

Ricobond® 7004 for Textile Treatment: Adhesion to Sulfur-Cured Rubber



Benefits

- Improved adhesion
- Adhesion promoter to styrene butadiene vinyl pyridine latex
- Adhesion between rubber and polar substrates
- Water-based
- Low viscosity
- Small particle size
- Good wetting
- Improved water resistance
- Compatibility with other water-based systems

Target Markets

- Textile treatment

Additional Information

MSDS/TDS: Ricobond® 7004

Description

Cray Valley has developed a series of aqueous dispersions of functionalized resins including Ricobond® 7004. Table 1 lists the chemical and physical properties of Ricobond 7004. When mixed with other water-based emulsions, Ricobond 7004 can increase rubber adhesion to textile and metal substrates and improve chemical resistance. The hydrophobic and hydrophilic components of Ricobond 7004 allow for interaction between polar and non-polar substrates. The dispersion shows good compatibility when formulated with other latexes such as styrene butadiene (SB) and styrene butadiene vinyl pyridine (VP) emulsions. Formulating with standard latexes can reduce surface tack while improving adhesion, water resistance, and acid and base resistance. Ricobond 7004 has previously demonstrated good adhesion performance in peroxide-cured EPDM rubber when formulated with SB latexes such as GenFlo® 8045 and GenFlo 3003.

TECHNICAL UPDATE

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Table 1: Physical and chemical properties of Ricobond 7004

Identification	Ricobond 7004
Mn, g/mol	4500-5500
Functional Groups/Chain	11
Viscosity, cps @ 25 °C	<500
pH	8.0-9.0
Solids, wt%	28-31

Ricobond 7004 was formulated with a styrene butadiene vinyl pyridine (VP, GenTac 106) emulsion. Twenty per cent of Ricobond 7004 was added to VP latex. Good compatibility was observed and the resulting mixture was homogeneous, grit free and remained stable. The blend was used to treat polyester/nylon woven fabric. A modified T-peel method was used to test adhesion of the fabric to NR/SBR sulfur-cured rubber. Table 2 shows the rubber compound formula and additives.

Table 2: Rubber model compound

Additive/Compound First Stage	
SBR-1502	50.0
SVR-CV60 (NR)	50.0
CB N330	50.0
Oil (Sundex 790)	10.0
Zinc Oxide	3.0
Stearic Acid	2.0
Second Stage	
TBBS	0.7
6PPD (solid)	1.0
TMQ (solid)	0.5
Sulfur	2.0

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Procedure and Testing

Sample preparation

A one-step dipping process was used to treat the polyester/nylon fabric. The blend used to treat the fabric was a 20:80 ratio of Ricobond 7004 to VP latex. The final blend was then diluted to 22% solids. Each fabric was dipped in a bath then passed through rollers to remove excess material. The fabric was then dried in an oven for 5 minutes at 200 °C. Plaques of rubber-fabric-rubber were made and cured at 160 °C for 25 minutes in a heated press. These plaques were then cut into four 1-inch by 5-inch strips.

Testing

A modified ASTM D1876 T-peel method was adapted to test the adhesion of the treated fabric to cured NR/SBR rubber. Figure 2 provides a visual description of the modified test. A Thwing-Albert EJA Vantage 10 tensile tester was used to perform the testing. T-peel speed and distance were constant for all samples. All strips were tested at room temperature (27 °C) and at 50% relative humidity.

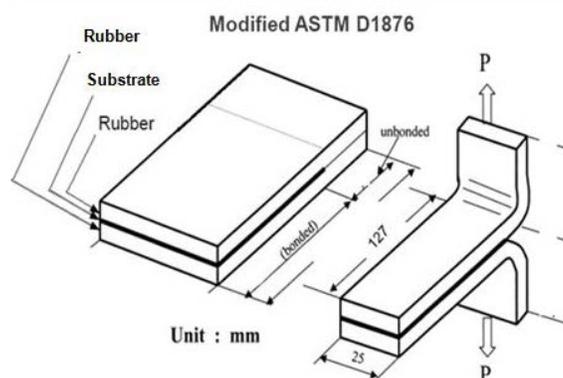


Figure 1: Modified ASTM D1876 test

Results

The addition of Ricobond 7004 to VP latex resulted in a significant improvement in adhesion. Figure 2 provides a comparison of the adhesion of VP latex and the VP/Ricobond 7004 blend.

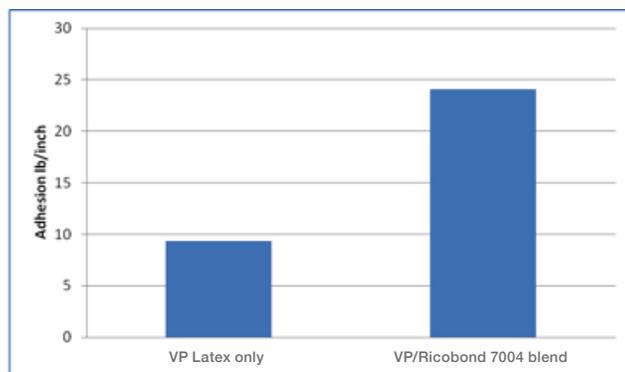


Figure 2: Adhesion of treated fabric to NR/SBR rubber

Summary and Future Studies

Ricobond 7004 can be blended with SB and VP latexes as adhesion promoters for textile treatment formulations. In sulfur-cure systems, the addition of Ricobond 7004 to VP latex improves adhesion. Future work will include continued evaluation of adhesion of the textile substrates to sulfur-cured rubber, treating other substrates such as polyester and nylon, and modifying the dip system for better adhesion.

Other Suggested Applications

Ricobond 7004 can also be used as an additive in other water-based formulations such as adhesives, coatings, paper sizing, construction materials and composites. It can also be used to treat high surface energy fillers to improve wetting and ultimate dispersion in elastomers and thermoplastic/thermoset resins.

About Total Cray Valley

Total Cray Valley is the premier global supplier of specialty chemical additives, hydrocarbon specialty chemicals, and liquid and powder tackifying resins used as ingredients in adhesives, rubbers, polymers, coatings and other materials. Total Cray Valley has pioneered the development of these advanced technologies, introducing hundreds of products that enhance the performance of products in energy, printing, packaging, construction, tire manufacture, electronics and other demanding applications.

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