

Active Zinc Oxide (TR)

台翔活性氧化锌 TR

PRODUCT DESCRIPTION (产品特性)

Active Zinc Oxide (TR) is a pre-dispersed wet process active zinc oxide formulated for the rubber industry. It has been used as an activator to substitute conventional (fumed grade) Zinc Oxide in sulfur vulcanization with environmental and economical significance. It was formulated for the application of tire industries as an alternative zinc oxide, which has been successfully adopted in the manufacturing of motorcycle (bicycle) tires, re-treads, diagonal bias-ply tires and radial tires.

台翔活性氧化锌 TR 是台翔化工湿法生产橡胶硫化专用的氧化锌。使用台翔活性氧化锌 TR 取代普通（间接法）氧化锌具有最大的环保及经济效应。目前台翔活性氧化锌 TR 成功的应用在小型（自行车，机车），翻修胎，斜交胎，及子午胎。

ADVANTAGES (产品优势)

Active Zinc Oxide (TR) compared to convention (fumed grade) zinc oxide, offers
台翔活性氧化锌(TR)与传统（间接法）氧化锌比较具有的优势

- Economical advantages/经济效应
 - Higher vulcanization activity due to its finer particle size (larger surface area)
粒径细，比表面积大，硫化活性高
 - Demand less of the zinc oxide content in achieving comparable physical properties
在较低的氧化锌含量下可以等剂量取代橡胶硫化反应中的间接法氧化锌
- Environmental advantages/环保效应
 - Less zinc oxide reduces the environmental impact of zinc oxide during vulcanization and the service of vulcanizates.
降低硫化过程中及硫化胶使用时氧化锌对环境的危害
 - Utilizes recycled zinc waste as raw material in saving natural resources
使用回收的锌废料做为原材料，有效节省自然资源
 - Responsible care manufacturing with least energy consumption
环保制程，使用能源少，尽善关怀生态的责任
- Performance advantages/功能效应
 - Spherical fine particles provide superior dispersion in rubber compounding
球型微细粒径，容易在橡胶中分散
 - Well balanced vulcanizates cross-linking structures in minimizing the blooming occurrences
良好的橡胶硫化架桥结构有效降低吐霜发生
 - Better compound scorch safety and Mooney viscosity.
较好的焦烧安全性和摩尼黏度

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PROPERTIES (物性)

Appearance/外观	White powder/白色粉末
Chemical Analysis/化学成份	%
ZnO 氧化锌	Exclusive/台翔自有专利
Pb 铅	≤0.010
Cd 镉	≤0.005
Cu 铜	≤0.001
Fe 铁	≤0.001
Specific Gravity/比重(g/cm ³)	Approx. 3.5
Volatility/挥发度(105°C/2hr)	< 3.5%
Storage Stability/储存期	Two year under normal storage conditions/ 在良好的保存环境下可保存两年
Packing/包装	25 kg per paper bag/ 25 公斤纸袋

RECOMMENDATIONS AND APPLICATIONS (应用范围及效果)

Although zinc is considered one of the least harmful among heavy metals, soluble zinc compounds are classified as eco-toxic to aquatic organisms. Release of zinc compounds into environment from rubber occurs during production, disposal and recycling of rubber products. In view of increased attitude of protecting the environment, it is desirable to keep the zinc oxide content as low as possible during vulcanization and the service of vulcanizates. This not only leads to lower pollution impact but also is advantageous from an economical point of view.

虽然锌属于危害最小的重金属，但溶解的锌化合物对水中生物具环境毒性。橡胶在生产、废弃及回收的过程中有可能释放出锌化合物造成环境危害。随着环保要求的提高，橡胶硫化过程及硫化胶需要降低氧化锌的使用剂量，这不但可减少环境危害，同时具有极高的经济效益。

Various grades of convention (fumed grade) zinc oxide are well-known additives for rubber. They are used primarily as activators or accelerators. One of the problems inherent with their use, however, is that only a relatively small percentage of the zinc oxide is effective and actually undergoes reaction with other components of the compounding mixture. Active Zinc Oxide (TR) was developed to increase the availability of zinc oxide during vulcanization. Therefore, it could result in reduction of the zinc oxide content without the detrimental effects on curing and physical properties of rubber products and thereby significantly reducing the environmental impact.

传统使用各种不同等级的普通（间接法）氧化锌作为橡胶硫化的活化剂。然而在硫化中，只有极小部分的氧化锌参与反应，造成大部分氧化锌的浪费。台翔活性氧化锌 TR 提高氧化锌实际参与硫化反应的效率。因此可以在较低的氧化锌含量下达到普通（间接法）氧化锌在硫化中的活化效果。具有极高的环保及经济效应。

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In order to increase the activity of ZnO and thereby reduce the necessary amount, the availability of Zn^{2+} -ions at the surface of the crystals should be increased. Active Zinc Oxide (TR) increases the availability of Zn^{2+} -ions by embedding $ZnO \cdot m(OH)_2 \cdot nCO_3$ in a carrier so that, like done in the field of catalysis, the increased reaction with accelerators and stearic acid during the vulcanization. In addition, with its finer particle size, the mean particle size is decreased and the specific area increased, which results in a higher reactivity.

低氧化锌含量的硫化活性剂必须提高氧化锌的活性才能达到间接法氧化锌在硫化反应的活化效果。台翔活性氧化锌 TR 镶结错化合物于载体中能有效提高硫化反应时 Zn^{+2} 离子与促进剂及硬脂酸的结合；同时粒径小，比表面积大，因而能在较低的氧化锌含量下达到间接法氧化锌硫化反应的活化效果。

Another environmental and economical significance of Active Zinc Oxide (TR) comes from its saving of natural resources by using recycled zinc waste as raw material and its responsible manufacturing process. On the other hand, convention (fumed grade) zinc oxide consumes great amount of energy in fuming the zinc ingot. Furthermore, the manufacturing of zinc ingot involves extensive efforts in mining and smelting, which leads pollution impact.

台翔活性氧化锌 TR 另一项环保经济效应来自于使用回收锌变异系数料作为原料，有效节省自然资源。先进的环保生产制程善尽关怀生态的责任。传统（间接法）氧化锌制程熔融蒸发锌锭，需消耗大量能源，同时锌锭的取得尚需经过采矿、冶炼等一系列环境卫生的生产过程。

Active Zinc Oxide (TR) with its finer particle size (higher surface area), is easier to disperse in rubber compounding than conventional (fumed grade) zinc oxide. Rubber vulcanized with good dispersion Active Zinc Oxide (TR) is usually with better physical properties (higher tensile strength, tear strength, better heat build up reduction).

台翔活性氧化锌 TR 粒径小，此表面积大，因此较普通（间接法）氧化锌容易在橡胶中分散。采用分散性良好的活性氧化锌可提高胶料的抗张强度、撕裂强度和热导性。

DOSAGE (使用剂量)

We recommend trying initially Active Zinc Oxide (TR) by weight in substitution of Convention (fumed grade) ZnO powder. Dosage can be 3-6phr.

使用台翔活性氧化锌 TR 取代普通(间接法)氧化锌粉末时，建议先沿用粉末使用剂量，视效果再酌量增减。使用量应介于 3.0-6.0phr。

APPLICATION NOTES (橡胶应用实例)

Application of Active Zinc Oxide (TR) in radial tires/台翔活性氧化锌 TR 在子午线轮胎应用实例

Steel belt belongs to one of the crucial components in the radial tires. The application of Active Zinc Oxide (TR) in the steel belt compound of radial tires was investigated.

钢丝带束层是子午线轮胎的关键部分，本实验比较探讨台翔活性氧化锌 TR 在带束层配方中取代间接法氧化锌的可行性。

*Steel belt experiment data/钢丝带束层实验数据

No 序号	Item 项目	Unit 单位	Result 结果	
			Active ZnO (TR) 台翔氧化锌 (TR)	Fumed Grade ZnO 间接法氧化锌
1	Rheometer 硫化数据			
	ML	dNm	2.36	2.33
	MH	dNm	26.62	31.64
	ts1	m:m	0.42	0.35
	t50	m:m	1.04	0.83
	t90	m:m	1.81	1.49
2	Mooney Viscosity 摩尼黏度			
	MV	MU	54.8	55.1
	T5	m:m	8.18	5.13
	T35	m:m	13.17	11.45
3	Tensile strength 拉力			
	Mod25%	Mpa	2.43	2.36
	Mod100%	Mpa	3.87	3.92
	Mod200%	Mpa	6.74	7.14
	Mod300%	Mpa	10.75	11.49
	Tensile Elongation	Mpa %	16.67 436.89	14.58 378.71
4	Tear/撕裂强度	Mpa	5.91	4.3
5	Specific Gravity 比重	g/cm ³	1.101 1.152	1.113 1.152
	6	Hardness/硬度	Shore A	80

The results show the replacement of fumed grade ZnO with Active Zinc Oxide (TR) at the same loading level has increased Mooney scorch time and with the decreased Mooney viscosity (better compound safety and mould flow capability). The physical properties of the vulcanizates are comparable of these two zinc oxides. With Active Zinc Oxide (TR) excels on the tear strength. The lower zinc oxide content, highly active Active Zinc Oxide (TR) is feasible as an activator to replace the low surface area (activity) fumed grade.

实验数据显示，等量使用台翔活性氧化锌®TR 取代间接法氧化锌，胶料的摩尼黏度下降，摩尼焦烧时间延长。硫化胶一般的物性基本保持不变，但在撕裂强度上有所提高。说明低氧化锌含量高活性的台翔活性氧化锌®TR 取代低表面积（低活性）是可行的，并且可适量降低胶料成本。

*台翔公司对上述数据力求正确，测试方法或生产批量或有些微差异，但不影响生产操作及橡胶物性。

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IMPORTANT NOTE (备注)

TaiXiang has sought to correct the above information, the information and data for reference purposes only.

Concrete information please keeps the standard of testing the kinds.

台翔公司对上述资料已力求正确，各项资料数据仅供参考，具体以实物检测为准。