EnviroCB 550

Product Summary

Scandinavian Enviro Systems' (Enviro) recovers carbon black from used car and truck tyres using their patented technology. The product is called EnviroCB 550 and has the following credentials:

- Recovers a valuable resource from used tyres
- It's manufacture results in 60% lower CO_2 emissions compared to virgin carbon black
- The first to be used in new rubber components: for Volvo Cars (>30M components since 2016) and Alvenius
- Has been endorsed by Vanlead tyre manufacturer in China as "the best they have ever tested" leading to plans for a Vanlead plant based on Enviro's process

2GBioPOWER can supply EnviroCB 550 which brings the following advantages:

- Stable competitive price, not linked to oil
- Performance equivalent to N550 (or better)
- Low VOC, odourless
- Tested in a wide range of applications
- Products with high recycled content without compromising performance
- Requires less silica, zinc and sulphur to be added in compound formulation
- Improves manufacturer's credentials with regulators and customers

EnviroCB 550 is covered by REACH and qualifies as a product within the EU.

About EnviroCB 550

Scandinavian Enviro Systems' recovered Carbon Black is a new semi-reinforcing carbon black product for polymer production. Its performance in compounds is similar to N550 for which it can be used as a 100% replacement as illustrated in the Volvo Cars' chassis grommets below.

The recovery of Carbon Black from used vehicle tyres has been explored for many years with mixed results. Working closely with rubber manufacturers, Scandinavian Enviro Systems has refined its process to produce a consistent, high quality recovered Carbon Black (rCB) which meets Volvo Cars' technical and performance requirements.

Tested Applications

EnviroCB 550 has also been found to meet performance and manufacturing requirements in the following applications by a number of companies, including Trelleborg and AnVa Polytech.

- Vehicle Chassis Grommets – 100% EnviroCB 550
- Calendering – 50% EnviroCB 550 / 50% virgin CB.
- Rail shock absorbers – 100% EnviroCB 550

It can also be used as a substitute for N660 in many applications.

Applications may employ EnviroCB 550 as a 100% substitute, but others may require slight changes of the compound recipe – as in the Calendering example above where a partial replacement worked well.

Technical Summary

EnviroCB 550 is a new semi-reinforcing carbon product for polymer production. Its performance in compounds is similar to N550, although its measured properties do differ:

Property	**Specification**	**Test Method**
BET Surface area, m^2/g	64-66	ASTM D- 6556
STSA, m^2/g	54-58	ASTM D- 6556
Oil Absorption Number, m^3/kg	90-105	ASTM D- 2414
Pellets hardness (average), g	< 60	ASTM D- 5230
Pour Density, kg/m^3	430-490	ASTM D- 1513
Sieve residue 325 mesh, %	< 0.01	ASTM D- 1514
Transmittance of toluene extract, %	> 95	ASTM D- 1618
pH	6-8	ASTM D- 1512
Moisture content, %	< 0.7	ASTM D- 1509
Ash content, %	< 9	ASTM D- 1506 **
Sulphur content, %	2.0 - 3.0	ASTM D- 1619
***Excluding silica and zinc. Silica content (SiO2) 5-9%. Zinc content (ZnO) 4-7%*		

Pricing

EnviroCB 550 is competitively priced, even when a low cost in oil drives the price of virgin CB down. When oil prices are high, EnviroCB 550 will be extremely competitive as production costs are not directly linked to oil.

How is it produced?

Enviro's process is called Carbonization by Forced Convection, and pyrolyses shredded car tyres using a hot gas. This ensures a consistent fine carbon with very low volatile content. The carbon is separated from the metal, milled and beaded using conventional processes. The resulting product comprises the original carbon in the tyres, plus inert additives and fillers. The additives include silica, zinc and sulphur. It has been found that less zinc is required in compound formulation, whereas the sulphur is inert. In principle the silica could be re-activated.

Green House Gas Savings

The tyres used in the production of EnviroCB 550 would typically be burned in cement kilns and power stations. However these applications place as much importance on the disposal of tyres for a fee (so called gate fee) as they do on the energy content, and the latter may not always be utilised. Cement kilns also value tyres for their steel content.

Virgin Carbon Black requires considerable energy to manufacture. A typical plant uses 500 kWh/t carbon black. Moreover, 33 GJ feed stock and about 30 GJ process energy are needed (Leendertse and Veen, 2002). If burned, the total GHG emissions amount to over 5 tonnes of CO_2 per tonne of carbon black.

Pyrolysis of tyres leads to full use of the energy content of tyres and re-use of the resultant recovered Carbon Black avoids the GHG emissions that would result from tyre incineration.

Availability

Enviro is able to manufacture 2,000 tonnes of rCB per annum at its current facility near Gothenburg in Sweden. Samples are available for laboratory and formulation tests, and larger quantities can be supplied for manufacturing tests. Plans are in progress for a for further plants using Enviro's technology, including the UK, Chile, Canada and China.

Company Backgrounds

Scandinavia Enviro Systems has been developing its technology over the last 20 years. The process has been developed specifically to produce high quality carbon from used vehicle tyres. Scandinavian Enviro Systems AB (publ) is listed for trading on Nasdaq OMX First North, under the ticker SES. www.envirosystems.se

2G Biopower is developing a UK tyre recycling business and has been working with Enviro for over 4 years, with an initial focus on the UK.

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