No. 111

Super Duty Airstroke®
(Epichlorohydrin Elastomer)

A. General Discussion

The standard rubber compound (elastomer) that we use to make our Airstroke bellows has a temperature operating range from -37°F to 57°C. Firestone determined some years ago that there was a market for an Airstroke actuator that could withstand higher temperatures without adversely affecting the elastomer. The Super Duty, or Epichlorohydrin, bellows was developed to meet this need.

THE OPERATING CHARACTERISTICS AND PRODUCT LIMITATIONS OF OUR EPICHLOROHYDRIN PARTS DIFFER QUITE SIGNIFICANTLY FROM OUR STANDARD AIRSTROKES:

B. Advantages

1. The operating temperature may be from -17° to 107°C continuously depending upon the application.
2. Epichlorohydrin has much better oil resistance when compared to our standard elastomers.

C. Limitations

1. Epichlorohydrin does not flex well; therefore, maximum performance will be realized with the Airstroke at *constant height and pressure*.

   For applications where the Airstroke must move:

   a. The lower the stroke, the better. Try not to exceed ± 25 mm vertical movement per convolution.

   b. The lower the cycle rate, the better. Try not to exceed 1 cycle per minute.
2. At constant height and pressure, the best choice for the mounting height of the Airstroke is the "Recommended Airmount design height" shown on each load/deflection graph in our design catalogue. (The higher the height of the Airstroke, the better. Do not use at heights extending into the grey area of each graph).
3. When using an Airstroke as an actuator, it may sometimes be necessary to operate in the lower height ranges of the Airstroke. Do not use the Airstroke to the minimum height shown on the graph – add at least 25 mm to it.
4. Epichlorohydrin parts may be used as isolators (Airmount®) where very low motion is experienced.

D. Application Approval

Please note that all orders for Epichlorohydrin parts require application approval by Firestone before order acceptance. Our two page Super-Duty Airmount application (copy attached) must be filled out and returned to your Firestone Regional Manager.

E. Pricing

Our Epichlorohydrin cross-reference list is attached. To calculate the Epichlorohydrin list price:

a. Find the proper Epichlorohydrin part number and the corresponding standard part number equivalent.

b. Refer to our standard Airmount/Airstroke Industrial price sheet.

c. Multiply the standard list price times 2 for the Epichlorohydrin list price. If the standard part number is not shown, please consult Firestone.

Super Duty Airstroke®
(Epichlorohydrin Elastomer)

F. Discount Schedule

The standard Industrial Distributor Discounts apply.

G. General Discussion

Firestone Epichlorohydrin parts are identified with a white, bow tie shaped mark molded into the bellows.

Epichlorohydrin is twice as costly as our standard part because the material is more expensive, and Epichlorohydrin is very difficult to work with resulting in a high bellows production scrap rate.

If the Epichlorohydrin part is to be used in an extremely high temperature operation, try to have air moving around the Airstroke. Also, use a thermal insulating material between the Airstroke bead plates and the mounting surfaces.

There will be times when it is better to recommend our standard part, even at temperatures exceeding 57°C. As an example, consider an application where 100 mm of stroke is required at 2 cycles per minute in, say, a 71°C environment. The Epichlorohydrin part will better withstand the higher temperature, but will not last as long as the standard part with this much flexing or movement. The standard part will flex much better, but the elastomer will gradually over-cure due to the high temperature and will not live as long in this respect.

So, you have to weigh one against the other. In this example, we would probably recommend the standard part, along with an explanation to the customer that 71°C does exceed our temperature recommendation, and that the part will not last as long as it would at room temperature. This may very well still be the best alternative for the customer as:

a. Comparing our standard part to an Epichlorohydrin part, the life of each in this application might be about the same – and Epichlorohydrin is twice as expensive.

b. Comparing either our standard or Epichlorohydrin parts to an air cylinder, our Airstroke is much less expensive initially (often 1/3 or 1/4 as much) and the air cylinder will probably need to be replaced or rebuilt before the Airstroke would fail. In addition, the Airstroke has no internal rod or piston, it can operate through an arc without a clevis, it can withstand some side loading (no rod to bend or score) and an Airstroke has a very compact starting height.

An example of a good application for Epichlorohydrin would be controlling the nip pressure between two rolls in an atmosphere of 93°C. In this case, the Airstroke is at constant height and pressure, probably 99% of the time. (Except when one roll is backed off for threading of the material.) Epichlorohydrin will far outlast our standard elastomer in this instance, and, therefore, is well worth the extra cost. It is also probably the customer's best design alternative. Even at two times the price of our regular part, the Airstroke is much less than an air cylinder with comparable force.

No. 111

Super Duty Airmount® Application (Epichlorohydrin Elastomer)

As much information, insofar as it is known, is required to help us evaluate these springs in the proposed application.

DISTRIBUTOR: _____

CUSTOMER NAME: _____

ADDRESS: _____

NAME OF APPLICATION: _____

AIRMOUNT USED: _____

TEMPERATURES:

Approx. % of time

Normal operating range:

Maximum _____ °C Minimum _____ °C _____

Maximum extreme temperature _____ °C _____

Minimum extreme temperature _____ °C _____

How many days per week is Airmount subjected to the above conditions?

Describe operating cycle:

PRESSURES:

Approx. % of time

Normal operating range:

Maximum _____ BAR Minimum _____ BAR _____

Maximum extreme pressure _____ BAR _____

Minimum extreme pressure _____ BAR _____

Super Duty Airmount® Application (Epichlorohydrin Elastomer)

OPERATING POSITIONS:

Approx. % of time

Normal operating range:

Maximum _____ mm Minimum _____ mm _____

Maximum extreme situation _____ mm _____

Minimum extreme situation _____ mm _____

Describe speed of cycling – pauses during operation – speeds during cycle if it varies significantly during cycle.

List possible contaminates to outside of Airmount. Be as specific as possible – provide specs. For contaminates if available – use trade names if known.

Name internal operating material. Provide trade name and spec., if available. Give approx. operating temperature and contaminates, it might be a factor.

SIGNED: _____

DATE: _____

APPROVED: _____