of 100 psi. Actual load bearing capabilities of the Air Spring depend on the air pressure available. The Corrected Load calculation compensates for available air pressure.*

*** If no air lines are available, a tank valve should be utilized; use 100 psi to select an Air Spring.*

Sizing Instructions

Step 1: Fill out the Application Worksheet.

Step 2: Refer to the Selection Chart under ***Isolation Specifications***. In the ***Isolator Load Range @ 100 psi*** column, identify the first Air Spring model that will support the Corrected Load (W_C) required for the application. Check the Data Table for ***Percent Isolation at an Input Frequency Of:*** and compare the Input Excitation Frequency (f_i) to the input frequencies listed. Referring to the percent isolation for the model identified, estimate the approximate percent of isolation. If the first model identified does not meet the isolation requirements, then select the model that will **both** support the Corrected Load (W_C) and provide the required percent of isolation. Select a model that includes an internal bumper, if one is needed in the application. Availability of internal bumpers can be found under the ***Features*** Table for each Air Spring.

Step 3: Verify the ***Envelope Dimensions*** of the selected Air Spring to ensure that the Air Spring will fit the application. Allow a 2 in. clearance on the diameter to prevent abrasion of the flex member. Select the ***Model Number*** that provides the ***Features*** and ***Mounting Dimensions*** required for the application.

Installation Considerations

- To ensure stability, the distance from the floor to the center of gravity of the load should not exceed the shortest distance between Air Springs.
- Air Springs provide little lateral stability. Therefore, be sure to include a method of stabilization.
- Pressurize the Air Spring only when it is loaded.

Sizing Example

Vibrations generated by a pump weighing 8,500 lbs. and rotating at 600 RPM are being transmitted onto sensitive monitors, causing them to malfunction. To control these damaging vibrations, four Isolators, located symmetrically about the center of gravity, will be used. The ambient temperature range is 60°F to 140°F. Air lines are not available at the site. Therefore, a tank valve will be used. There is the possibility of depressurization of the Air Spring. An isolation of greater than 90% is required. There is a 12 in. diameter space to house the Air Spring. Any ***Air Fitting Port*** and ***End Retainer Style*** would be acceptable.

Step 1: From the completed Application Worksheet, we know:

- Load per isolator is 2,125 lbs.
- Because a tank valve is being utilized, size using 100 psi
- Corrected load per isolator is 2,125 lbs.
- Working temperature range is 60°F to 140°F
- Because of the possibility of depressurization, an internal bumper is required
- Input excitation frequency is 600 CPM

Step 2: The first Enidine Imperial Air Spring model that has an internal bumper and is capable of supporting the Corrected Load Per Isolator is the YI-1B8-554. This Air Spring provides 90% isolation at 435 CPM and 96% at 870 CPM. Therefore, at 600 CPM, the percent isolation is estimated to be 90%.

Step 3: The maximum diameter of a YI-1B8-554 is 8.7 in. Therefore, we need a 10.7 in. diameter space to house the Air Spring. A 12 in. diameter is available. Any ***Air Fitting Port*** and ***End Retainer Style*** would be acceptable. Imperial Model YI-1B8-554 is selected. (Note: this model has no internal bumper, therefore external endstops must also be used.)

Single Convolute Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

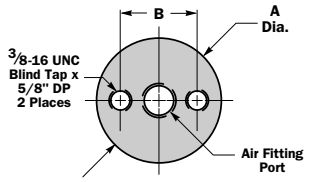
Imperial Single Convolute Bellows Type

MODEL NUMBER			ACTUATION SPECIFICATIONS					ISOLATION SPECIFICATIONS					
Product Description Number	Assembly Number		Maximum Stroke (in.)	FORCE (lbs.) @ 100 psi AT A STROKE OF:* 1.0 (in.)	2.0 (in.)	3.0 (in.)	Maximum Stroke	Isolator Load Range @ 100 psi** (lbs.)	Approximate System Natural Frequency Hz	Design Height Range (in.)	% ISOLATION AT INPUT FREQ OF:*** 7.25 Hz	14.5 Hz	30 Hz
YI-1B5	**500**	502	2.00	1,250	560	—	560	1,100 – 1,350	3.25	2.5 – 3.0	72	94	98
	510	512	3.00	1,500	1,200	520	520	1,050 – 1,500	2.75	2.5 – 4.0	82	96	99
	520	521	3.00	1,500	1,150	440	440	1,000 – 1,500	2.67	3.5 – 5.0	83	96	99
YI-1B6	**530**		2.80	1,900	1,500	—	850	1,500 – 1,900	2.75	3.0 – 4.0	78	95	98
	531		2.80	1,900	1,500	—	850	1,500 – 1,900	2.75	3.0 – 4.0	78	95	98
	532		2.50	1,800	1,300	—	850	1,500 – 1,900	2.75	3.0 – 4.0	78	95	98
	535		3.40	2,000	1,600	1,025	750	1,500 – 2,100	2.25	4.0 – 6.0	90	97	99
	536		3.40	2,000	1,600	1,025	750	1,500 – 2,100	2.25	4.0 – 6.0	90	97	99
	538		3.40	2,000	1,600	1,025	750	1,500 – 2,100	2.25	4.0 – 6.0	90	97	99
YI-1B7	**540**		3.20	2,400	1,900	1,100	850	1,600 – 2,200	2.67	3.5 – 4.5	83	96	99
	541		3.20	2,400	1,900	1,100	850	1,600 – 2,200	2.67	3.5 – 4.5	83	96	99
	542		2.90	2,300	1,750	—	850	1,600 – 2,200	2.67	3.5 – 4.5	83	96	99
YI-1B8	**550**		3.30	3,300	2,650	1,600	1,100	2,000 – 2,900	2.83	3.75 – 4.75	83	96	99
	552		3.30	3,300	2,650	1,600	1,100	2,000 – 2,900	2.83	3.75 – 4.75	83	96	99
	553		3.30	3,300	2,650	1,600	1,100	2,000 – 2,900	2.83	3.75 – 4.75	83	96	99
	554		3.00	3,200	2,500	1,100	1,100	2,000 – 2,900	2.83	3.75 – 4.75	83	96	99
	560	**562**	3.20	3,100	2,700	1,900	1,600	1,900 – 3,300	2.33	4.0 – 6.5	85	96	99
	563		3.20	3,100	2,700	1,900	1,600	1,900 – 3,300	2.33	4.0 – 6.5	85	96	99
	564		3.20	3,100	2,700	1,900	1,600	1,900 – 3,300	2.33	4.0 – 6.5	85	96	99
YI-1B9	**202**	**204**	2.90	5,050	4,150	—	2,850	3,200 – 3,900	2.50	4.5 – 5.0	84	96	99
	201	205	2.00	4,150	2,850	—	2,850	3,200 – 3,900	2.50	4.5 – 5.0	84	96	99
	207		2.90	5,050	4,150	—	2,850	3,200 – 3,900	2.50	4.5 – 5.0	84	96	99
	208		2.00	4,150	2,850	—	2,850	3,200 – 3,900	2.50	4.5 – 5.0	84	96	99
YI-1B12	**313**	**304**	3.30	8,700	8,000	7,000	6,574	7,300 – 8,800	2.33	3.0 – 5.0	89	97	99
	301	305	3.00	8,500	7,650	6,574	6,574	7,300 – 8,800	2.33	3.0 – 5.0	89	97	99
YI-1B14	350	**352**	3.30	12,650	11,500	9,900	9,300	10,000 – 11,900	2.33	4.0 – 5.25	86	96	99
	351	353	1.40	10,000	—	—	9,300	10,000 – 11,750	2.33	4.25 – 5.25	86	96	99
	364	362	6.00	13,500	12,800	11,600	4,800	11,600 – 13,500	2.25	3.25 – 5.25	87	97	99
YI-1B15	375	**377**	3.5	14,900	13,900	12,200	11,300	12,000 – 13,700	2.17	4.4 – 5.4	91	97	99
	376	378	1.6	12,400	—	—	11,300	12,000 – 13,700	2.17	4.4 – 5.4	91	97	99

Important Note: *All catalog performance data is based on 100 psi maximum operating pressure. For product selection at pressures less than 100 psi, please refer to the manual selection procedure within this catalog, use our automated sizing software E.A.S., or contact Enidine customer service at 1-800-852-8508.*

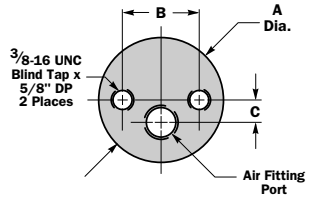
End Retainer Styles

STYLE 2



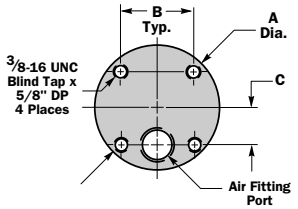
Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 3



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 4



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

** Listed strokes start from the minimum allowable height of the Air Spring.*
*** To obtain the lower load range limit (i.e., minimum load @ 20 psi), divide the smaller value by 5.*
**** In the "Isolation Specification" section, this data reflects the approximate percentage of isolation obtainable, if the design height is at the center of the design height range, and the load per air spring is within the isolator load range. Note: For values other than 100 psi, consult factory.*

Single Convolute Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

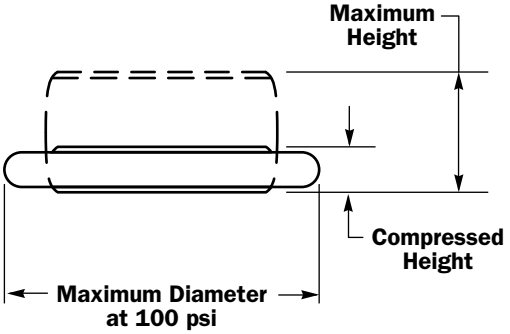
Imperial Single Convolute Bellows Type

ENVELOPE DIMENSIONS					MOUNTING DIMENSIONS			FEATURES					
Maximum Diameter @ 100 psi (in.)	Compressed Height (in.)	Minimum Height as Actuator (in.)	Maximum Height as Insulator (in.)	Maximum Height as Actuator (in.)	A End Plate Ret. Diam. (in.)	B Blind Tap Spacing (in.)	C Fill Port Offset (in.)	End Retainer Style	Air Fitting Port (NPTF)		Internal Bumper	Assembly Number	Flex Member Material
5.70	1.80	1.80	3.80	3.80	3.40	1.75	—	2	1/4	3/4	NO	**500** 502	NP
6.00	1.80	1.80	4.80	4.80	3.40	1.75	—	2	1/4	3/4	NO	**510** 512	NP
6.50	1.80	2.80	5.80	5.80	3.40	1.75	—	2	1/4	3/4	NO	520 521	NP
6.50	2.00	2.00	4.80	4.80	4.15	1.75	—	2	1/4		NO	**530**	NP
6.50	2.00	2.00	4.80	4.80	4.15	2.75	1.38	3	1/4		NO	531	NP
6.50	2.00	2.30	4.80	4.80	4.15	2.75	1.38	3	1/4		YES	532	NP
7.00	2.00	2.00	7.10	7.10	4.15	1.75	—	2	1/4		NO	**535**	NP
7.00	2.00	2.00	7.10	7.10	4.15	2.75	1.38	3	1/4		NO	536	NP
7.00	2.00	2.30	7.10	7.10	4.15	2.75	1.38	3	1/4		YES	538	NP
7.70	2.00	2.00	5.20	5.20	4.15	1.75	—	2	1/4		NO	**540**	NP
7.70	2.00	2.00	5.20	5.20	4.15	2.75	1.38	3	1/4		NO	541	NP
7.70	2.00	2.30	5.20	5.20	4.15	2.75	1.38	3	1/4		YES	542	NP
8.70	2.00	2.00	5.30	5.30	5.00	2.75	—	2	1/4		NO	**550**	NP
8.70	2.00	2.00	5.30	5.30	5.00	2.75	—	2	3/4		NO	**552**	NP
8.70	2.00	2.00	5.30	5.30	5.00	2.75	1.38	3	1/4		NO	553	NP
8.70	2.00	3.50	5.30	5.30	5.00	2.75	1.38	3	1/4		YES	554	NP
9.40	2.00	3.50	6.70	6.70	5.00	2.75	—	2	1/4	3/4	NO	**560** **562**	NP
9.40	2.00	3.50	6.70	6.70	5.00	2.75	1.38	3	1/4		NO	563	NP
9.40	2.00	3.50	6.70	6.70	5.00	2.75	1.38	3	1/4		YES	564	NP
11.00	2.30	2.30	5.90	5.20	6.40	3.50	1.75	3	1/4	1/2	NO	**202** **204**	NR
11.00	2.30	3.20	5.90	5.20	6.40	3.50	1.75	3	1/4	1/2	YES	201 205	NR
11.00	2.30	2.30	5.90	5.20	6.40	3.50	1.50	3	3/4		NO	207	NR
11.00	2.30	3.20	5.90	5.20	6.40	3.50	1.50	3	3/4		YES	208	NR
13.20	2.30	2.30	7.20	5.60	9.00	6.20	2.87	3	1/4	3/4	NO	**313** **304**	NR
13.20	2.30	2.60	7.20	5.60	9.00	6.20	2.87	3	1/4	3/4	YES	301 305	NR
15.20	2.30	2.30	7.20	5.60	11.30	6.25	3.12	4	1/4	3/4	NO	350 **352**	NR
15.20	2.30	4.20	7.20	5.60	11.30	6.25	3.12	4	1/4	3/4	YES	351 353	NR
15.90	2.30	2.30	8.30	8.30	11.30	6.25	3.12	4	1/4	3/4	NO	364 362	NR
17.50	2.30	2.30	7.90	5.80	11.30	6.25	3.12	4	1/4	3/4	NO	375 **377**	NR
17.50	2.30	4.20	7.90	5.80	11.30	6.25	3.12	4	1/4	3/4	YES	376 378	NR

NOTE: NP= Neoprene
NR= Natural Rubber



(Single) Bellows Type



Double Convolute Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

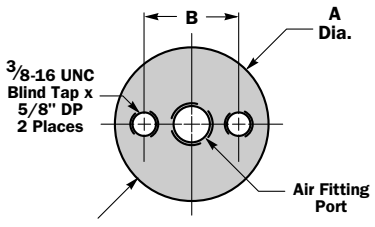
Imperial Double Convolute Bellows Type

MODEL NUMBER		ACTUATION SPECIFICATIONS					ISOLATION SPECIFICATIONS					
Product Description Number	Assembly Number	Maximum Stroke (in.)	FORCE (lbs.) @ 100 psi AT A STROKE OF:* 2.0 (in.)	4.0 (in.)	6.0 (in.)	Maximum Stroke	Isolator Load Range @ 100 psi** (lbs.)	Approximate System Natural Frequency Hz	Design Height Range (in.)	% ISOLATION AT INPUT FREQ OF:*** 7.25 Hz	14.5 Hz	30 Hz
YI-2B6	**530**	4.90	1,900	1,100	—	580	1,300 – 2,000	2.09	4.5 – 6.5	85	96	99
	531	4.90	1,900	1,100	—	580	1,300 – 2,000	2.09	4.5 – 6.5	85	96	99
	532	4.30	1,700	800	—	580	1,300 – 2,000	2.09	4.5 – 6.5	85	96	99
	535	6.30	2,350	1,600	700	560	1,500 – 2,200	2.09	5.0 – 7.0	92	97	99
	536	5.70	2,100	1,450	—	560	1,500 – 2,200	2.09	5.0 – 7.0	92	97	99
YI-2B7	**540** 546	6.50	2,900	2,300	1,250	800	1,600 – 2,500	2.08	6.0 – 8.0	91	97	99
	541	6.50	2,900	2,300	1,250	800	1,600 – 2,500	2.08	6.0 – 8.0	91	97	99
	542	5.70	2,750	2,000	—	800	1,600 – 2,500	2.08	6.0 – 8.0	91	97	99
YI-2B8	**550** 552	7.20	3,600	2,700	1,800	1,000	2,300 – 2,700	1.92	7.0 – 8.0	93	97	99
	553	7.20	3,600	2,700	1,800	1,000	2,300 – 2,700	1.92	7.0 – 8.0	93	97	99
	554	6.60	3,350	2,500	1,400	1,000	2,300 – 2,700	1.92	7.0 – 8.0	93	97	99
YI-2B9	**200** 204	6.30	4,650	3,850	2,550	2,300	2,300 – 3,700	1.92	7.5 – 9.5	92	97	99
	201 205	5.70	4,400	3,550	2,100	2,300	2,300 – 3,700	1.92	7.5 – 9.5	92	97	99
	216	6.30	4,650	3,850	2,550	2,300	2,300 – 3,700	1.92	7.5 – 9.5	92	97	99
	208	5.70	4,400	3,550	2,100	2,300	2,300 – 3,700	1.92	7.5 – 9.5	92	97	99
	250♦	7.70	4,800	4,000	3,250	2,500	3,000 – 3,800	1.67	8.0 – 10.0	93	98	99
	251♦	6.90	4,700	3,900	3,100	2,500	3,000 – 3,800	1.67	8.0 – 10.0	93	98	99
	255	6.90	4,700	3,900	3,100	2,500	3,000 – 3,800	1.67	8.0 – 100	93	98	99
	256 263	7.20	4,800	4,000	3,250	2,500	3,000 – 3,800	1.67	8.0 – 10.0	93	98	99
	275	7.20	4,800	4,000	3,250	2,500	3,000 – 3,800	1.67	8.0 – 10.0	93	98	99
YI-2B12	**425** **429**	6.10	8,400	7,200	5,200	5,200	5,200 – 7,200	1.83	7.5 – 9.5	92	98	99
	309 318	5.30	8,050	6,600	—	5,200	5,200 – 7,200	1.83	7.5 – 9.5	92	98	99
	437	6.10	8,400	7,200	5,200	5,200	5,200 – 7,200	1.83	7.5 – 9.5	92	98	99
	416 419	8.40	8,200	7,200	6,900	4,500	7,100 – 8,100	1.58	7.5 – 9.5	92	98	99
YI-2B14	354 **352**	6.00	12,900	11,100	8,400	7,900	8,400 – 11,100	1.83	7.5 – 9.5	93	98	99
	355 353	4.80	11,600	9,400	—	7,900	8,400 – 11,100	1.83	7.5 – 9.5	93	98	99
	362 363	8.00	13,500	12,580	11,000	9,100	11,800 – 13,100	1.58	7.5 – 9.5	93	98	99
	452	8.30	13,500	12,580	11,000	9,100	11,800 – 13,100	1.58	7.5 – 9.5	93	98	99
YI-2B15	375 **377**	6.60	13,700	12,300	10,300	9,000	10,300 – 12,300	1.67	7.5 – 9.5	93	98	99
	376 378	5.40	12,850	10,950	—	9,000	10,300 – 12,300	1.67	7.5 – 9.5	93	98	99

Important Note: *All catalog performance data is based on 100 psi maximum operating pressure. For product selection at pressures less than 100 psi, please refer to the manual selection procedure within this catalog, use our automated sizing software E.A.S., or contact Enidine customer service at 1-800-852-8508.*

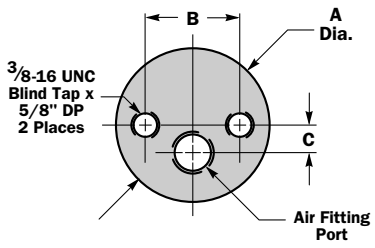
End Retainer Styles

STYLE 2



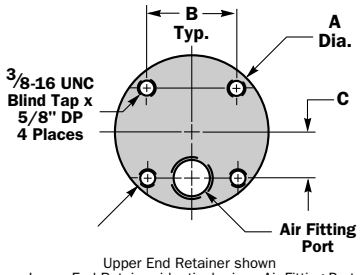
Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 3



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 4



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

** Listed strokes start from the minimum allowable height of the Air Spring.*
*** To obtain the lower load range limit (i.e., minimum load @ 20 psi), divide the smaller value by 5.*
**** In the "Isolation Specification" section, this data reflects the approximate percentage of isolation obtainable, if the design height is at the center of the design height range, and the load per air spring is within the isolator load range. Note: For values other than 100 psi, consult factory.*

Double Convolute Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

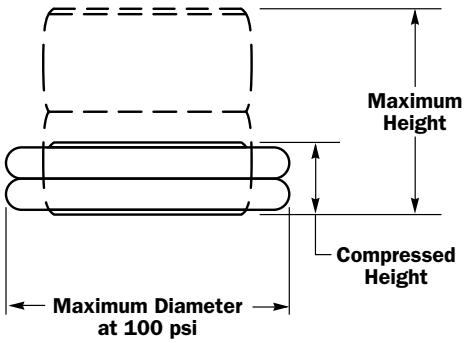
Imperial Double Convolute Bellows Type

ENVELOPE DIMENSIONS					MOUNTING DIMENSIONS			FEATURES				
Maximum Diameter @ 100 psi (in.)	Compressed Height (in.)	Minimum Height as Actuator (in.)	Maximum Height as Insulator (in.)	Maximum Height as Actuator (in.)	A End Plate Ret. Diam. (in.)	B Blind Tap Spacing (in.)	C Fill Port Offset (in.)	End Retainer Style	Air Fitting Port (NPTF)		Internal Bumper	Assembly Number	Flex Member Material
6.50	2.80	2.80	7.70	7.70	4.84	1.75	—	2	1/4		NO	**530**	NP
6.50	2.80	2.80	7.70	7.70	4.84	2.75	1.38	3	1/4		NO	531	
6.50	2.80	3.40	7.70	7.70	4.84	2.75	1.38	3	1/4		YES	532	
7.00	2.80	2.80	9.10	9.10	4.84	2.75	1.38	3	1/4		NO	535	
7.00	2.80	3.40	9.10	9.10	4.84	2.75	1.38	3	1/4		YES	536	
8.00	2.50	2.50	9.00	9.00	5.00	2.75	—	2	1/4	3/4	NO	**540**	546	NP
8.00	2.50	2.50	9.00	9.00	5.00	2.75	1.38	3	1/4		NO	541	
8.00	2.50	3.30	9.00	9.00	5.00	2.75	1.38	3	1/4		YES	542	
8.80	2.90	2.90	10.10	10.10	5.87	2.75	—	2	1/4	3/4	NO	**550**	552	NP
8.80	2.90	2.90	10.10	10.10	5.87	2.75	1.38	3	1/4		NO	553	
8.80	2.90	3.50	10.10	10.10	5.87	2.75	1.38	3	1/4		YES	554	
10.30	3.20	3.20	10.80	9.50	6.40	3.50	1.75	3	1/4	1/2	NO	**200**	204	NR
10.30	3.20	3.80	10.80	9.50	6.40	3.50	1.75	3	1/4	1/2	YES	201	205	
10.30	3.20	3.20	10.80	9.50	6.40	3.50	1.50	3	3/4		NO	**216**		
10.30	3.20	3.80	10.80	9.50	6.40	3.50	1.50	3	3/4		YES	208		
10.30	3.50	3.50	12.20	10.70	6.40	3.50	1.75	3†	1/4		NO	250♦		
10.30	3.50	3.80	12.20	10.70	6.40	3.50	1.75	3†	1/4		YES	251♦		
10.30	3.50	3.80	12.20	10.70	6.40	3.50	1.75	3	1/4		YES	255		
10.30	3.50	3.50	12.20	10.70	6.40	3.50	1.75	3	1/4	1/2	NO	256	263	
10.30	3.50	3.50	12.20	10.70	6.40	3.50	1.50	3	3/4		NO	275		
13.00	3.40	3.40	11.10	9.50	9.00	6.20	2.87	3	1/4	3/4	NO	**425**	**429**	NR
13.00	3.40	4.20	11.10	9.50	9.00	6.20	2.87	3	1/4	3/4	YES	309	318	
13.00	3.40	3.40	11.10	9.50	9.00	6.20	—	2	1/4		NO	437		
13.70	4.30	4.30	14.40	12.70	9.00	6.20	2.87	3	1/4	3/4	NO	416	419	
15.10	3.50	3.50	11.30	9.70	11.30	6.25	3.12	4	1/4	3/4	NO	354	**352**	NR
15.10	3.50	4.90	11.30	9.70	11.30	6.25	3.12	4	1/4	3/4	YES	355	353	
16.00	3.50	3.50	15.20	12.50	11.30	6.25	3.12	4	1/4	3/4	NO	362	363	
16.00	4.50	4.20	15.20	12.50	11.30	6.25	3.12	4	1/4		YES	452		
16.70	3.70	3.70	12.80	10.30	11.30	6.25	3.12	4	1/4	3/4	NO	375	**377**	NR
16.70	3.70	4.90	12.80	10.30	11.30	6.25	3.12	4	1/4	3/4	YES	376	378	

NOTE: NP= Neoprene
NR= Natural Rubber



(Double) Bellows Type



♦*For Models YI-2B9-250 and YI-2B9-251, the Upper End Retainer is supplied with 1/2-13 UNC X .63 inch long Mounting Studs.*

Triple Convolute Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

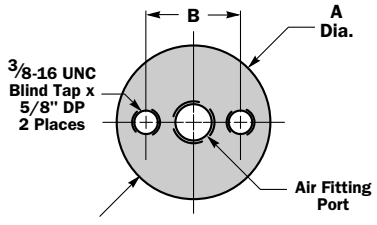
Imperial Triple Convolute Bellows Type

MODEL NUMBER			ACTUATION SPECIFICATIONS					ISOLATION SPECIFICATIONS					
				FORCE (lbs.) @ 100 psi AT A STROKE OF:*							*** % ISOLATION AT INPUT FREQ OF:		
Product Description Number	Assembly Number		Maximum Stroke (in.)	3.0 (in.)	6.0 (in.)	9.0 (in.)	Maximum Stroke	Isolator Load Range @ 100 psi** (lbs.)	Approximate System Natural Frequency Hz	Design Height Range (in.)	7.25 Hz	14.5 Hz	30 Hz
YI-3B12	304	**305**	10.60	8,500	7,400	5,800	4,600	5,200 – 7,100	1.50	11.0 – 15.0	94	98	99
	308		10.60	8,500	7,400	5,800	4,600	5,200 – 7,100	1.50	11.0 – 15.0	94	98	99
	325	326	11.10	10,500	8,750	7,250	5,800	6,300 – 8,400	1.50	11.0 – 15.0	94	98	99
YI-3B14	450	374	15.80	12,400	10,900	9,650	4,500	10,200 – 11,000	1.25	10.5 – 12.5	95	99	99
	453	411	15.60	12,250	10,800	9,500	4,500	10,200 – 11,000	1.25	10.5 – 12.5	95	98	99
	403	**361**	10.20	13,500	11,900	9,750	8,300	10,700 – 12,100	1.50	10.5 – 12.5	95	98	99
	351	353	7.90	12,500	10,000	—	8,300	10,700 – 12,100	1.50	10.5 – 12.5	95	98	99
YI-3B15	375	**377**	9.90	14,500	12,650	10,100	7,200	11,200 – 12,800	1.42	10.5 – 12.5	91	97	99
	376	378	7.30	13,000	10,500	—	7,200	11,200 – 12,800	1.42	10.5 – 12.5	91	97	99

Important Note: *All catalog performance data is based on 100 psi maximum operating pressure. For product selection at pressures less than 100 psi, please refer to the manual selection procedure within this catalog, use our automated sizing software E.A.S., or contact Enidine customer service at 1-800-852-8508.*

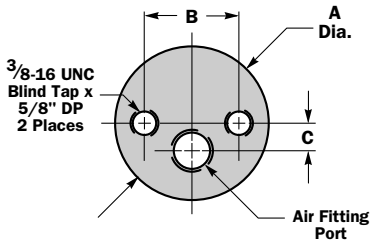
End Retainer Styles

STYLE 2



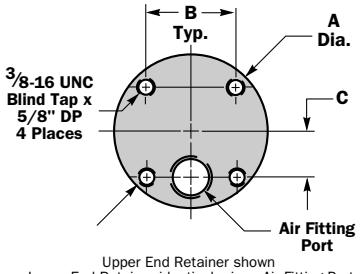
Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 3



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

STYLE 4



Upper End Retainer shown
Lower End Retainer identical minus Air Fitting Port

** Listed strokes start from the minimum allowable height of the Air Spring.*
*** To obtain the lower load range limit (i.e., minimum load @ 20 psi), divide the smaller value by 5.*
**** In the "Isolation Specification" section, this data reflects the approximate percentage of isolation obtainable, if the design height is at the center of the design height range, and the load per air spring is within the isolator load range. Note: For values other than 100 psi, consult factory.*

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

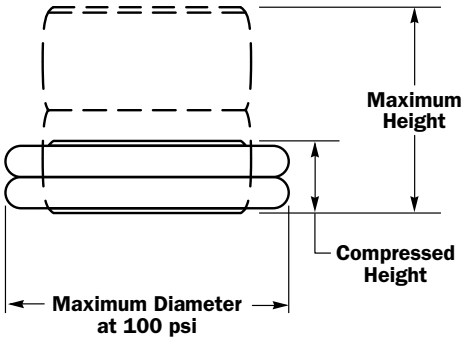
Imperial Triple Convolute Bellows Type

ENVELOPE DIMENSIONS					MOUNTING DIMENSIONS			FEATURES						
Maximum Diameter @ 100 psi (in.)	Compressed Height (in.)	Minimum Height as Actuator (in.)	Maximum Height as Insulator (in.)	Maximum Height as Actuator (in.)	A End Plate Ret. Diam. (in.)	B Blind Tap Spacing (in.)	C Fill Port Offset (in.)	End Retainer Style	Air Fitting Port (NPTF)		Internal Bumper	Assembly Number		Flex Member Material
13.00	4.80	4.80	18.00	15.40	9.00	6.20	2.87	3	1/4	3/4	NO	304	**305**	NR
13.00	4.80	4.80	18.00	15.40	9.00	6.20	—	2	1/4		NO	308		
13.80	4.60	4.80	19.00	15.70	10.30	6.20	2.87	3	11/4	3/4	NO	325	326	
15.50	4.70	4.70	20.50	20.50	11.30	6.25	3.13	4	1/4	3/4	NO	450	374	NR
15.50	4.70	4.90	20.50	20.50	11.30	6.25	3.13	4	1/4	3/4	YES	453	411	
15.50	5.00	5.00	18.00	15.20	11.30	6.25	3.12	4	1/4	3/4	NO	403	**361**	
15.50	5.00	7.30	18.00	15.20	11.30	6.25	3.12	4	1/4	3/4	YES	351	353	
16.50	4.70	4.70	17.00	14.60	11.30	6.25	3.12	4	1/4	3/4	NO	375	**377**	NR
16.50	4.70	7.30	17.00	14.60	11.30	6.25	3.12	4	1/4	3/4	YES	376	378	

NOTE: NP= Neoprene
NR= Natural Rubber



(Triple) Bellows Type



Sleeve and Rolling Lobe Type Air Springs

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

Imperial Sleeve Type

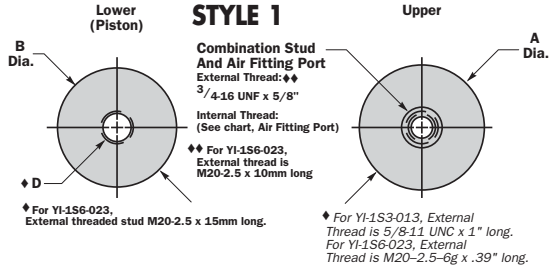
MODEL NUMBER		ACTUATION SPECIFICATIONS					ISOLATION SPECIFICATIONS					
			FORCE (lbs.) @ 100 psi AT A STROKE OF:*							*** % ISOLATION AT INPUT FREQ OF:		
Product Description Number	Assembly Number	Maximum Stroke (in.)	1.0 (in.)	3.0 (in.)	5.0 (in.)	Maximum Stroke	Isolator Load Range @ 100 psi** (lbs.)	Approximate System Natural Frequency Hz	Design Height Range (in.)	7.25 Hz	14.5 Hz	30 Hz
YI-1S3	**011**	4.40	400	400	—	110	350 – 400	2.00	5.0 – 6.0	92	97	99
	013	2.10	560	—	—	120	440 – 580	3.25	2.0 – 3.0	71	93	98
YI-1S4	**007**	4.90	850	830	—	310	840 – 850	2.17	3.8 – 4.4	90	97	99
	008	6.50	700	900	850	540	800 – 900	1.33	6.5 – 7.5	95	98	99
YI-1S5	005	5.50	1,000	1,100	900	800	1,000 – 1,100	1.58	6.2 – 7.2	95	98	99
	006	6.50	1,000	1,150	1,100	750	1,100 – 1,150	1.50	7.0 – 9.0	96	99	99
	010	4.00	1,100	950	—	560	1,000 – 1,100	2.00	3.8 – 4.3	90	97	99
YI-1S6	023	6.80	1,700	1,600	1,590	1,200	1,600	1.58	7.0 – 8.6	94	98	99

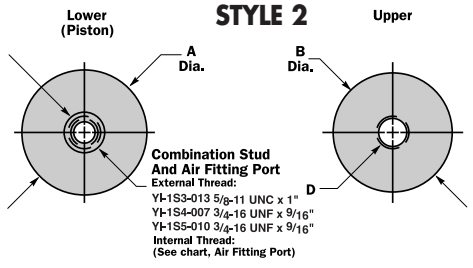
Imperial Rolling Lobe Type

MODEL NUMBER		ACTUATION SPECIFICATIONS					ISOLATION SPECIFICATIONS					
			FORCE (lbs.) @ 100 psi AT A STROKE OF:*							*** % ISOLATION AT INPUT FREQ OF:		
Product Description Number	Assembly Number	Maximum Stroke (in.)	4.0 (in.)	8.0 (in.)	12.0 (in.)	Maximum Stroke	Isolator Load Range @ 100 psi** (lbs.)	Approximate System Natural Frequency Hz	Design Height Range (in.)	7.25 Hz	14.5 Hz	30 Hz
YI-1R8	005	13.00	3,280	2,950	—	—	3,000 – 3,100	1.33	10.5 – 13.0	95	98	99
	009	11.80	2,800	—	—	—	2,700 – 2,900	1.17	10.5 – 13.0	96	98	99
YI-1R9	003	12.30	3,350	3,040	1,300	1,250	3,200 – 3,700	1.42	8.0 – 12.0	93	98	99
	009	8.60	4,150	1,600	—	900	3,900 – 4,400	1.67	6.0 – 7.5	91	97	99
YI-1R10	089	14.10	5,100	5,250	3,550	2,100	5,000 – 5,200	1.25	9.5 – 13.5	96	99	99
YI-1R11	028	9.30	6,450	3,800	—	2,300	5,500 – 6,700	1.58	6.0 – 10.0	95	98	99
	039	11.00	6,700	5,750	—	2,300	6,500 – 7,000	1.67	8.0 – 12.0	94	98	99
YI-1R12	092	13.40	7,440	7,200	4,350	2,700	6,800 – 7,600	1.42	10.5 – 16.5	96	99	99
	095	9.10	7,100	3,800	—	2,400	6,800 – 7,300	1.58	7.0 – 9.0	94	98	99
	103	17.50	7,450	7,050	6,600	2,600	6,900 – 7,300	1.25	15.0 – 20.0	96	99	99
	132	10.80	7,350	5,900	—	2,700	7,400 – 7,600	1.67	8.0 – 10.0	93	98	99
	256	19.60	7,575	7,225	7,000	3,100	7,000 – 7,300	1.17	16.0 – 20.0	96	99	99
	274	14.70	7,400	7,200	5,100	3,000	7,300 – 7,500	1.17	11.3 – 14.3	96	99	99
YI-1R14	019	16.90	8,500	8,500	—	—	8,400 – 8,500	1.17	14.0 – 18.0	96	99	99
	018	14.80	8,400	8,400	6,100	2,500	8,400 – 8,500	1.25	11.0 – 16.5	96	99	99
	037	12.30	10,500	8,500	3,000	2,900	10,400 – 11,000	1.75	7.5 – 11.0	92	98	99

Important Note: *All catalog performance data is based on 100 psi maximum operating pressure. For product selection at pressures less than 100 psi, please refer to the manual selection procedure within this catalog, use our automated sizing software E.A.S., or contact Enidine customer service at 1-800-852-8508.*

End Retainer Styles





* *Listed strokes start from the minimum allowable height of the Air Spring.*
** *To obtain the lower load range limit (i.e., minimum load @ 20 psi), divide the smaller value by 5.*
*** *In the "Isolation Specification" section, this data reflects the approximate percentage of isolation obtainable, if the design height is at the center of the design height range, and the load per air spring is within the isolator load range. Note: For values other than 100 psi, consult factory.*

Bold numbers *indicate featured stock – contact Enidine customer service for details.*

Imperial Sleeve Type

ENVELOPE DIMENSIONS			MOUNTING DIMENSIONS			FEATURES				
Maximum Diameter @ 100 psi (in.)	Compressed Height (in.)	Maximum Height (In.)	A Upper End Plate Diam. (in.)	B Lower End Plate Diam. (In.)	D Blind Tap for Mounting (in.)	End Retainer Style	Air Fitting Port (NPTF)	Internal Bumper	Assembly Number	Flex Member Material
3.25	3.60	8.00	2.75	2.75	1/2-13 UNC x 0.63 DP.	1	1/8	NO	**011**	NP
3.60	1.50	3.60	2.40	3.40	5/16-18 UNC x 0.44 DP.	2	1/8	NO	**013**	
4.60	2.20	7.10	4.10	4.10	3/8-16 UNC x 0.50 DP.	2	1/8	NO	**007**	NP
4.60	4.00	10.50	4.10	4.10	1/2-13 UNC x 0.63 DP.	1	1/8	NO	008	
5.60	4.00	9.50	5.10	5.10	1/2-13 UNC x 0.63 DP.	1	1/8	NO	005	NP
5.60	4.00	10.50	5.10	5.10	1/2-13 UNC x 0.63 DP.	1	1/8	NO	006	
5.60	2.20	6.25	5.10	5.10	3/8-16 UNC x 0.50 DP.	2	1/8	NO	010	
6.80	4.10	10.90	6.30	6.30	♦M20-2.5-6g x 10 mm Long	1	1/8	NO	023	NP

Imperial Rolling Lobe Type

ENVELOPE DIMENSIONS			MOUNTING DIMENSIONS			FEATURES				
Maximum Diameter @ 100 psi (in.)	Compressed Height (in.)	Maximum Height (In.)	A Upper End Plate Diam. (in.)	B Lower End Plate Diam. (In.)	D Blind Tap for Mounting (in.)	End Retainer Style	Air Fitting Port (NPTF)	Internal Bumper	Assembly Number	Flex Member Material
8.70	5.60	18.60						NO	005	NR
8.70	6.80	18.60						YES	009	
9.50	5.60	17.90						NO	003	NR
9.50	3.20	11.80						NO	009	
11.00	6.00	20.10						NO	089	NR
11.50	3.70	13.00						NO	028	NR
11.70	6.10	17.10						YES	039	
12.70	7.70	21.10						YES	092	NR
12.70	4.40	13.50						YES	095	
12.70	9.50	27.00						YES	103	
12.90	6.10	16.90						YES	132	
12.60	9.50	29.10						YES	256	
12.80	8.10	22.80						YES	274	
14.60	8.90	25.80						YES	019	NR
14.60	7.70	22.50						YES	018	
14.80	5.70	18.00						YES	037	

FOR ROLLING LOBE TYPE AIR SPRINGS:

CONTACT YOUR LOCAL REPRESENTATIVE OR ENIDINE FOR MOUNTING AND AIR FITTING DIMENSIONS.

NOTE: NP= Neoprene
NR= Natural Rubber



Sleeve Type



Rolling Lobe Type

