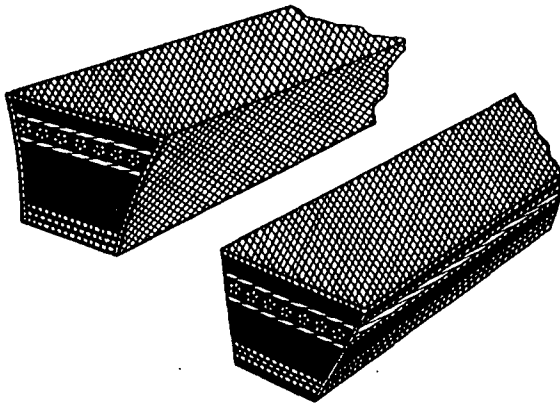


Traditional V-Belts

The most common drive belt used in automobiles today is the traditional V-belt. It comes in banded and bandless versions. Banded belts have a cover that protects the belt from oil, heat, ozone, sunlight, moisture and weathering. They were once the most popular type of V-belt sold, but they are rarely seen in today's cars. They've been replaced by bandless V-belts; these have a protective layer on the top and bottom surfaces.



(Figure 31) Banded and Bandless V-Belts.

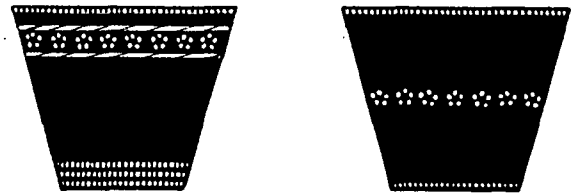
Tests demonstrate that banded and bandless V-belts have about the same useful life, but banded belts appear to wear out sooner because of obvious wear to the cover. Although this does not materially affect the belt itself, most car manufacturers, responsible for the belts for the extended warranty period on the car, have shifted to bandless belts.

Most V-belts consist of three sections: the overcord, the tensile cord, and the undercord. The overcord—the material above the tensile cord—gives added transverse support to the tensile members in the belt's interior and protects them from dirt, oil and other contaminants. The overcord material is composed of fabric and "rubber". (This is an "elastomeric material" or synthetic rubber, since real rubber does not stand up well to petroleum compounds. The major automotive belt compound used today is neoprene.)

The tensile cord—the heart of the belt—consists of one or more rows of tensile members that give the belt its true muscle. The cords are surrounded by an adhesion material that bonds them to the overcord and undercord.

The textile material in the belt must be processed in alternate baths of adhesives and liquid elastomeric materials. It is then surrounded with a special gum stock that softens and flows during the process of heated curing (vulcanization) to fill in the voids around the treated textile. The final result is a V-belt composed of many units that act together as one solid dependable unit.

Almost all automotive V-belts use polyester for their tensile cord, although nylon and Dupont Kevlar are other common textile materials. The ideal tensile cord must have the combined qualities of fatigue strength, tensile strength, shock resistance, manufacturing uniformity, length stability and resilience.



(Figure 32) The tensile cord placement on the two types of bandless automotive V-belts marketed today: 1) top, and 2) center.

Since the cords are located at a wider part of the belt, there are about 40% more cords in high tensile cord belt. This spreads the belt strain over more cords (decreasing strain per cord) and increasing the strength of the belt. In SAE (Society of Automotive Engineers) accelerated tests, one high tensile cord belt lasted as long as four center tensile cord belts.

Because of the waste in manufacture, the high tensile cord belt costs more to manufacture and is priced higher. The trade-off is that the high tensile cord belt lasts significantly longer. The less expensive center tensile cord belts, while not as long lasting on highly loaded drives, are suitable for less demanding applications.

The undercord is all material beneath the tensile cord that provides support to the cords and transfers their forces to the pulley groove side-walls. The undercord must be stiff enough to keep the tensile cord from sagging transversely under a heavy load, yet flexible enough radially to bend and flex through millions of cycles without cracking.