CYCLE LIFE • MOVEMENT

RANGE . . .

Cycle life requirements of different applications vary widely. A piping system that goes through a temperature-induced movement cycle once a year is not comparable to one occurring once a day. The cycle life ranges of Expansion Joints in these two systems must be set on a different basis.

In addition to a 7,000 cycle suggested minimum, the Specifications express rated movement in the 1,000 and 15,000 cycle range. This permits ready selection of a standard unit for a desired cycle life. For higher cycle life requirements consult Anaconda Metal Hose.

EXPECTANCY . . .

Anaconda has conducted extensive research and test programs to accurately determine the fatigue characteristics of bellows used in Anaconda Expansion Joints. The end product of this research is presented in this bulletin.

The design engineer must allow for temperature, pressure or tolerance variations that cause abnormal motion.

TEMPERATURE . . .

Elevated temperatures reduce both rated movement for a given life cycle and pressure capabilities of the Expansion Joint. To compensate, multiply both rated movement and maximum working pressure (from Specifications) by the temperature compensating factor in the chart at right. Standard Expansion Joints have an operating range from -20°F. to +850°F. This is the generally accepted range for carbon steel fittings. Special fittings are available for operating temperatures above and below this range. Physical properties of the bellows alloy are affected by temperatures.

TEMPERATURE °F.	TEMPERATURE COMPENSATING FACTOR
Room Temp.	1.00
200	.94
300	.88
400	.83
500	.78
600	.74
700	.70
800	.66
900	.62
1000	.60
1100	.58
1200	.55
1300	.50
1400	.44
1500	.40

EXAMPLE 1:

If working temperature is +600°F, reduce both rated movement and maximum working pressure with the factor .74 from the table. For a 16 ML 44:

Rated working pressure is 100 PSIG multiplied by the temperature compensating factor of .74. This reduces the maximum working pressure to 74 PSIG. The axial movement capability for 1000 cycles is 5.2 inches, multiplied by the temperature compensating factor of .74. This reduces the axial movement capability for 1000 cycles to 3.85 inches.

EXAMPLE 2:

If the working temperature is +550°F, the temperature compensating factor can be determined by the interpolation between 500°F and 600°F from the table to obtain a factor of .76. For an 8" MS 44:

Rated working pressure is 200 PSIG multiplied by the factor of .76 reduces the working pressure to 152 PSIG. The rated axial movement for 1000 cycles is 2 inches multiplied by the factor of .76, this reduces the axial movement to 1.52 inches.

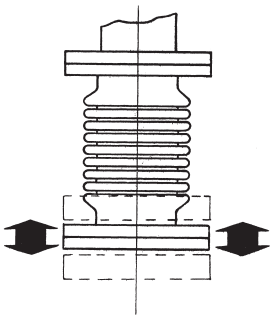
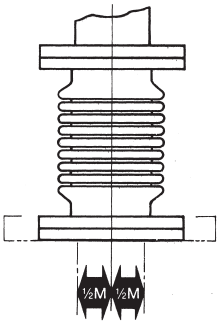


Figure 3

AXIAL TRAVEL

Anaconda Single Short Type Expansion Joints will take their rated total axial travel entirely in compression or entirely in extension. (See Figure 3). Anaconda Single Long Type Expansion Joints will take their rated total axial travel entirely in compression or up to ¼" of extension.

With both extension and compression, the sum of the movements should not exceed the total travel in the specifications.



"A" "B"
Figure 4

LATERAL TRAVEL

Anaconda Single Short and Single Long Series Expansion Joints will take the full rated lateral travel on one side of centerline in 7,000 and 15,000 cycle column. In the case of the 1,000 cycle column, the rated travel SHOULD be distributed in accordance with Figure 4. If even distribution of total travel is impossible, then travel on one side of centerline MUST NOT EXCEED the travel shown in the 7,000 cycle life column.

Recommended motion (M) distribution . . . equal on each side of centerline . . . is generally accomplished by cold-springing the Expansion Joint into position "A" at installation temperature. The Expansion Joint will travel to position "B" when temperature extreme is reached. See Figure 4.

COMBINED MOVEMENTS . . .

The following equation has been developed to determine the suitability of an Anaconda Expansion Joint when subjected to both lateral and axial movements simultaneously.

$$\frac{A}{A_r} + \frac{L}{L_r} \leq 1$$

A = Applied Axial Motion

A_r = Rated Axial Motion

L = Applied Lateral Motion

L_r = Rated Lateral Motion

When the number exceeds 1, the selected unit will not render the desired number of life cycles.
If unable to select suitable standard unit, contact our Engineering Dept.