

TABLE VI — DESIGN STRESSES FOR SPRINGS AT ELEVATED TEMPERATURES
 (all values include the Wahl Curvature Correction Factor and are based on 5% relaxation maximum at stress and temperature after 7 days
 Stresses at temperature are adjusted for modulus (G) at temperature.)

				Stress, 1000 psi, for Metal Temperature, °F																		
Alloy	Temper of wire	Method of Coiling	Thermal Treatment after Coiling	Up to	400 to	450 to	500 to	550 to	600 to	650 to	700 to	750 to	800 to	850 to	900 to	950 to	1000 to	1050 to	1100 to	1150 to	1200 to	
				400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200		
MONEL K-500	Spring 5/8" & Under	Cold	Aged 1000°F/ 10 Hr A C	65	65	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Spring 1/2" & Over	Hot	Aged 1100°F/ 8 Hr A C	65	65	55	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DURANICKEL alloy 301 & PERMANICKEL alloy 300	Spring 1/2" & Under	Cold	Aged 900° F/ 8 Hr A.C.	70	70	70	70	70	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Hot-Rolled 1/2" & Over	Hot	Aged 1100°F/ 8 Hr A.C.	70	70	70	70	60	—	—	—	—	—	—	—	—	—	—	—	—	—	—
INCONEL alloy 600	Spring	Cold	Stress-Equalized 800 to 900°F/ 1 Hr A C	75	75	75	75	75	75	75	60	20	—	—	—	—	—	—	—	—	—	—
INCONEL alloy X-750	Spring 7/16" & Under	Cold	Aged 1200° F/ 4 Hr A.C	100	100	100	90	90	85	85	—	—	—	—	—	—	—	—	—	—	—	—
	No 1 Temper 7/16" & Under	Cold	Aged 1350°F/ 16 Hr A C	70	70	70	70	70	70	70	70	70	60	50	45	40	25	—	—	—	—	—
	Hot-Rolled 3/8" & Over	Cold	Aged 1350°F/ 16 Hr A C	70	70	70	70	70	70	70	65	60	55	50	45	40	25	—	—	—	—	—
	Spring 3/8" & Under	Cold	Solution Treated 2100°F / 2 hr AC + High-Temp Aged 1550°F/ 24 hr AC + Low-Temp Aged 1300°F/ 20 hr A.C.	55	55	55	55	55	55	55	55	55	55	55	55	55	50	50	40	30	—	—
	Spring 3/8" & Under	Cold	Solution-Treated 2100°F/ 1 Hr WQ + Aged 1400°F/ 4 Hr, A C	50	50	50	50	50	50	50	50	50	50	50	50	50	45	45	35	25	—	—
INCONEL alloy 718	No 1 Temper Annealed & Aged	Cold	Annealed 1800°F/ 1 hr A C + Aged 1325°F/ 8 hr AC to 1150°F, hold for total of 16 hr	100	100	100	100	100	100	100	100	100	90	80	80	80	75	70	70	60	—	—

LOW TEMPERATURE SPRINGS

As the temperature decreases, the tensile strength and modulus of carbon and low alloy spring stresses increase accompanied by a reduction of impact strength and increased notch sensitivity. However compression springs have the configuration to readily absorb impact energy, so with conservatively stressed designs spring

steels are suitable to temperatures as low as -320° F under ordinary conditions.

As the temperature approaches absolute zero or if high toughness is desired Type 302/304 stainless is the least expensive and safest choice of materials for cold wound springs in sizes up to approximately 1-1/8" diameter. For heavier sizes where hot wound springs are required, Inconel 718, Inconel X-750, or A-286 are the best choice.

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