

not free from such defects, the surface may be machined or ground to eliminate these defects. Forgings and seamless tubing for bodies of tanks shall be stamped with heat numbers.

(b) Steel (see Note 1) must conform to the following requirements as to chemical composition:

Designation	Class I (percent)	Class II (percent)	Class III (percent)
Carbon, maximum .....	0.50	0.50	0.53
Manganese, maximum ..	1.65	1.65	1.85
Phosphorus, maximum ..	.05	.05	.05
Sulphur, maximum .....	.06	.05	.05
Silicon, maximum .....	.35	.30	.37
Molybdenum, maximum .....	.....	.25	.30
Chromium, maximum ....	.....	.30	.30
Sum of manganese and carbon not over .....	2.10	2.10	.....

NOTE 1: Alternate steel containing other alloying elements may be used if approved.

(1) For instructions as to the obtaining and checking of chemical analysis, see § 179.500-18(b)(3).

(2) [Reserved]

**§ 179.500-6 Heat treatment.**

(a) Each necked-down tank shall be uniformly heat treated. Heat treatment shall consist of annealing or normalizing and tempering for Class I, Class II and Class III steel or oil quenching and tempering for Class III steel. Tempering temperatures shall not be less than 1000 °F. Heat treatment of alternate steels shall be approved. All scale shall be removed from outside of tank to an extent sufficient to allow proper inspection.

(b) To check uniformity of heat treatment, Brinnel hardness tests shall be made at 18 inch intervals on the entire longitudinal axis. The hardness shall not vary more than 35 points in the length of the tank. No hardness tests need be taken within 12 inches from point of head to shell tangency.

(c) A magnetic particle inspection shall be performed after heat treatment on all tanks subjected to a quench and temper treatment to detect the presence of quenching cracks. Cracks shall be removed to sound metal by grinding and the surface exposed shall be blended smoothly into the surrounding area. A wall thickness check shall then be made of the affected area by ultrasonic equipment or other suitable means acceptable to the inspector and if the remaining wall

thickness is less than the minimum recorded thickness as determined by § 179.500-4(b) it shall be used for making the calculation prescribed in paragraph (b) of this section.

**§ 179.500-7 Physical tests.**

(a) Physical tests shall be made on two test specimens 0.505 inch in diameter within 2-inch gauge length, taken 180 degrees apart, one from each ring section cut from each end of each forged or drawn tube before necking-down, or one from each prolongation at each end of each necked-down tank. These test specimen ring sections or prolongations shall be heat treated, with the necked-down tank which they represent. The width of the test specimen ring section must be at least its wall thickness. Only when diameters and wall thickness will not permit removal of 0.505 by 2-inch tensile test bar, laid in the transverse direction, may test bar cut in the longitudinal direction be substituted. When the thickness will not permit obtaining a 0.505 specimen, then the largest diameter specimen obtainable in the longitudinal direction shall be used. Specimens shall have bright surface and a reduced section. When 0.505 specimen is not used the gauge length shall be a ratio of 4 to 1 length to diameter.

(b) Elastic limit as determined by extensometer, shall not exceed 70 percent of tensile strength for class I steel or 85 percent of tensile strength for class II and class III steel. Determination shall be made at cross head speed of not more than 0.125 inch per minute with an extensometer reading to 0.0002 inch. The extensometer shall be read at increments of stress not exceeding 5,000 psi. The stress at which the strain first exceeds

$$\frac{\text{stress (psi)}}{30,000,000 \text{ (psi)}} + 0.005 \text{ (inches per inch)}$$

shall be recorded as the elastic limit.

(1) Elongation shall be at least 18 percent and reduction of area at least 35 percent.

NOTE 1: Upon approval, the ratio of elastic limit to ultimate strength may be raised to permit use of special alloy steels of definite composition that will give equal or better physical properties than steels herein specified.