Wear of Commercial Pit and Fissure Sealants*

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The objective of this study was to compare the abrasion resistance, resistance to penetration, and mode of deformation of a filled (A*) and two unfilled (B† and C‡) pit and fissure sealants.

Samples were mixed following manufacturers' instructions and stored at 37 C for 24 hours before testing. Five cylindrical samples of each sealant were abraded on silicon carbide paper§ with continuous flushing with water by a two-body abrasion test (Powers et al. *JADA* 89: 1118, 1974). The surfaces of five samples of each sealant cured in a sample holder were scratched by a diamond hemisphere (360 μm in diameter) at normal loads of 1 to 10 N in increments of 1 N by a procedure described elsewhere (Powers and Craig, *J Dent Res* 51:168, 1972). The wear track width (W) was measured and surface failure evaluated by a scanning electron microscope (SEM).

Means of the abrasion data (standard deviations in parentheses) were A, 23.3 (1.4); B, 21.5 (1.1); and C, 23.9 (2.2) $\times$ 10^{-4} mm^3/mm of travel. There were no significant differences among the means for the 95% level as determined by analysis of variance. Means of W versus normal load are plotted in Figure 1. Both load and sealant were significant factors and a Scheffe interval of 3.6 μm for comparisons of means of W among sealants was computed at the 95% level from the analysis of variance. At each normal load, the sealants were significantly different from one another. Sealant A had the lowest and C the highest values of W. SEM photomicrographs of the surface failure of the sealants are shown in Figure 2. The addition of 40% quartz to the diacrylate resin of A increased the resistance to penetration and dramatically altered the nature of surface damage caused by sliding, but did not affect the resistance to abrasion by silicon carbide in comparison to the unfilled sealants, B and C.

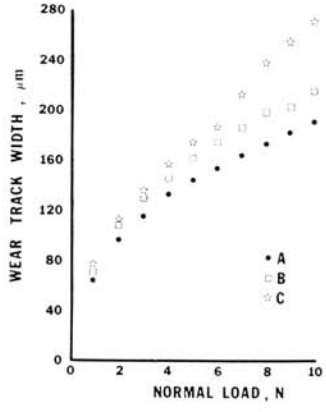

Fig 1.—Track width versus normal load for hemispherical diamond slider traversing sealants.

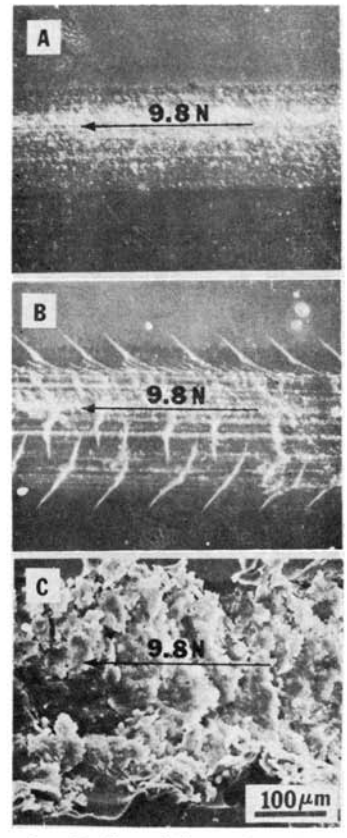

Fig 2.—Surface failure of sealants (A to C) for single-pass sliding under a normal load of 9.8 N.

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* Kerr Pit and Fissure Sealant, Lot No. 0411750100, Kerr Manufacturing Company, Romulus, Mi

† Delton Pit and Fissure Sealant, Lot No. 2915D001, Johnson & Johnson, East Windsor, NJ.

‡ Nuva-Seal, Lot No. 75328 (base), Lot No 75335 (catalyst), L. D. Caulk Company, Milford, De.

§ Carbimet (600 grit), Buehler Ltd., Evanston, Il.