Balance of Processing and Mechanical Properties of SSBR Compounds with High Loading Silica

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Abstract: The effects of several functional additives on the balance of processing properties and mechanical properties of the solution polymerized styrene butadiene rubber (SSBR) compound with high loading silica were studied. The results showed that, with the addition of functional additive Procure D_3 in the tire tread compound, the silica dispersion, processing properties and processing safety of the compound were improved, the Mooney viscosity was reduced, and the curing rate and production efficiency were improved. At the same time, the Mooney viscosity during storage was stable, and the dimensional stability of extruded tread increased, so the stable dynamic equilibrium was obtained. By adding functional additive ProCure D_3, the stress-strain properties, heat aging resistance and wear resistance of the compound were also improved, and the dynamic heat build-up was reduced. The high loading silica filled PCR tire tread compound with functional additive ProCure D_3 had good balance between the wet skid resistance and rolling resistance.

Key words: tire; silica; SSBR; functional additive; processing property; mechanical property; dynamic mechanical performance; wet skid resistance; rolling resistance

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轨道交通工具必须满足消防安全要求,欧盟2018年生效的DIN EN 45545-2规定更严格,并对所有轨道交通工具部件的生产商具有约束力。瓦克原有产品组合中获得认证的固体及液体硅橡胶解决方案已满足大部分要求,尤其是DIN EN 45545-2中R22和R23的规定。有机硅弹性体的普遍优势是具有阻燃性,着火时烟不多。有机硅不含卤素,发生火灾时不会释放氯化氢,因此释放的烟雾与其他材料相比,所含有毒物质少得多,安全性高。

瓦克在开发ELASTOSIL®R 771时,将HL2级危险等级定为最低目标。危险等级根据操作和建造类别而定,从最低的HL1至最为严格的HL3。用ELASTOSIL®R 771制成的部件,可满足DIN EN 45545-2中R1的HL2级的要求,即可满足大部分轨道交通工具的应用要求。

越来越多的公共建筑也必须满足欧盟消防安全规定,ELASTOSIL®R 771系列产品在公共建筑领域也有广泛应用。由于着火时冒烟少,不会释放有害健康的氯化氢,ELASTOSIL®R 771尤为适用于防火帘、绝缘材料和门窗密封件等需要具备抵御火灾能力的建筑部件。

ELASTOSIL®R 771与上一代产品ELASTOSIL®R 770相同,是一种高温及过氧化物交联型固体硅橡胶(HTV),目前可提供邵尔A型硬度为60和70度的产品,硬度为50度的产品正在规划之中。轨道交通部件生产商在用ELASTOSIL®R 771进行加工时,不需要改变任何工艺。这种硅橡胶新产品ELASTOSIL®R 771可用常规压延、挤出、压缩成型工艺,生产柔韧的成型件和型材以及薄板、薄膜和织物增强的有机硅条材。

(冯 涛)