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Load-deflection rate measurements of activated open and closed coil springs

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ABSTRACT

The purpose of this investigation was to provide load-deflection rate data for a variety of open and closed coil springs. Ten millimeter lengths of open and closed coil stainless steel and Cobalt-Chromium-Nickel (Co-Cr-Ni) alloys in combinations of 0.008, 0.009 and 0.010 inch wire sizes, and 0.030 and 0.032 inch lumen sizes were tested. Other groups included heat treated Co-Cr-Ni springs and springs of 15 and 20 millimeter lengths. Forces and activations were measured by a tension load cell with an Instron universal testing instrument.

Stiffness increased dramatically with wire size and pitch angle of the coils. Stiffness decreased slightly with increased lumen size. Co-Cr-Ni closed coil springs were slightly stiffer than stainless steel, whereas stainless steel open coil springs were much stiffer than Co-Cr-Ni. Heat treatment increased the stiffness of Co-Cr-Ni coil springs. The length of the spring had a great effect on the load-deflection rate. A shorter spring is stiffer than a longer spring by an amount directly proportional to the ratio of the length of the longer spring to that of the shorter spring.

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