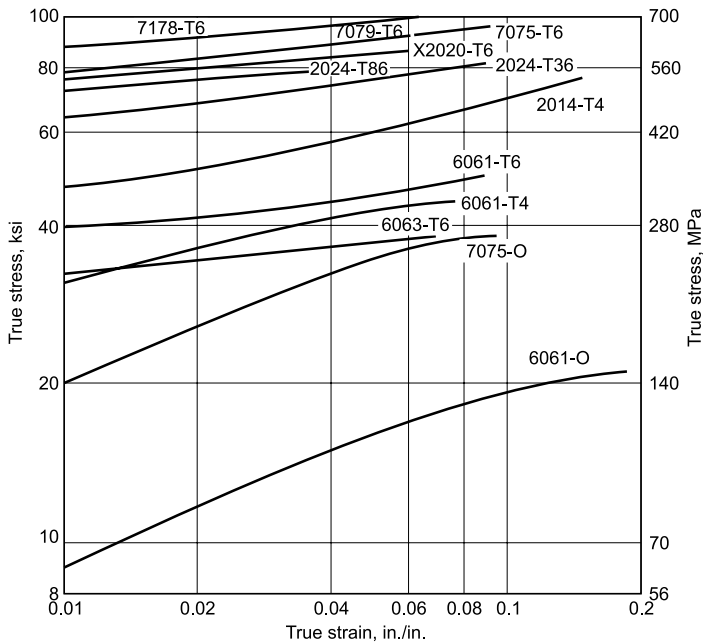
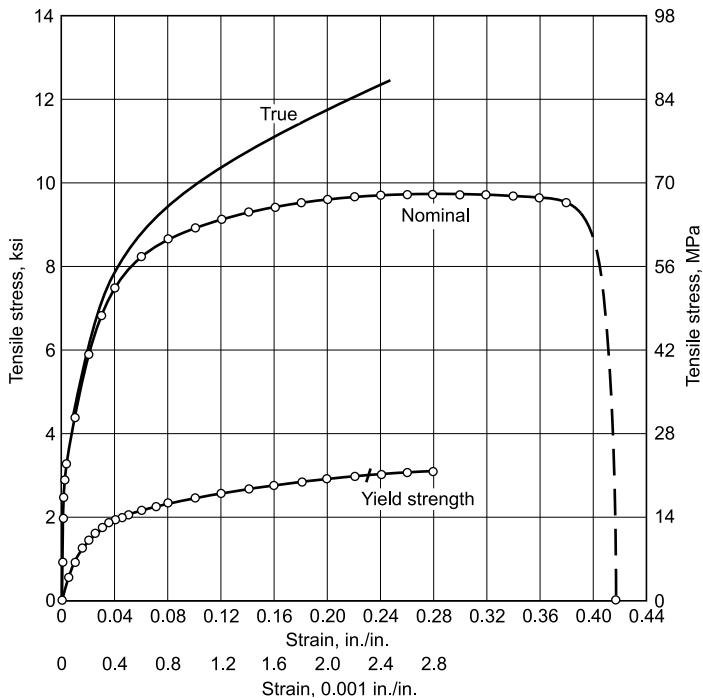


Wrought Aluminum (WA)



WA.001 Heat-treatable aluminum alloys, true stress-strain curves

X2020-T6, 2014-T4, 2024-T36, 2024-T86, 6061-O, 6061-T4, 6061-T6, 6063-T6, 7075-O, 7075-T6, 7079-T6, 7178-T6

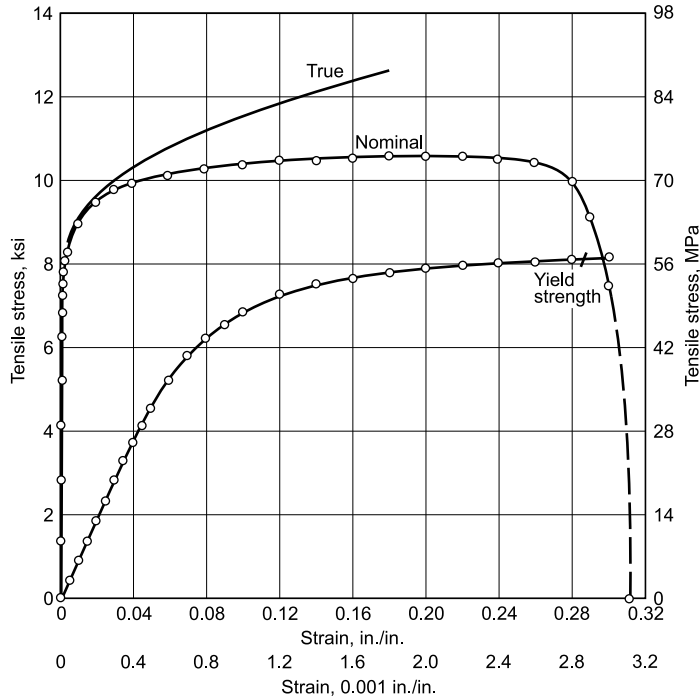


WA.002 1060-O aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 67.2 MPa (9.75 ksi). True tensile strength, 86.2 MPa (12.5 ksi). Nominal yield strength (0.2% offset), 21 MPa (3.0 ksi). Elongation (in 50.8 mm, or 2 in.), 42.7%. Reduction of area, 91%. True strain at maximum load, 24.8%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.22 in the area of uniform plastic deformation. UNS A91060

Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, Oct 1951

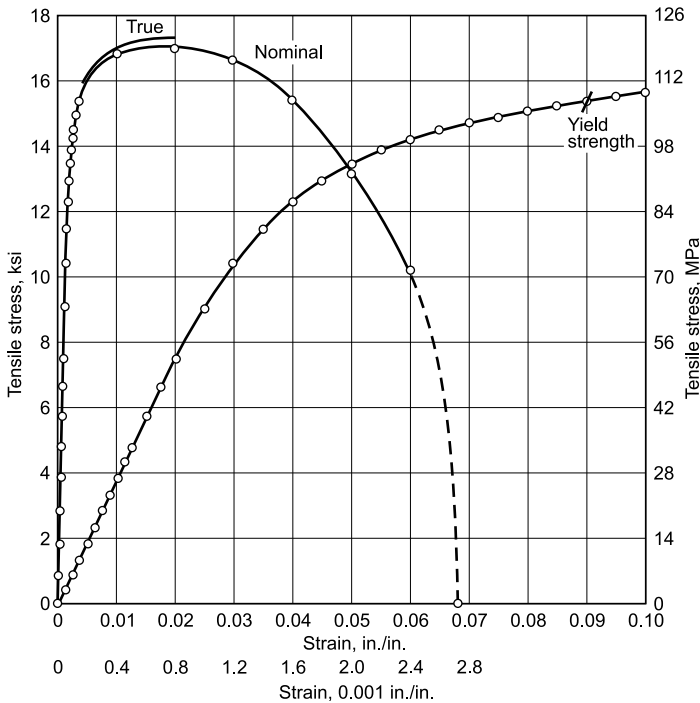
300/Wrought Aluminum (WA)



WA.003 1060-H12 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 73.1 MPa (10.6 ksi). True tensile strength, 87.6 MPa (12.7 ksi). Nominal yield strength (0.2% offset), 57 MPa (8.2 ksi). Elongation (in 50.8 mm, or 2 in.), 31.1%. Reduction of area, 90%. True strain at maximum load, 18.0%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.14 in the area of uniform plastic deformation. UNS A91060

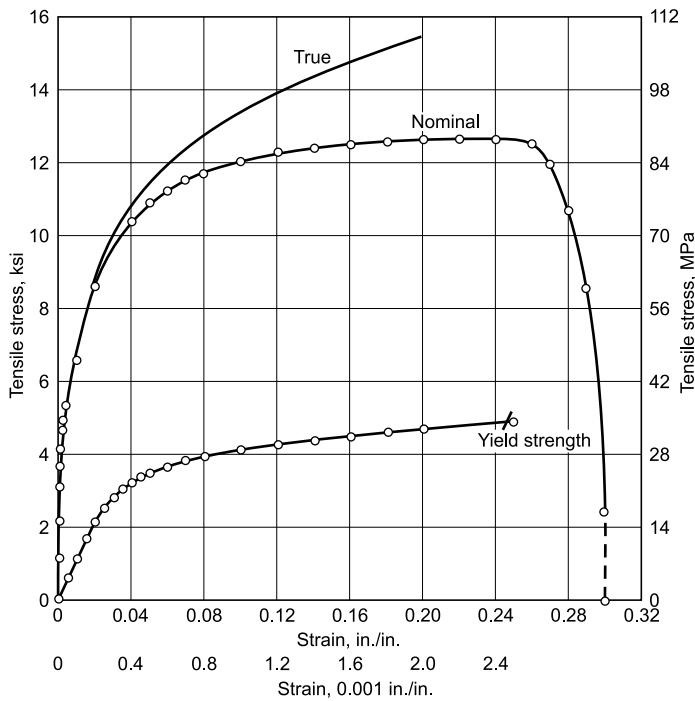
Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954



WA.004 1060-H18 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 119 MPa (17.2 ksi). True tensile strength, 121 MPa (17.5 ksi). Nominal yield strength (0.2% offset), 108 MPa (15.6 ksi). Elongation (in 50.8 mm, or 2 in.), 6.7%. Reduction of area, 79%. True strain at maximum load, 2.0%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.02 in the area of uniform plastic deformation. UNS A91060

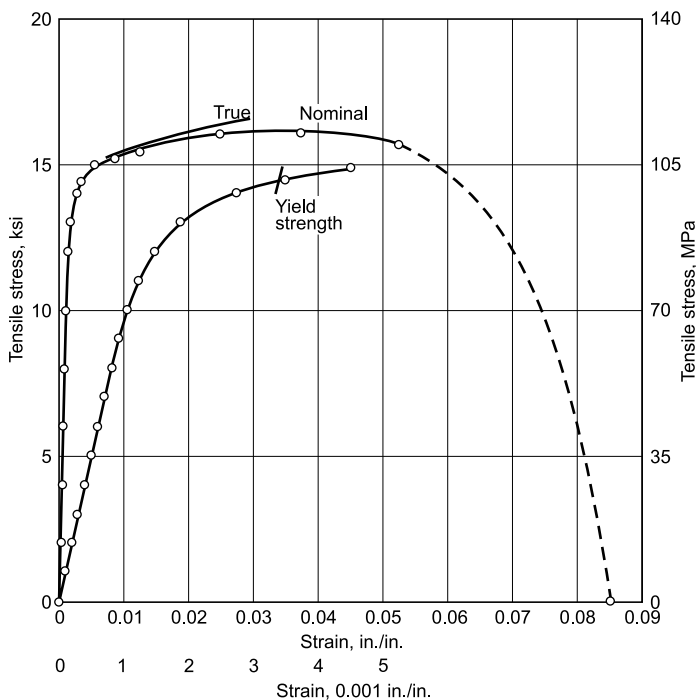
Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954



WA.005 1100-O aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 84.8 MPa (12.3 ksi). True tensile strength, 103 MPa (15.0 ksi). Nominal yield strength (0.2% offset), 33 MPa (4.8 ksi). Elongation (in 50.8 mm, or 2 in.), 30.0%. Reduction of area, 88%. True strain at maximum load, 20.0%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.22 in the area of uniform plastic deformation. UNS A91100

Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954

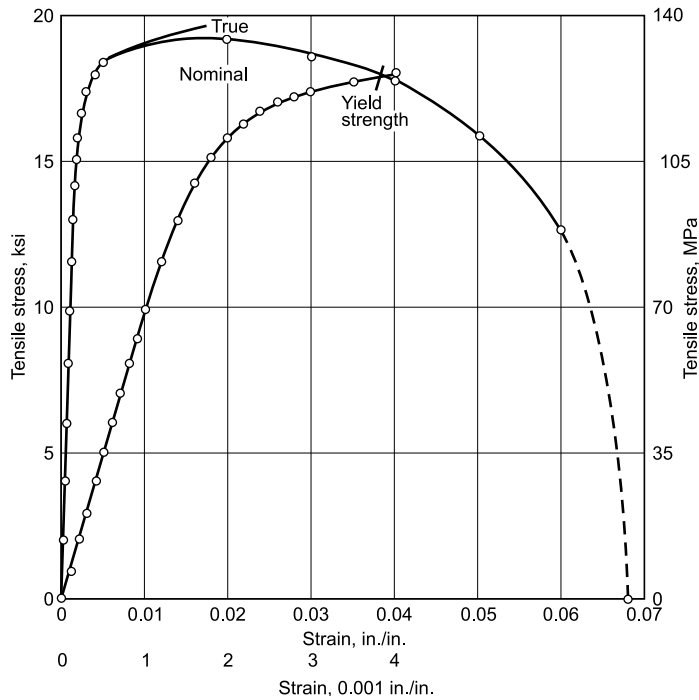


WA.006 1100-H12 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 111 MPa (16.1 ksi). True tensile strength, 108 MPa (15.7 ksi). Nominal yield strength (0.2% offset), 99.3 MPa (14.4 ksi). Elongation (in 50.8 mm, or 2 in.), 8.5%. Reduction of area, 76%. True strain at maximum load, 3.4%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.05 in the area of uniform plastic deformation. UNS A91100

Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954

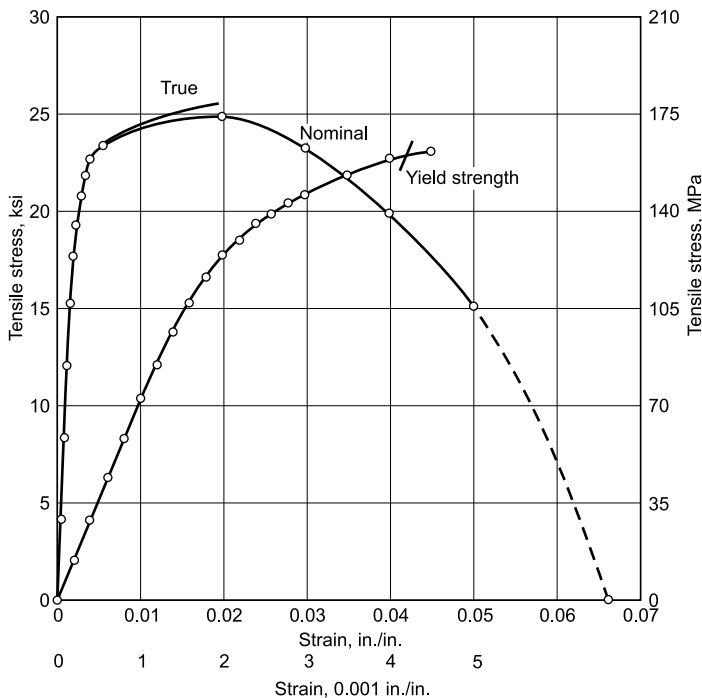
302/Wrought Aluminum (WA)



WA.007 1100-H16 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 132 MPa (19.2 ksi). True tensile strength, 135 MPa (19.6 ksi). Nominal yield strength (0.2% offset), 122.7 MPa (17.8 ksi). Elongation (in 50.8 mm, or 2 in.), 6.8%. Reduction of area, 79%. True strain at maximum load, 1.7%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.02 in the area of uniform plastic deformation. UNS A91100

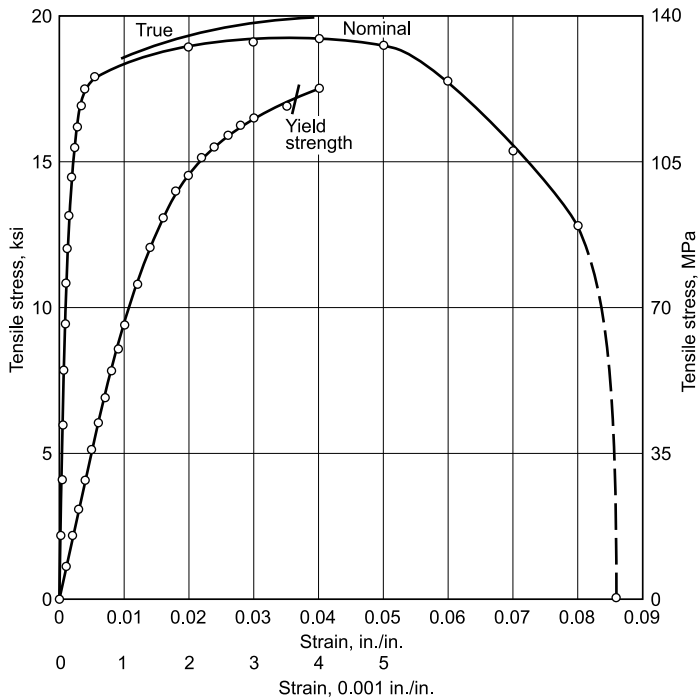
Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954



WA.008 1100-H18 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 171 MPa (24.8 ksi). True tensile strength, 175 MPa (25.4 ksi). Nominal yield strength (0.2% offset), 157 MPa (22.8 ksi). Elongation (in 50.8 mm, or 2 in.), 6.6%. Reduction of area, 72%. True strain at maximum load, 2.0%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.06 in the area of uniform plastic deformation. UNS A91100

Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954

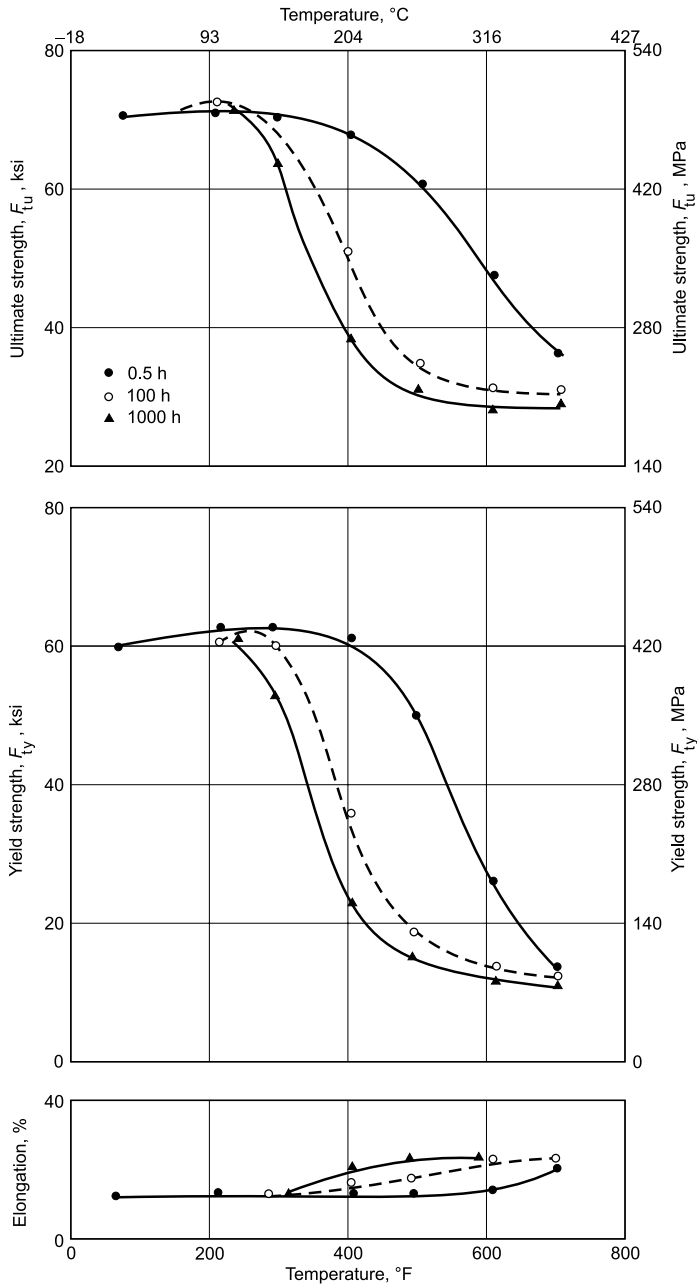


WA.009 1100-H26 aluminum alloy rod, tensile stress-strain curves

The upper row of strain values on the abscissa applies to both the complete true curve and the complete nominal curve. The lower row of strain values applies to the expanded portion of the curves; this expanded portion is essentially identical for both the true and nominal curves. Test specimen diam, 12.7 mm (0.5 in.). Gage length: 203.2 mm (8 in.). Nominal tensile strength, 125 MPa (18.2 ksi). True tensile strength, 138 MPa (20.0 ksi). Nominal yield strength (0.2% offset), 119 MPa (17.2 ksi). Elongation (in 50.8 mm, or 2 in.), 8.6%. Reduction of area, 78%. True strain at maximum load, 3.9%. A log-log plot of the stress-strain curve would yield a slope (n) of 0.06 in the area of uniform plastic deformation. UNS A91100

Source: Alcoa, Aluminum Research Laboratory, New Kensington, PA, July 1954

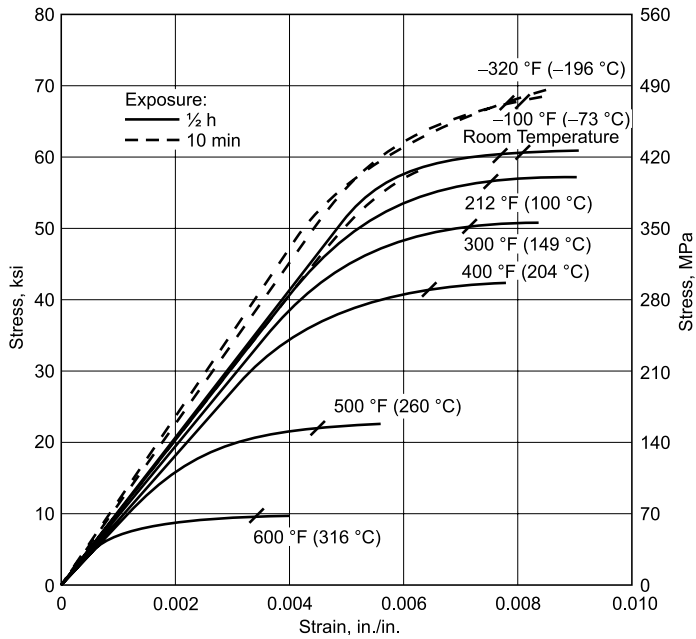
304/Wrought Aluminum (WA)



WA.010 2014-T6 aluminum alloy, clad 2014-T6, room-temperature tensile properties

Effect of exposure to elevated temperature. Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

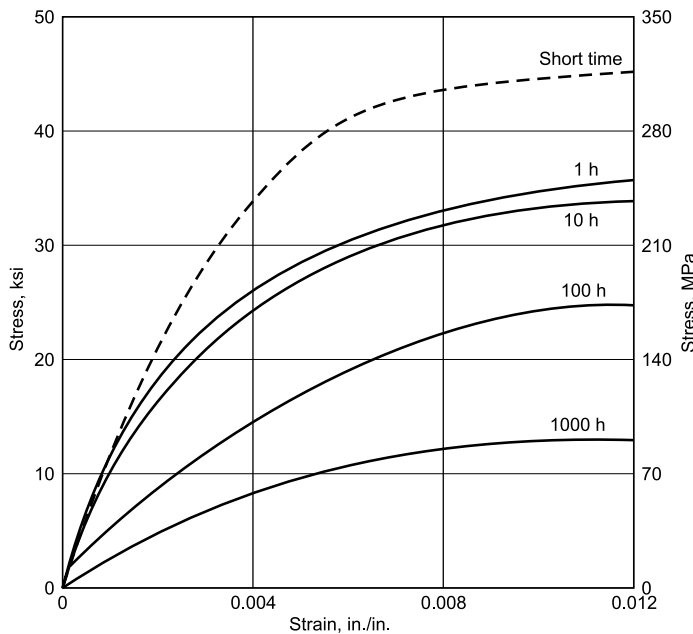
Source: Metallic Materials & Elements for Flight Vehicle Structures, MIL-HDBK-5, Dept. of Defense, FSC 1500, Aug 1962. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 19



WA.011 2014-T6 aluminum alloy, clad 2014-T6, bar, tensile stress-strain curves

Tested at various temperatures. Bar diameter: 19.05 mm (0.75 in.). Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

Source: "Phase II—Cryogenic Properties of 2014-T6 and A-286," Bell Aerosystems Co., BLR61-35(M) Rev. A, 29 June 1962. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 19

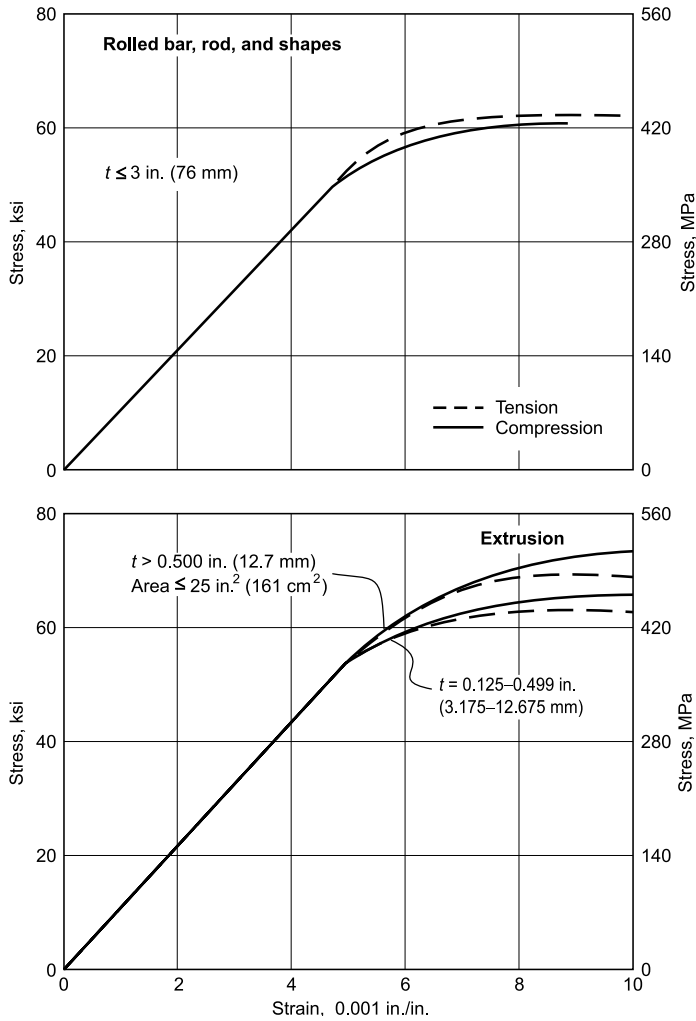


WA.012 2014-T6 aluminum alloy, clad 2014-T6, isochronous tensile stress-strain curves

Tested at 205 °C (400 °F). Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

Source: F.M. Howell and G.W. Stickley, "Isochronous Stress-Strain Curves for Several Heat-Treated Wrought Aluminum Alloys at 300 and 400 F," Alcoa Research Laboratories, 29 April 1958. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 25

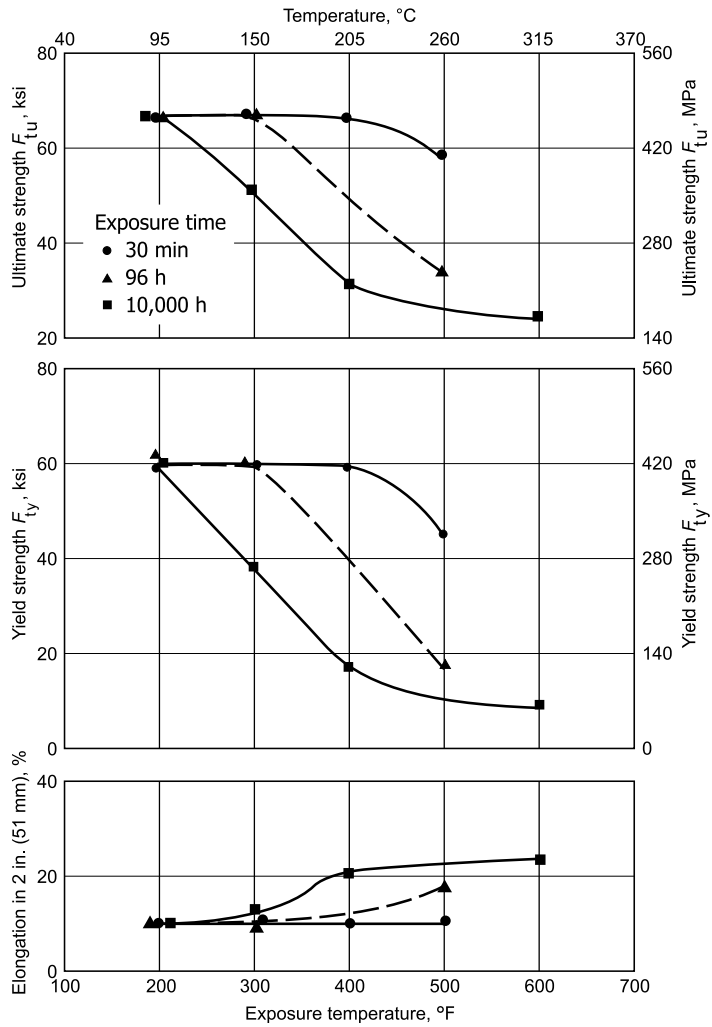
306/Wrought Aluminum (WA)



WA.013 2014-T6 aluminum alloy, clad 2014-T6, rolled bar, rod, and extrusions, tensile and compressive stress-strain curves

t , thickness. Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

Source: Metallic Materials & Elements for Flight Vehicle Structures, MIL-HDBK-5, Dept of Defense, FSC 1500, Aug 1962. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 18

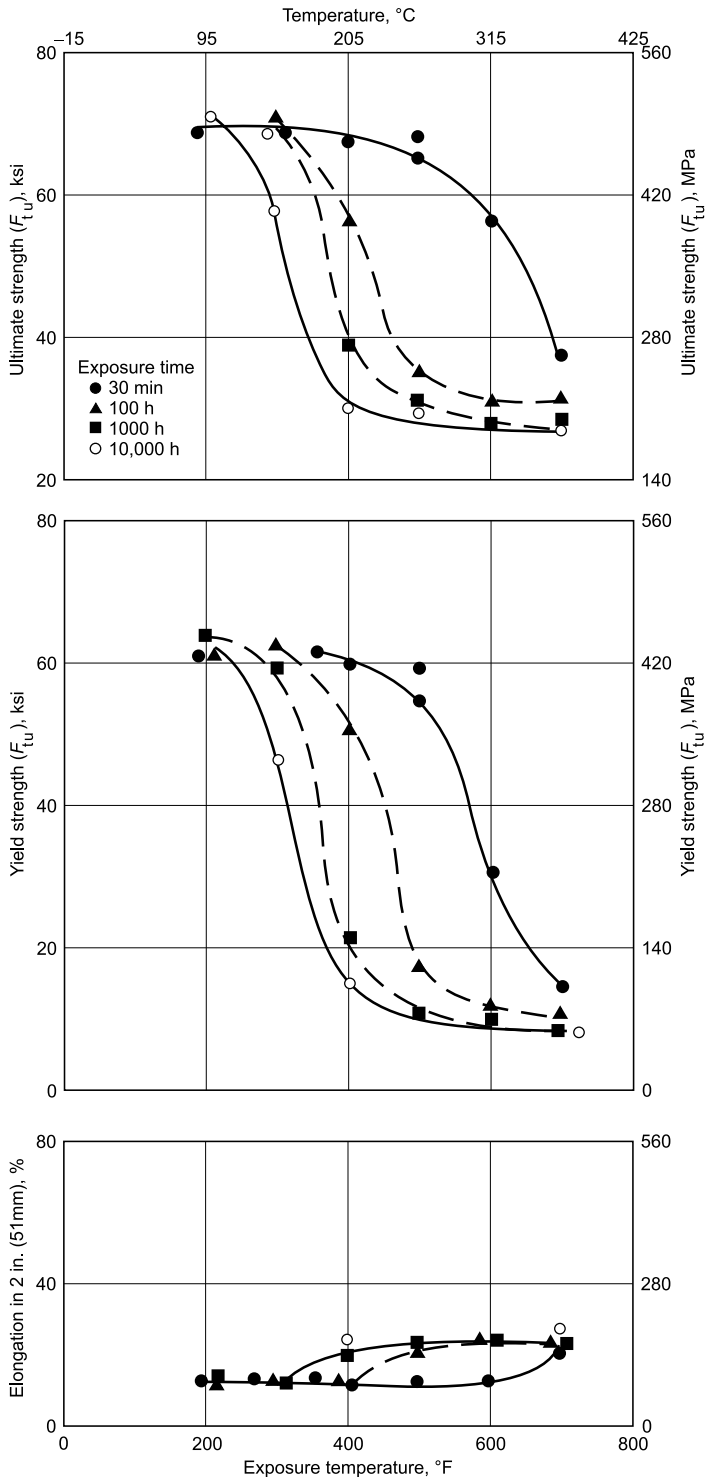


WA.014 2014-T6 aluminum alloy, clad 2014-T6, rolled and drawn rod, effect of exposure to elevated temperature on tensile properties

Tested at room temperature. Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

Source: *Report on the Elevated Temperature Properties of Aluminum and Magnesium Alloy*, STP 291, ASTM, Oct 1960. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 22

308/Wrought Aluminum (WA)



WA.015 2014-T6 aluminum alloy, clad 2014-T6, forged rod, effect of exposure to elevated temperature on tensile properties

Tested at room temperature. Composition: Al-4.5Cu-1Mn-1Si-0.5Mg. UNS A92014

Source: *Report on the Elevated Temperature Properties of Aluminum and Magnesium Alloy*, STP 291, ASTM, Oct 1960. As published in *Aerospace Structural Metals Handbook*, Vol 3, Code 3201, CINDAS/Purdue University, 1995, p 22



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