Basic formula of neoprene rubber
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According to the nature of the compound in neoprene rubber, and its role in the formula, Neoprene rubber can be divided into vulcanizing system, protection system, reinforcing and filling system, plasticizing and softening system total 4 kinds. Now points described in detail below.
A. Basic formula
1. Vulcanization system
Neoprene rubber, unlike natural rubber, commonly used vulcanizing agent are some metal oxide, rather than sulfur. To use with sulfur is just in order to improve some performance of the rubber, such as low temperature compression deformation, stretching stress and hardness, but at the same time it will affect the heat aging and tear resistance of vulcanizates, therefore, we generally don't use sulfur very often.
(a) Metal oxide
Because the neoprene rubber molecules contain chlorine, so we widely use metal oxide as an acid acceptor for formula system. Due to the presence of chloride, double bond part activity decline. Therefore, sulfur vulcanization method is restricted. In the process of sulfide zinc oxide acts with neoprene rubber molecular chain, generating ether bond so that to complete crosslinking of neoprene, namely vulcanization usually. Metal oxide based on the influence of the curing rate can be divided into 4 types.
(1) Highly active oxide, magnesium oxide, zinc oxide, mercury and lead oxide.
(2) Secondary active oxide antimony oxide, barium oxide, oxide, aluminum oxide, manganese oxide, calcium oxide, iron oxide.
(3) Neutral oxide, copper oxide, chromium oxide, vanadium oxide and tungsten oxide.
(4) Curing slow arsenic oxide oxidation, oxidation and ferric oxide.
Early trials adopts zinc oxide and magnesium oxide, especially to combine both, with 5 copies of zinc oxide and 4 copies of magnesium oxide to have a satisfactory effect of vulcanization, with safe process, good performance of vulcanized rubber.
Quality of magnesium oxide has great effect on the stability of mixing rubber and physical properties of the vulcanizates. Magnesium oxide acts as stabilizer under the processing temperature, which is an effective stabilizer. Under 100-110 °C it can prevent rubber scorch during processing and storage, and under the curing temperature, it acts as sulfide and promote sulfide, so as to ensure enough rubber vulcanization degree; Meanwhile it has acid absorption property. The products can absorb and neutralize neoprene rubber’s decomposition out trace hydrogen chloride, make rubber products good plasticity and fiber materials of rubber fabric products from corrosion. And by increasing the amount of magnesium oxide it can increase the plasticity of the rubber and the storage stability; The hardness of Vulcanized rubber with the stretching stress also increases.
The activity of magnesium oxide has big effect on sulfur-adjust neoprene rubber (CR1211 & CR3211) mooney scorch. Magnesium oxide activity refers
to its reactivity with other material, such as its index of decomposition reaction ability among acids from neoprene rubber. This ability will significantly influence the processing safety, vulcanization rate and vulcanization. Activity is factor of the surface area and surface state, commonly measured by iodine adsorption value. The more iodine uptakes, the higher activity is. According to the activity of magnesium oxide, it can be generally divided into three categories: highly active, iodine value of 100-140; middle activity, iodine value of 40-60; low activity, iodine value less than 25.