

Most brake lining materials of the type used consist of a mixture of fibrous reinforcement, a variety of friction/wear/noise modifying agents and a heat resistant binder to hold the composite together. The raw materials are fixed together and molded to a final shape under heat and pressure. Finally, the part is baked at high temperatures to develop optimum strength and heat resistance. The importance of strength and heat resistance cannot be overly emphasized because the material must not crush or shear off the backing plate under severe temperatures and pressure conditions.

Optimizing the brake lining material for all of the above performance criteria requires careful selection of each raw material and extensive experimentation to insure that each is used in the proper amount. It should be noted that during the manufacturing of brake linings, the raw materials are subjected to heat and pressure so that the binder will uniformly coat all the other ingredients. This is essential to achieve the required strength, but it also serves to encapsulate the fibres and hold them in place. Asbestos is a major component of brake linings. The asbestos content of brake linings manufactured by Raybestos Manhattan is about forty to sixty weight percent. Asbestos is a high strength, heat resistant fibre with excellent processing characteristics. Unlike many other high strength, heat resistant fibres such as fibreglass, asbestos does not melt or soften at high temperatures. Rather, it stays in a solid form and is converted by heat into a non-fibrous mineral particle called forsterite. This is somewhat analogous to the conversion of wood fibres to charcoal. The important point is the fact that it does not melt at high temperatures because this can cause smearing and brake failure under severe service conditions. Another unique characteristic of asbestos is that its hardness is slightly less than that of cast iron used in brake drums so that it does not cause drum wear. Asbestos is a significant component of brake linings and no other fibre has the requisite characteristics to directly replace asbestos in this application.

Chrysotile is the only type of asbestos fibre used by Raybestos Manhattan in its manufacture of brake lining materials. Chrysotile, or white asbestos, represents over ninety-five percent of the world's production of all asbestos minerals. It is a magnesium silicate fibre of the serpentine group mined primarily in Canada although the U.S., Russia and Rhodesia are also significant producers. It is characterized by relatively long, flexible fibres with high strength and the ability to retain the strength at high temperatures.

Crocidolite, or blue asbestos, is a complex iron silicate of the amphibole group. It is mined in South Africa and to a lesser extent in Australia and Bolivia. Crocidolite fibres are generally less flexible than chrysotile and more difficult to process. Crocidolite fibres have

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