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| 10-3  A helical compression spring is wound using 2.5-mm-diameter music wire. The spring has an outside diameter of 31 mm with plain ground ends, and 14 total coils.   1. (*a*)  Estimate the spring rate. 2. (*b*)  What force is needed to compress this spring to closure? 3. (*c*)  What should the free length be to ensure that when the spring is compressed solid the torsional stress does not exceed the yield strength? 4. (*d*)  Is there a possibility that the spring might buckle in service? |  |

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| 10-5  A helical compression spring is made with oil-tempered wire with wire diameter of 0.2 in, mean coil diameter of 2 in, a total of 12 coils, a free length of 5 in, with squared ends.   1. (*a*)  Find the solid length. 2. (*b*)  Find the force necessary to deflect the spring to its solid length. 3. (*c*)  Find the factor of safety guarding against yielding when the spring is compressed to its solid length. |  |