Part 1 Brief Introduction

Butyl rubber is the same as ethylene propylene rubber, belongs to nonpolar saturated carbon chain rubber, has the commonness of this kind of rubber, which has excellent chemical stability and high insulation, and because of its structure characteristics, it also has some features different from those of the ethylene-propylene rubber.

Butyl rubber sheet has excellent chemical stability, water resistance, water proof property and insurability. These performances compared with ethylene propylene rubber were a little inferior, but with unsaturated rubber it is much better. It’s resistant to oil, polarity, and low temperature performance is also very good as well as ethylene propylene rubber.

The crystallization of butyl rubber is not sensitive to low temperature, is not easy to crystallization under low temperature, high crystallization occurs under tensile, elongation is lower than 150% also did not see crystallization; If below -40 ℃, plus tensile conditions, crystallization is faster. Without reinforcing the tensile strength of the butyl rubber can reach 14-21 MPa, but in order to further improve the mechanical properties such as wear resistance, resistance to tear, it often needs to reinforce.

Part 2 Basic Properties of butyl rubber

1. General butyl rubber
   (1) Physical properties.
      ① Appearance: Off-white viscous elastic solid, cold flow properties
      ② Density: 0.9g/cm3
      ③ Mooney viscosity(ML 100℃ 1+8): 45±5, 65±5, 75±5
      ④ Ash content: 0.3% ~ 0.5%
      ⑤ Volatility: 0.1%~0.3%
      ⑥ Content of stabilizer: 0.1%~0.25%
   (2) Elasticity and damping property. Butyl rubber has the lowest elasticity among all types of general rubbers, impact elasticity, at room temperature its impact elasticity is only 8% to 11%; Above 0 ℃ butyl rubber impact elasticity is lower than other rubber.

   Butyl rubber sheet has good damping property, that is, absorption of vibration. In a wide temperature range and very wide frequency range it can keep tan ≥ 0.5 or higher. For example under 25 ℃, keep tan ≥0.5 butyl rubber frequency range spans 6 qty levels.

   (3) The gas tightness. In general rubber, butyl rubber has the best air tightness, which has very small gas permeability. If to compare in the entire polymer, butyl rubber air tightness is moderate.

2. Halogenated butyl rubber
   (1) The brominated butyl rubber. Brominated butyl rubber due to adding the strong polarity bromine atoms, it not only can improve the curing rate of rubber, but also solves the problem of poor adhesion. Therefore, the use of brominated butyl rubber as the middle tier can make good adhesion between butyl rubber and other rubber, metal, fibre effectively, strength can reach 40
n/cm, max to more than 100 n/cm.

(2) Chlorinated butyl rubber. Besides chloride butyl rubber has butyl rubber’s very good aging resistance, electric insulativity, ozone resistance, abrasion resistance, acid-proof alkaline, compression set resistance, flexing resistance and permeability all these characteristics, it also solved the butyl rubber vulcanization rate low problem and the poor adhesion, can sulfide with natural rubber, chloroprene rubber, styrene-butadiene rubber and so on, and further improved the heat resistance and weather resistance of butyl rubber. As a result, the application of chlorinated butyl rubber has exceeded the butyl rubber.

Dry glue mixing method of chlorinated butyl rubber chlorine uses activated carbon as carrier. But because activated carbon is polluting, so it can only be used as a dark rubber products.

Chlorinated butyl rubber uses with a small amount of other rubber can improve its performance. Use with natural rubber, styrene-butadiene rubber, for example, can improve the adhesion; With neoprene rubber can improve flame resistance; With chlorosulfonated polyethylene rubber can improve the tensile modulus and hardness, reduce compression permanent deformation; With nitrile rubber can improve oil resistant performance; With reclaimed rubber can reduce the cost, at the same time can improve strength and elongation.

Part 3 Application of butyl rubber

Butyl rubber and halogenated butyl rubber is mainly used for tire industry, especially suitable for inner tube, capsule, airtight layer, the tire and rubber hose, waterproof materials, anti-corrosion products, electrical products, heat resistant conveyor belt, etc.

When make products mentioned above, we choose brands of butyl rubber according to the saturation. General electric products choose low unsaturation butyl rubber, it has good electrical insulation performance. Heat resistant products selected high unsaturation butyl rubber, this is in contrast to the conventional concept, mainly due to the butyl rubber get soften by thermal aging and crosslinking density decreased; Instead high saturation rubber has big starting crosslinking degree, after aging its rest crosslinking degree is higher than low unsaturation rubber, moreover high unsaturation butyl rubber has low declining aging hardness, so the performance is still good.