

Source,Steel type,Initial hardness (HRC) - post quenching,Tempering time (s),Tempering temperature (°C),C (%wt),Mn (%wt),P (%wt),S (%wt),Si (%wt),Ni (%wt),Cr (%wt),Mo (%wt),V (%wt),Al (%wt),Cu (%wt),Final hardness (HRC) - post tempering

Grange and Baughman, 1956,AISI-SAE 1026,?600,204.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,50.6

Grange and Baughman, 1956,AISI-SAE 1026,?600,260,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,48.3

Grange and Baughman, 1956,AISI-SAE 1026,?600,315.6,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,43.7

Grange and Baughman, 1956,AISI-SAE 1026,?600,371.1,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,40.5

Grange and Baughman, 1956,AISI-SAE 1026,?600,426.7,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,37.3

Grange and Baughman, 1956,AISI-SAE 1026,?600,482.2,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,31.2

Grange and Baughman, 1956,AISI-SAE 1026,?600,537.8,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,26.2

Grange and Baughman, 1956,AISI-SAE 1026,?600,593.3,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,23.1

Grange and Baughman, 1956,AISI-SAE 1026,?600,648.9,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,17.3

Grange and Baughman, 1956,AISI-SAE 1026,?600,704.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,11.7

Grange and Baughman, 1956,AISI-SAE 1026,?3600,204.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,48.9

Grange and Baughman, 1956,AISI-SAE 1026,?3600,260,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,45.9

Grange and Baughman, 1956,AISI-SAE 1026,?3600,315.6,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,42.5

Grange and Baughman, 1956,AISI-SAE 1026,?3600,371.1,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,39.2

Grange and Baughman, 1956,AISI-SAE 1026,?3600,426.7,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,33.4

Grange and Baughman, 1956,AISI-SAE 1026,?3600,482.2,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,28.5

Grange and Baughman, 1956,AISI-SAE 1026,?3600,537.8,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,22.6

Grange and Baughman, 1956,AISI-SAE 1026,?3600,648.9,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,12.6

Grange and Baughman, 1956,AISI-SAE 1026,?3600,704.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,8.6

Grange and Baughman, 1956,AISI-SAE 1026,?14400,204.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,47.6

Grange and Baughman, 1956,AISI-SAE 1026,?14400,260,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,44.7

Grange and Baughman, 1956,AISI-SAE 1026,?14400,315.6,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,40.9

Grange and Baughman, 1956,AISI-SAE 1026,?14400,371.1,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,37.1

Grange and Baughman, 1956,AISI-SAE 1026,?14400,426.7,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,31.6

Grange and Baughman, 1956,AISI-SAE 1026,?14400,482.2,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,26.2

Grange and Baughman, 1956,AISI-SAE 1026,?14400,537.8,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,20.7

Grange and Baughman, 1956,AISI-SAE 1026,?14400,593.3,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,15.0

Grange and Baughman, 1956,AISI-SAE 1026,?14400,648.9,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,9.4

Grange and Baughman, 1956,AISI-SAE 1026,?14400,704.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,7.0

Grange and Baughman, 1956,AISI-SAE 1026,?86400,204.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,45.5

Grange and Baughman, 1956,AISI-SAE 1026,?86400,260,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,43.4

Grange and Baughman, 1956,AISI-SAE 1026,?86400,315.6,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,40.7

Grange and Baughman, 1956,AISI-SAE 1026,?86400,371.1,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,34.3

Grange and Baughman, 1956,AISI-SAE 1026,?86400,426.7,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,28.4

Grange and Baughman, 1956,AISI-SAE 1026,?86400,482.2,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,23.6

Grange and Baughman, 1956,AISI-SAE 1026,?86400,537.8,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,18.7

Grange and Baughman, 1956,AISI-SAE 1026,?86400,593.3,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,10.9

Grange and Baughman, 1956,AISI-SAE 1026,?86400,648.9,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,2.6

Grange and Baughman, 1956,AISI-SAE 1026,?86400,704.4,0.25,0.79,0.012,0.026,0.11,0,0,0,0,0,0,3.2

Grange and Baughman, 1956,AISI-SAE 1030,?600,204.4,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,52.1

Grange and Baughman, 1956,AISI-SAE 1030,?600,260,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,49.1

Grange and Baughman, 1956,AISI-SAE 1030,?600,315.6,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,44.3

Grange and Baughman, 1956,AISI-SAE 1030,?600,371.1,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,40.2

Grange and Baughman, 1956,AISI-SAE 1030,?600,426.7,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,37.5

Grange and Baughman, 1956,AISI-SAE 1030,?600,482.2,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,30.4

Grange and Baughman, 1956,AISI-SAE 1030,?600,537.8,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,25.8

Grange and Baughman, 1956,AISI-SAE 1030,?600,593.3,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,22.1

Grange and Baughman, 1956,AISI-SAE 1030,?600,648.9,0.31,0.57,0.008,0.025,0.09,0.02,0.02,0,0,0,0,15.5

Grange and Baughman, 1956,AISI-SAE 1045,?,86400,593.3,0.45,0.73,0.017,0.03,0.17,0.01,0.02,0.01,0,0,0,18.5
Grange and Baughman, 1956,AISI-SAE 1045,?,86400,648.9,0.45,0.73,0.017,0.03,0.17,0.01,0.02,0.01,0,0,0,12.4
Grange and Baughman, 1956,AISI-SAE 1045,?,86400,704.4,0.45,0.73,0.017,0.03,0.17,0.01,0.02,0.01,0,0,0,9.9
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,204.4,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,55.0
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,260,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,52.0
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,315.6,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,49.0
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,371.1,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,44.0
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,426.7,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,40.0
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,482.2,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,35.5
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,537.8,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,30.5
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,593.3,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,24.5
Grange and Baughman, 1956,AISI-SAE 1049,?,3600,648.9,0.48,0.76,0.046,0.048,0.14,0,0,0,0,0,19.0
Grange and Baughman, 1956,AISI-SAE 1050,?,600,204.4,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,57.1
Grange and Baughman, 1956,AISI-SAE 1050,?,600,315.6,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,51.3
Grange and Baughman, 1956,AISI-SAE 1050,?,600,426.7,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,45.8
Grange and Baughman, 1956,AISI-SAE 1050,?,600,537.8,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,36.0
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,204.4,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,56.0
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,260,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,54.0
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,315.6,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,50.0
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,371.1,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,46.5
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,426.7,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,41.0
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,482.2,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,37.7
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,537.8,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,32.6
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,593.3,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,27.2
Grange and Baughman, 1956,AISI-SAE 1050,?,3600,648.9,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,18.5
Grange and Baughman, 1956,AISI-SAE 1050,?,86400,204.4,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,53.6
Grange and Baughman, 1956,AISI-SAE 1050,?,86400,315.6,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,48.7
Grange and Baughman, 1956,AISI-SAE 1050,?,86400,426.7,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,39.5
Grange and Baughman, 1956,AISI-SAE 1050,?,86400,537.8,0.5,0.91,0.046,0.041,0.13,0,0,0,0,0,26.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,204.4,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,58.3
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,260,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,55.9
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,315.6,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,52.4
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,371.1,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,49.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,426.7,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,44.8
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,482.2,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,39.7
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,537.8,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,34.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,593.3,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,29.7
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,648.9,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,23.4
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,704.4,0.63,0.87,0.023,0.018,0.17,0.02,0.04,0,0,0,0,16.7
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,204.4,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,59.2
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,260,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,56.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,315.6,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,53.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,371.1,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,50.0
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,426.7,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,45.0
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,482.2,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,41.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,537.8,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,36.5
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,593.3,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,31.2
Grange and Baughman, 1956,AISI-SAE 1065,?,3600,648.9,0.65,0.87,0.04,0.042,0.19,0,0,0,0,0,25.8
Grange and Baughman, 1956,AISI-SAE 1080,?,600,204.4,0.82,0.75,0.054,0.055,0.3,0,0,0,0,0,62.7

Grange and Baughman, 1956,AISI-SAE 4140,?,14400,315.6,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,48.9
Grange and Baughman, 1956,AISI-SAE 4140,?,14400,426.7,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,43.8
Grange and Baughman, 1956,AISI-SAE 4140,?,14400,537.8,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,36.0
Grange and Baughman, 1956,AISI-SAE 4140,?,14400,648.9,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,26.2
Grange and Baughman, 1956,AISI-SAE 4140,?,28800,204.4,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,52.9
Grange and Baughman, 1956,AISI-SAE 4140,?,28800,315.6,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,49.2
Grange and Baughman, 1956,AISI-SAE 4140,?,28800,426.7,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,43.5
Grange and Baughman, 1956,AISI-SAE 4140,?,28800,537.8,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,35.2
Grange and Baughman, 1956,AISI-SAE 4140,?,28800,648.9,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,24.7
Grange and Baughman, 1956,AISI-SAE 4140,?,57600,204.4,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,53.0
Grange and Baughman, 1956,AISI-SAE 4140,?,57600,315.6,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,49.5
Grange and Baughman, 1956,AISI-SAE 4140,?,57600,426.7,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,42.7
Grange and Baughman, 1956,AISI-SAE 4140,?,57600,537.8,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,34.7
Grange and Baughman, 1956,AISI-SAE 4140,?,57600,648.9,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,23.3
Penha, 2010,AISI-SAE 4140,58.8,86400,100,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,58.5
Penha, 2010,AISI-SAE 4140,58.8,86400,150,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,51.4
Penha, 2010,AISI-SAE 4140,58.8,86400,200,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,50.4
Penha, 2010,AISI-SAE 4140,58.8,86400,250,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,49.7
Penha, 2010,AISI-SAE 4140,58.8,86400,300,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,44.6
Penha, 2010,AISI-SAE 4140,58.8,86400,400,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,40.9
Penha, 2010,AISI-SAE 4140,58.8,86400,600,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,28.1
Penha, 2010,AISI-SAE 4140,58.8,86400,700,0.41,0.88,0.016,0.018,0.23,0.1,0.02,0.22,0,0,0,15.9
Grange and Baughman, 1956,AISI-SAE 4140,?,115200,204.4,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,52.6
Grange and Baughman, 1956,AISI-SAE 4140,?,115200,315.6,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,49.1
Grange and Baughman, 1956,AISI-SAE 4140,?,115200,426.7,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,42.7
Grange and Baughman, 1956,AISI-SAE 4140,?,115200,537.8,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,34.1
Grange and Baughman, 1956,AISI-SAE 4140,?,115200,648.9,0.37,0.77,0.019,0.026,0.15,0.04,0.98,0.21,0,0,0,21.2
Penha, 2010,AISI-SAE 4340,55.8,10,100,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,56.9
Penha, 2010,AISI-SAE 4340,55.8,10,150,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,55.4
Penha, 2010,AISI-SAE 4340,55.8,10,200,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,55.8
Penha, 2010,AISI-SAE 4340,55.8,10,250,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,54.9
Penha, 2010,AISI-SAE 4340,55.8,10,300,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,53.9
Penha, 2010,AISI-SAE 4340,55.8,10,400,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,54.4
Penha, 2010,AISI-SAE 4340,55.8,10,500,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,45.2
Penha, 2010,AISI-SAE 4340,55.8,10,600,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,44.1
Penha, 2010,AISI-SAE 4340,55.8,10,700,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,35.1
Grange and Baughman, 1956,AISI-SAE 4340,?,40,426.7,0.42,0.78,0.018,0.027,0.24,1.79,0.8,0.33,0,0,0,49.0
Grange and Baughman, 1956,AISI-SAE 4340,?,40,537.8,0.42,0.78,0.018,0.027,0.24,1.79,0.8,0.33,0,0,0,44.0
Grange and Baughman, 1956,AISI-SAE 4340,?,40,593.3,0.42,0.78,0.018,0.027,0.24,1.79,0.8,0.33,0,0,0,40.9
Grange and Baughman, 1956,AISI-SAE 4340,?,40,648.9,0.42,0.78,0.018,0.027,0.24,1.79,0.8,0.33,0,0,0,38.6
Penha, 2010,AISI-SAE 4340,55.8,90,100,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,55.9
Penha, 2010,AISI-SAE 4340,55.8,90,150,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,55.2
Penha, 2010,AISI-SAE 4340,55.8,90,200,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,55.4
Penha, 2010,AISI-SAE 4340,55.8,90,250,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,54.5
Penha, 2010,AISI-SAE 4340,55.8,90,300,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,50.0
Penha, 2010,AISI-SAE 4340,55.8,90,400,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,48.0
Penha, 2010,AISI-SAE 4340,55.8,90,500,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,45.0
Penha, 2010,AISI-SAE 4340,55.8,90,600,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,37.7
Penha, 2010,AISI-SAE 4340,55.8,90,700,0.39,0.75,0.019,0.016,0.26,1.74,0.79,0.26,0,0,0,33.6

Penha, 2010,AISI-SAE 5160,61.6,90,700,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,33.6
Penha, 2010,AISI-SAE 5160,61.6,900,100,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,60.2
Penha, 2010,AISI-SAE 5160,61.6,900,150,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,59.4
Penha, 2010,AISI-SAE 5160,61.6,900,200,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,59.1
Penha, 2010,AISI-SAE 5160,61.6,900,250,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,57.5
Penha, 2010,AISI-SAE 5160,61.6,900,300,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,53.2
Penha, 2010,AISI-SAE 5160,61.6,900,400,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,45.6
Penha, 2010,AISI-SAE 5160,61.6,900,500,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,40.6
Penha, 2010,AISI-SAE 5160,61.6,900,600,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,42.0
Penha, 2010,AISI-SAE 5160,61.6,900,700,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,26.7
Penha, 2010,AISI-SAE 5160,61.6,3600,250,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,52.2
Penha, 2010,AISI-SAE 5160,61.6,3600,300,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,50.0
Penha, 2010,AISI-SAE 5160,61.6,3600,400,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,43.7
Penha, 2010,AISI-SAE 5160,61.6,3600,500,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,35.3
Penha, 2010,AISI-SAE 5160,61.6,3600,600,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,27.7
Penha, 2010,AISI-SAE 5160,61.6,3600,700,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,19.4
Penha, 2010,AISI-SAE 5160,61.6,9000,100,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,59.1
Penha, 2010,AISI-SAE 5160,61.6,9000,150,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,58.4
Penha, 2010,AISI-SAE 5160,61.6,9000,200,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,55.2
Penha, 2010,AISI-SAE 5160,61.6,9000,250,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,51.9
Penha, 2010,AISI-SAE 5160,61.6,9000,300,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,44.1
Penha, 2010,AISI-SAE 5160,61.6,9000,400,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,39.9
Penha, 2010,AISI-SAE 5160,61.6,9000,500,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,33.8
Penha, 2010,AISI-SAE 5160,61.6,9000,600,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,23.9
Penha, 2010,AISI-SAE 5160,61.6,9000,700,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,18.3
Penha, 2010,AISI-SAE 5160,61.6,86400,100,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,58.0
Penha, 2010,AISI-SAE 5160,61.6,86400,150,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,56.4
Penha, 2010,AISI-SAE 5160,61.6,86400,200,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,51.7
Penha, 2010,AISI-SAE 5160,61.6,86400,250,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,46.0
Penha, 2010,AISI-SAE 5160,61.6,86400,300,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,43.6
Penha, 2010,AISI-SAE 5160,61.6,86400,400,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,39.6
Penha, 2010,AISI-SAE 5160,61.6,86400,500,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,25.0
Penha, 2010,AISI-SAE 5160,61.6,86400,600,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,20.9
Penha, 2010,AISI-SAE 5160,61.6,86400,700,0.62,0.88,0.012,0.018,0.22,0,0.79,0,0,0,0,8.6
Grange and Baughman, 1956,AISI-SAE 6145,?,40,426.7,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,49.1
Grange and Baughman, 1956,AISI-SAE 6145,?,40,537.8,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,41.7
Grange and Baughman, 1956,AISI-SAE 6145,?,40,593.3,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,40.1
Grange and Baughman, 1956,AISI-SAE 6145,?,40,648.9,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,39.0
Grange and Baughman, 1956,AISI-SAE 6145,?,120,426.7,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,48.2
Grange and Baughman, 1956,AISI-SAE 6145,?,120,537.8,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,40.8
Grange and Baughman, 1956,AISI-SAE 6145,?,120,593.3,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,38.9
Grange and Baughman, 1956,AISI-SAE 6145,?,120,648.9,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,38.2
Grange and Baughman, 1956,AISI-SAE 6145,?,300,426.7,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,47.6
Grange and Baughman, 1956,AISI-SAE 6145,?,300,537.8,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,40.2
Grange and Baughman, 1956,AISI-SAE 6145,?,300,593.3,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,38.2
Grange and Baughman, 1956,AISI-SAE 6145,?,300,648.9,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,37.0
Grange and Baughman, 1956,AISI-SAE 6145,?,900,426.7,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,46.1
Grange and Baughman, 1956,AISI-SAE 6145,?,900,537.8,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,39.1
Grange and Baughman, 1956,AISI-SAE 6145,?,900,593.3,0.43,0.74,0.019,0.024,0.23,0.06,0.92,0,0.16,0,0,36.2

Penha, 2010,AISI-SAE 6150,63.1,90,400,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,56.5
Penha, 2010,AISI-SAE 6150,63.1,90,500,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,48.4
Penha, 2010,AISI-SAE 6150,63.1,90,600,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,44.3
Penha, 2010,AISI-SAE 6150,63.1,90,700,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,37.6
Penha, 2010,AISI-SAE 6150,63.1,900,100,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,63.5
Penha, 2010,AISI-SAE 6150,63.1,900,150,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,64.0
Penha, 2010,AISI-SAE 6150,63.1,900,200,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,60.0
Penha, 2010,AISI-SAE 6150,63.1,900,250,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,57.3
Penha, 2010,AISI-SAE 6150,63.1,900,300,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,53.2
Penha, 2010,AISI-SAE 6150,63.1,900,400,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,49.6
Penha, 2010,AISI-SAE 6150,63.1,900,500,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,44.2
Penha, 2010,AISI-SAE 6150,63.1,900,600,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,37.7
Penha, 2010,AISI-SAE 6150,63.1,900,700,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,36.0
Penha, 2010,AISI-SAE 6150,63.1,3600,250,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,53.3
Penha, 2010,AISI-SAE 6150,63.1,3600,300,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,50.5
Penha, 2010,AISI-SAE 6150,63.1,3600,400,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,47.2
Penha, 2010,AISI-SAE 6150,63.1,3600,500,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,40.0
Penha, 2010,AISI-SAE 6150,63.1,3600,600,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,33.2
Penha, 2010,AISI-SAE 6150,63.1,3600,700,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,22.3
Penha, 2010,AISI-SAE 6150,63.1,9000,100,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,62.7
Penha, 2010,AISI-SAE 6150,63.1,9000,150,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,57.4
Penha, 2010,AISI-SAE 6150,63.1,9000,200,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,56.5
Penha, 2010,AISI-SAE 6150,63.1,9000,250,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,51.6
Penha, 2010,AISI-SAE 6150,63.1,9000,300,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,49.4
Penha, 2010,AISI-SAE 6150,63.1,9000,400,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,44.1
Penha, 2010,AISI-SAE 6150,63.1,9000,500,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,38.0
Penha, 2010,AISI-SAE 6150,63.1,9000,600,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,31.3
Penha, 2010,AISI-SAE 6150,63.1,9000,700,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,18.3
Penha, 2010,AISI-SAE 6150,63.1,86400,100,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,60.5
Penha, 2010,AISI-SAE 6150,63.1,86400,150,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,55.7
Penha, 2010,AISI-SAE 6150,63.1,86400,200,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,54.5
Penha, 2010,AISI-SAE 6150,63.1,86400,250,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,50.3
Penha, 2010,AISI-SAE 6150,63.1,86400,300,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,49.0
Penha, 2010,AISI-SAE 6150,63.1,86400,400,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,39.6
Penha, 2010,AISI-SAE 6150,63.1,86400,500,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,37.0
Penha, 2010,AISI-SAE 6150,63.1,86400,600,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,26.7
Penha, 2010,AISI-SAE 6150,63.1,86400,700,0.51,0.81,0.021,0.014,0.28,0,0.98,0,0,0,0,9.9
Grange and Baughman, 1956,AISI-SAE 9264,?,600,204.4,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,61.0
Grange and Baughman, 1956,AISI-SAE 9264,?,600,260,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,59.3
Grange and Baughman, 1956,AISI-SAE 9264,?,600,315.6,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,58.8
Grange and Baughman, 1956,AISI-SAE 9264,?,600,371.1,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,57.5
Grange and Baughman, 1956,AISI-SAE 9264,?,600,426.7,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,54.8
Grange and Baughman, 1956,AISI-SAE 9264,?,600,482.2,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,49.8
Grange and Baughman, 1956,AISI-SAE 9264,?,600,537.8,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,45.2
Grange and Baughman, 1956,AISI-SAE 9264,?,600,593.3,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,41.3
Grange and Baughman, 1956,AISI-SAE 9264,?,600,648.9,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,39.2
Grange and Baughman, 1956,AISI-SAE 9264,?,600,704.4,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,34.7
Grange and Baughman, 1956,AISI-SAE 9264,?,3600,204.4,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,59.9
Grange and Baughman, 1956,AISI-SAE 9264,?,3600,260,0.55,0.78,0.012,0.022,1.62,0,0.77,0.01,0,0,0,58.9

Penha, 2010,AISI-SAE E52100,63.3,900,250,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,58.3
Penha, 2010,AISI-SAE E52100,63.3,900,300,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,57.5
Penha, 2010,AISI-SAE E52100,63.3,900,400,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,52.6
Penha, 2010,AISI-SAE E52100,63.3,900,500,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,52.3
Penha, 2010,AISI-SAE E52100,63.3,900,600,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,47.2
Penha, 2010,AISI-SAE E52100,63.3,900,700,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,33.0
Penha, 2010,AISI-SAE E52100,63.3,3600,250,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,57.2
Penha, 2010,AISI-SAE E52100,63.3,3600,300,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,55.2
Penha, 2010,AISI-SAE E52100,63.3,3600,400,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,50.5
Penha, 2010,AISI-SAE E52100,63.3,3600,500,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,45.8
Penha, 2010,AISI-SAE E52100,63.3,3600,600,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,36.8
Penha, 2010,AISI-SAE E52100,63.3,3600,700,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,24.5
Penha, 2010,AISI-SAE E52100,63.3,9000,100,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,62.8
Penha, 2010,AISI-SAE E52100,63.3,9000,150,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,59.8
Penha, 2010,AISI-SAE E52100,63.3,9000,200,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,58.4
Penha, 2010,AISI-SAE E52100,63.3,9000,250,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,56.8
Penha, 2010,AISI-SAE E52100,63.3,9000,300,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,53.7
Penha, 2010,AISI-SAE E52100,63.3,9000,400,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,49.9
Penha, 2010,AISI-SAE E52100,63.3,9000,500,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,40.4
Penha, 2010,AISI-SAE E52100,63.3,9000,600,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,32.1
Penha, 2010,AISI-SAE E52100,63.3,9000,700,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,22.3
Penha, 2010,AISI-SAE E52100,63.3,86400,100,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,59.8
Penha, 2010,AISI-SAE E52100,63.3,86400,150,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,59.4
Penha, 2010,AISI-SAE E52100,63.3,86400,200,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,56.4
Penha, 2010,AISI-SAE E52100,63.3,86400,250,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,55.1
Penha, 2010,AISI-SAE E52100,63.3,86400,300,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,52.9
Penha, 2010,AISI-SAE E52100,63.3,86400,400,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,45.0
Penha, 2010,AISI-SAE E52100,63.3,86400,500,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,37.7
Penha, 2010,AISI-SAE E52100,63.3,86400,600,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,26.0
Penha, 2010,AISI-SAE E52100,63.3,86400,700,1.02,0.4,0.017,0.014,0.23,0,1.42,0,0,0,0,7.3
Grange and Baughman, 1956,Nitriding Steel ,? ,600,204.4,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,55.0
Grange and Baughman, 1956,Nitriding Steel ,? ,600,260,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,53.4
Grange and Baughman, 1956,Nitriding Steel ,? ,600,315.6,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,52.7
Grange and Baughman, 1956,Nitriding Steel ,? ,600,371.1,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,51.0
Grange and Baughman, 1956,Nitriding Steel ,? ,600,426.7,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,49.8
Grange and Baughman, 1956,Nitriding Steel ,? ,600,482.2,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,46.2
Grange and Baughman, 1956,Nitriding Steel ,? ,600,537.8,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,43.2
Grange and Baughman, 1956,Nitriding Steel ,? ,600,593.3,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,41.0
Grange and Baughman, 1956,Nitriding Steel ,? ,600,648.9,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,35.5
Grange and Baughman, 1956,Nitriding Steel ,? ,600,704.4,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,31.6
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,204.4,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,54.2
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,260,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,53.0
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,315.6,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,52.6
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,371.1,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,50.7
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,426.7,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,47.9
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,482.2,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,45.0
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,537.8,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,42.5
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,593.3,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,37.7
Grange and Baughman, 1956,Nitriding Steel ,? ,3600,648.9,0.41,0.57,0.017,0.005,0.24,0.17,1.57,0.36,0,1.26,0,33.3

