

Kansas Administrative Regulations

Department of Labor

Article 51.—High Pressure Boilers

49-51-3. Maximum allowable working pressure for nonstandard boilers.

(a) The maximum allowable working pressure of a nonstandard boiler shall be determined by the application of the following formula:

$$\frac{TStE}{RFS} = \text{maximum allowable working pressure psig}$$

where:

TS = ultimate tensile strength of shell plates, psig

t = minimum thickness of shell plate, in the weakest course, in inches

E = efficiency of longitudinal joint:

For tube ligaments, E shall be determined by the rules given in section I of the ASME code.

For riveted construction, refer to the national board inspection code, 1998 edition.

For seamless construction, E shall be considered to be 100 percent.

R = inside radius of the weakest course of the shell, in inches.

FS = factor of safety permitted.

Nonstandard boilers with welded seams shall not be operated at pressures exceeding 15 psig for steam or 30 psig for water.

(b) Tensile strength. When the tensile strength of steel or wrought iron shell plates is not known, it shall be deemed to be 55,000 psig for steel and 45,000 psig for wrought iron.

(c) Crushing strength of mild steel. The resistance to crushing of mild steel shall be deemed to be 95,000 psig.

(d) Strength of rivets in shear. When computing the ultimate strength of rivets in shear, the following values in pounds per square inch of the cross-sectional area of the rivet shank shall be used:

	PSIG
· Iron rivets in single shear	38,000
· Iron rivets in double shear	76,000
· Steel rivets in single shear	44,000
· Steel rivets in double shear	88,000

When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross-sectional area of rivets, after driving, may be selected from the following table, or as ascertained by cutting out one rivet in the body of the joint:

Table sizes of rivets based on plate thickness

thickness of plate-inch	$\frac{1}{4}$	$\frac{9}{32}$	$\frac{5}{16}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{13}{32}$
diameter of rivet after driving-inch	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$

thickness of plate-inch	$\frac{7}{16}$	$\frac{15}{32}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$
diameter of rivet after driving-inch	$\frac{15}{16}$	$\frac{15}{16}$	$\frac{15}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$

(Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

***** Authenticated Kansas Administrative Regulation *****