

Description

The CASABOND 1200 series are adhesion promoters for use in direct-bonding systems for rubber compounds.

CASABOND 1200 / 1201 / 1202 / 1203 are proprietary blends of resorcinol and stearic acid, in the ratios 75:25, 66:34, 60:40, 80:20 respectively. The products are prepared as homogeneous melts of the two ingredients, with the active resorcinol dispersed in a finely-divided form within the fatty acid matrix.

The products are recommended for use in compounded direct-bonding systems, in applications involving rubber-to-metal and rubber-to-textile adhesion. The products can be formulated into systems based on natural rubber, SBR, BR, NBR, EPDM, CR and blends of NR/SBR, NR/BR and BR/SBR. Incorporated into compounds prepared from these elastomers, during vulcanisation the Casabond 1200 series will enhance adhesion to brass- and zinc-coated steel.

Direct bonding of textiles such as rayon, nylon and polyester, as well as glass and aromatic fibres, may also be carried out using elastomeric compounds containing CASABOND 1200 products.

Resorcinol-based adhesion promoters require the presence of a methylene donor such as hexamethylenetetramine (HMT) or hexamethoxymethylmelamine. Where HMT is employed it is desirable to use this in a pre-dispersed form, thereby ensuring efficient and effective distribution of the methylene donor.

Direct bonding compounds that contain HMT may be detrimental to polyester fibres at high temperatures. Other methylene donors are therefore preferred in these particular applications, such as hexamethoxymethylmelamine (HMMM).

Direct bonding compounds are usually prepared by two-stage mixing techniques. The methylene donor, along with the sulphur and accelerator, are added during the second mixing stage. This ensures good processing safety. CASABOND 1200 grades may be added at either the first or second mixing stage (except where the elastomer is polychloroprene, in which case second-stage addition is essential).

Direct bonding compounds for rubber-to-metal applications usually require 3 – 4 pphr of sulphur. Insoluble sulphur is the preferred grade, thereby avoiding the blooming that is associated with soluble, rubber-grade sulphur.

The use of sulphonamides is recommended, particularly N,N-dicyclohexyl-2-benzothiazole sulphonamide (DCBS) or 2-(morpholiniothio)benzothiazole (MBS).

High levels of adhesion result from the *in-situ* chemical reaction, at vulcanising temperature, between the resorcinol and the formaldehyde that is liberated from the methylene donor. The addition of reinforcing silica is claimed to catalyse the R/F reaction and contribute to the adhesion of the rubber compound to the substrate. A combination of these three ingredients, when incorporated into a rubber compound, is the basis of the R.F.S. (Resorcinol / Formaldehyde / Silica) bonding system.

Direct Bonding Systems Guidelines and Typical Formulations

<u>Bonding Natural Rubber (NR) to Brass-Coated Steel Wire</u>		<u>Bonding Natural Rubber (NR) to Nylon Woven Fabrics</u>	
	<u>pbw</u>		<u>pbw</u>
Natural Rubber – SMR5	100.0	Natural Rubber	100.0
PEPTON™ 66 (*) Chemical Peptiser	0.1	PEPTON™ 66 (*) Chemical Peptiser	0.15
Zinc Oxide	10.0	Zinc Oxide	10.0
HAF (N330) Carbon Black	45.0	FEF (N550) Carbon Black	35.0
Precipitated Silica	15.0	Precipitated Silica	10.0
Aromatic Process Oil	4.0	Aromatic Process Oil	5.0
CASABOND 1200 Series	3.00	CASABOND 1200 Series	4.0
Hexamethylenetetramine	1.50	Hexamethylenetetramine	1.75
Antioxidant	1.00	Antioxidant	1.00
Pre-dispersed, insoluble sulphur (70% active)	5.50	Predispersed, insoluble sulphur (70% active)	3.50
Accelerator (DCBS)	0.70	Accelerator (MBS)	1.00
Stearic Acid	1.00		

(*) Pepton 66, chemical peptiser manufactured by THOMAS SWAN & CO. LTD.

When designing a direct bonding compound, the stearic acid component of the products should be considered. A vulcanising temperature of 150°C will provide good adhesion, but it may be beneficial to employ a time cycle slightly in excess of normal optimum cure time. High bond strength can also be obtained using a shorter time cycle at temperatures up to 165°C.

CASABOND 1200 Series in Manufactured Rubber Goods

Typical finished products include: -

- Hoses - Textile or wire reinforced: hydraulic / oil suction / discharge hoses.
- Belting - Textile or wire reinforced: conveyor- / transmission- / V-belting.
- Tyres - Textile or wire reinforced: passenger / truck / aircraft tyres (both cross-ply and radial)
- Rubberised Fabrics - Protective clothing; tarpaulins; diaphragms with synthetic, woven fibres.

Advantages of CASABOND 1200 Series in Rubber Compounding

Improved Handling – The flaked form of the CASABOND 1200 series facilitates resorcinol dispersion and improves general health and safety characteristics, when compared to commercial grades of crystalline resorcinols.

Improved Dispersion – The resorcinol within CASABOND 1200 / 1201 / 1202 / 1203 is finely pre-dispersed within the fatty acid carrier. In this form it disperses more efficiently, upon addition in to the rubber compound, compared to the relatively large crystalline particles of commercial resorcinol.

Reduced Energy Consumption – the CASABOND 1200 series disperse efficiently in rubber compounds, and may be used at temperatures below 90°C. When using a crystalline resorcinol grade it is generally necessary to increase such processing temperatures to 115-120°C, in order to melt and ‘flux’ the resorcinol and thereby adequately disperse the ingredient in the rubber compound. Reduced processing temperatures offer reduced energy consumption through the use of CASABOND 1200 products.

Reduced Fuming – At high processing temperatures, fuming problems are likely to be associated with the use of crystalline resorcinol. The use of CASABOND 1200 products can minimise this fuming through the lower processing temperatures that are required to achieve good dispersion, when compared with crystalline resorcinol.

Range of Compositions – the CASABOND 1200 series offers a convenient range of compositions, as described in the table below.

Typical Properties

Property	CASABOND 1200	CASABOND 1201	CASABOND 1202	CASABOND 1203
Form	Free-flowing flakes	Free-flowing flakes	Free-flowing flakes	Free-flowing flakes
Colour	Red-brown	Red-brown	Red-brown	Red-brown
Assay (Resorcinol) %	75	66	60	80

Recommended Dosage

Direct bonding systems generally require 2.5 – 3.0 pphr of resorcinol, the recommended level of CASABOND 1200 series is therefore 3.0 – 4.0 pphr. In addition, it is necessary to add 1.5 – 2.0 pphr of a methylene donor, e.g. HMT (hexamethylene-tetramine). Up to 10.0 – 15.0 pphr addition of reinforcing silica is beneficial, offering a further improvement of bond strength.

Packaging

25kg bags.

Shelf Life

24 months.

Handling and Safety

Please consult the relevant Material Safety Data Sheet (MSDS).