Only linings that prove worthy in the laboratory receive further testing.

ROAD TESTING OF BRAKE LININGS

As is true of all automotive development, the vehicle itself must produce the final verification of laboratory brake findings. Large fleets of vehicles and numerous engineering personnel are continually engaged in brake development and testing operations (Fig. 7). Tests of every type of Chevrolet brakes totaled 1,680,000 miles from October 1957 to October 1958.

The results of brake road tests described herein apply to organic lining bonded to the shoes, as contrasted to the riveted type, both of which are shown in Fig. 8.

Tests on metallic linings apply to the type shown in Fig. 9, with the lining riveted to the shoes in segments. The metallic segments on the shoe are flexible in their application in that they can be varied in number, position on shoe or material formula to produce the braking effort desired.

The ultimate structure of all linings is determined by test. A brake lining material that has progressed from laboratory to road testing first undergoes a "general feel" test. Brake development engineers try the facings for an overall impression.

If the findings are good, an effectiveness test is made. The 50 and 80 mph brake deceleration test results shown in Fig. 10 depict the effectiveness of high speed emergency stops with organic and metallic linings. This test requires the use of a load applicator, decelerometer and recording unit. Load is applied to the brake pedal automatically and the recording unit indicates pedal load, deceleration, pedal travel and time required to make test stops. The 50 and 80 mph brake deceleration curves show the brake effectiveness of the organic and metallic linings. The rate of load application on the brake pedal to obtain the curves is 30 pounds per second and each curve represents a single stop. The curves reveal that the organic material is less speed sensitive and more effective in this test. It should be pointed out that the metallic lining curves are those in which the brakes were cool at the start of the stop. For the organic lining, the pedal load required at a deceleration rate of 20 feet per second per second from 50 mph is 80 pounds, and from 80 mph is 118 pounds. Under the same conditions for metallic lining, the pedal load from 50 mph is 103 pounds, and from 80 mph is 165 pounds.

If linings perform well in the effectiveness test, they are subjected to the fade test. The chart in Fig. 11 illustrates a brake fade test comparison of organic and metallic linings. Line pressure is indicated by the co-ordinate at the left and stop numbers at the bottom of the chart. The stops were made from 60 mph at 15 feet per second per second deceleration. The interval between fade stops was 4-tenths of a mile, or about 40 seconds. Initial feel and recovery stops were made from 40 mph at 6 feet per second per second at one mile intervals. The organic curve shows a slightly decreasing initial to final line pressure during the first three stops with each successive stop becoming harder. This is indicated by the shaded distance between the broken and solid line curves. By the 4th stop the line pressure increases progressively during each stop and the pedal becomes harder. By the 7th stop, line pressure is over 800 psi and fade continues with each stop. Recovery is slow and requires 2 miles to level out to within 20 pounds per square inch of the initial. As the metallic lining curves indicate, the line pressure increases only 50 pounds per square inch during entire test. The line pressure decreases during each stop with no recovery being required. Tests such as this show the need for organic linings that have less heat build-up and, thereby, less fade. Therefore,