

11.D9 A fifty-millimeter (two-inch) diameter cylindrical steel specimen is to be quenched in moderately agitated water. We are to decide which of eight different steels will have surface and center hardnesses of at least 50 and 40 HRC, respectively.

In moderately agitated water, the equivalent distances from the quenched end for a 50-mm diameter bar for surface and center positions are 2 mm (1/16 in.) and 10 mm (3/8 in.), respectively [Figure 11.17(a)]. The hardnesses at these two positions for the alloys cited are given below (as determined from Figures 11.14 and 11.15).

<u>Alloy</u>	<u>Surface Hardness (HRC)</u>	<u>Center Hardness (HRC)</u>
1040	50	27
5140	56	45
4340	57	56
4140	57	54
8620	42	27
8630	51	38
8640	57	51
8660	64	64

Thus, alloys 5140, 4340, 4140, 8640, and 8660 will satisfy the criteria for both surface hardness (minimum 50 HRC) and center hardness (minimum 40 HRC).