

# Polyisoprene Lining for Casings

## A cost effective solution for corrosive and erosive elements and closed loop water processes

### The effects of closed loop water systems

Most plants employ closed loop water systems due to the high cost of fresh water and sewerage, and to meet environmental regulations. These systems lend themselves to the build up of corrosive elements and erosive particulates over time.

Standard materials, such as cast iron and steel, often experience premature wear due to corrosion and/or erosion. Materials that previously held up well when fresh water was used, often corrode and/or erode when subjected to today's closed loop recirculated water.

### Increased energy consumption

The casing of a liquid ring vacuum pump is especially prone to this type of wear, because it is in contact with the liquid ring. Typically, after prolonged exposure to these corrosive and erosive elements, the surface of the casing becomes rough, which increases the friction factor. This results in increased energy required to rotate the liquid ring. Nash has measured power consumption increases of up to 20 percent under these circumstances.

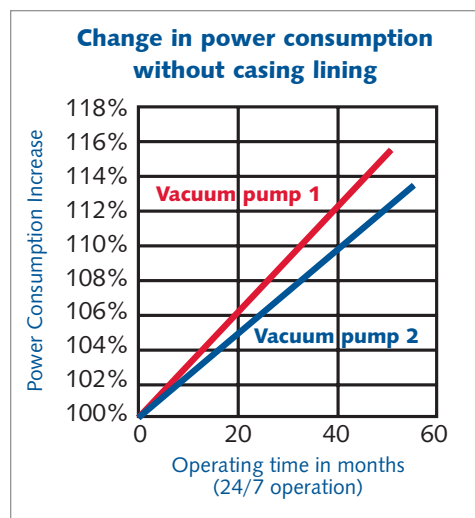
The graph below is based on actual field measurements. It illustrates the power consumption increase of two vacuum pumps with standard unlined casings, over a period of about 50 months, in a paper mill with a closed water system. Absorbed power was in the range of 114 to 116 percent and still rising.

### The polyisoprene lined solution

The pumps used in the actual field study were disassembled, then lined with polyisoprene and returned to their original service with the following results:

- power consumption was reduced to the same level as when the pumps were new
- no future power increase over time, even though the water conditions remained unchanged
- periodic internal inspections over time (through the pump's inspection ports) showed no signs of casing wear

The customer had this to say, "As a result of our long-term experience with the lining types (polyisoprene and stainless steel), we consider both to be technically equal. Both lining types enhance the operational reliability and cost effectiveness of the vacuum pumps to the same degree."



Physical values of the polyisoprene lining			
Characteristics	Units	Standards	Value
Shore hardness	D	DIN 53 505	78 + 5
Density	g/cm <sup>3</sup>	DIN 53 479	1.35 + 0.02
Tensile strength	Mpa	DIN 53 504	38
Breaking tension	%	DIN 53 504	4.3
Adhesion to steel	N/mm <sup>2</sup>	ASTM D 429 Method A	mean value 6 minimum 44
Test voltage	KV/mm coating thickness	DIN 53 29055 T.2	4

### **Polyisoprene lined casings - the standard on Nash 2BE3 and P2620 pumps**

The NASH 2BE3 and P2620 pumps are supplied with polyisoprene lined casings as standard. This no-cost feature provides protection against absorbed power consumption as well as reduced maintenance and repairs.

Nash has more than 30 years of experience lining vacuum pumps with polyisoprene. It has proven dependable in the most difficult service conditions, such as wet chlorine.

### **Features of polyisoprene lined casings**

The polyisoprene lining is vulcanized, not glued, to the pump casing. The chemical bond to the steel casing is so strong that a tensile test results in the polyisoprene material failing, but the bond remaining intact.

The liner is resistant against many acids, alkalis, salt solutions, and erosive particles in the liquid ring. Should any damage occur, the liner is field repairable.

Other components of these large pumps (i.e. the end shields) are available with a polyisoprene lining. While providing suitable long-term corrosion protection, this offers significant cost savings compared to supplying these parts in solid stainless steel.

### **Quality assurance through rigorous testing**

Continuous production monitoring and quality assurance according to ISO 9001:2000 guarantee good specific abrasive resistance, chemical and thermal stressing characteristics. Before shipping, the following standard tests are made and documented with a certificate according to EN 10 204:

- the lining thickness is checked, DIN 28 055
- the Shore hardness is measured, DIN 53 505
- high-voltage testing for pores and cracks, DIN 28 055
- visual check DIN 28 055



**Polyisoprene lined casing - before use**



**Polyisoprene lined casing - after use**

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