HYDROCHLORIC ACID & TANK LININGS

Superior quality linings for hydrochloric acid & tank linings

Hydrochloric acid (HCl), or as once named muriatic acid, is a strong, highly corrosive acid. The commercial "concentrated" or fuming acid contains 38% hydrogen chloride. U. S. P. grades range from 28 to 38%, with 37% HCl being most common. Blair Rubber's personnel are experienced in designing and processing rubber compounds for the highly corrosive environments encountered in various HCl applications.

For storage tanks, tank trailers and tank cars, natural rubber linings on steel have been predominantly used for hydrochloric acid containment. The acid reacts with natural rubber hydrocarbon to chlorinate the surface, making an impermeable membrane. In concentrated hydrochloric acid, it only takes approximately three months for natural rubber crust formations to be in the range of 1/64" (0.16") thickness in depth. This crusting effect makes natural rubber an excellent lining for HCl.

As surface stress cracks develop, the acid penetrates the rubber and forms a new surface crust. The cycle continues until complete lining failure eventually occurs. Lining service performance ranges from 7 to 24 + years depending on lining durometer selection, environmental conditions and vessel stresses. **Marflex™ PG70** has lasted for 25+ years in such conditions and has the longest documented trouble free service.

Through the years, service history has demonstrated that a pure gum natural rubber gives the longest lining life for concentrated HCl. Generally, the lower the durometer, the longer it remains flexible.

It is that extra hardness that impedes the rubber's ability to resist flex stresses as found in over-the-road trailers or rail cars. Contrary to pure gum recommendation for concentrated HCl, a 60 durometer natural rubber. **Enduraflex™ VE611BN**, is recommended for dilute (5-10%) HCl. In dilute acid service, the compounded natural rubber has less water absorption than gum rubber. Laboratory tests show 6-8 % less water absorption for compounded 60 durometer lining as compared to a pure gum.

Lining examination has shown that the HCl vapors are more detrimental to the lining than the HCl liquid itself. To improve the natural rubber life in the vapor phase, it is recommended the natural lining be overlaid with chlorobutyl **Plioweld™ LS582, Enduraflex™ VE621BC, VE622BCN, or VE625BCN**. Chlorobutyl retains its lining flexibility and it is readily adhered to the natural rubber substrate. Chlorobutyl has a greater tolerance to HCl vapors and is less affected from heat aging. The hardness change for chlorobutyl is not appreciable as compared to natural rubber. The reduced hardness yields a more flexible composite to reduce flex cracking.

Also, it has been observed that the natural rubber lining life can be enhanced by painting the vessel exterior white to reflect sun rays. Studies in California have shown a 40ºF to 60ºF (5ºC to 16ºC) lower temperature inside tank cars painted white as opposed to those painted black.

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In the interested of increasing the lining life for food grade concentrated HCl service we recommend our lowest durometer FDA pure gum PG70 over the white loaded FDA natural rubber to increase the lining life. White fillers in natural rubber reduce the physical properties. The higher durometer increases the potential for flex cracking. That being said, when a soft white natural rubber lining is required, VE370WN is the right choice.

When you have specific service conditions, contact Blair Rubber's technical staff for assistance in selecting the correct lining.

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