

## NEBRASKA ADMINISTRATIVE CODE

TITLE 229 - DEPARTMENT OF LABOR

CHAPTER 27 - PRESSURE VESSELS - EXISTING INSTALLATIONS

001. This chapter is adopted pursuant to Neb. Rev. Stat. §48-727.

002. Maximum Allowable Working Pressure for Standard Pressure Vessels - The maximum allowable working pressure for standard pressure vessels shall be determined in accordance with the applicable provisions of the edition of the ASME code or the API-ASME code under which they were constructed and stamped.

003. Maximum Allowable Working Pressure for Nonstandard Pressure Vessels, except as provided in 004 of this chapter.

- A. The maximum allowable working pressure of a nonstandard pressure vessel shall be determined by the strength of the weakest course computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, the inside diameter of the course and the factor of safety set by these rules.

$TStE \div RFS = \text{maximum allowable working pressure (MAWP), psig where:}$

$TS =$  specified minimum tensile strength of shell plate material, psi. (When the tensile strength of carbon steel plate is not known, it may be taken as 55,000 psi for temperatures not exceeding 650 degrees Fahrenheit. For other materials use the lowest stress values for that material from ASME Section VIII.)

$t =$  minimum thickness of shell plate of weakest course, inches.

E = efficiency of longitudinal joint depending upon construction. Use the following values: for riveted joints - calculated riveted efficiency; for fusion-welded and brazed joints:

|                                     |     |
|-------------------------------------|-----|
| single lap weld .....               | 40% |
| double lap weld .....               | 50% |
| single butt weld .....              | 60% |
| double butt weld or forge weld..... | 70% |
| brazed steel.....                   | 80% |

R = inside radius of weakest course of shell (inches) provided the thickness does not exceed 10 percent of the radius shall be used.

FS = factor of safety allowed by these rules.

- B. The minimum factor of safety shall in no case be less than 5 for existing installations. The working pressure shall be decreased when deemed necessary by the inspector to insure the operation of the vessel within safe limits. The condition of the vessel and the particular service to which it is subject will be the determining factors.
  - C. The maximum allowable working pressure permitted for formed heads under pressure shall be determined by using the appropriate formulas from ASME code, and the tensile strength and factors of safety given in 002 and 003(A) of this Chapter.
  - D. The maximum allowable working pressure for nonstandard pressure vessels subjected to external pressure shall be determined by the rules of the appropriate ASME code.
004. Formulas - Pressure vessels that were not ASME code stamped but which were constructed of known materials and were designed and constructed in accordance with sound engineering standards, formulas and practices that provide safety equivalent to the intent of the code shall be calculated on the same basis as used in the original design.

005. Inspection of Inaccessible Parts - Where, in the opinion of the inspector, as the result of conditions disclosed at the time of inspection, it may be necessary to remove interior or exterior lining, covering or brickwork to expose certain parts of the vessel not normally visible, the owner or user shall remove such material to permit proper inspection and to determine remaining thickness.
006. Each pressure vessel shall be provided with pressure relief devices, indicating and controlling devices as necessary to protect against overpressure. The devices shall be so constructed, located and installed that they cannot readily be rendered inoperative. The relieving capacity of such pressure relief device shall be adequate to prevent a rise in pressure in the vessel of more than 10% or 3 psig, whichever is greater, above the maximum allowable working pressure except when multiple relieving devices are provided, they shall prevent the pressure from rising more than 16% or 4 psig, whichever is greater, above the maximum allowable working pressure. When multiple pressure relieving devices are provided, at least one device shall be set at or below the maximum allowable working pressure and the additional devices shall be set no higher than 105% of the maximum allowable working pressure. When an additional hazard is involved due to fire or other unexpected sources of external heat, the pressure relief devices shall meet the requirements of ASME code.
007. Whenever repairs are made to fittings and appliances or it becomes necessary to replace them, the work must comply with the requirements for new installations and 229 NAC 15.