**Section 505.2000 Standards for Design, Construction, Operation and Inspection**

Non-ISI boilers and pressure vessels, including related appurtenances, except those exempt under Section 505.50(a), operated within or upon or in connection with a nuclear facility in Illinois, shall be designed, constructed, installed, examined, tested, repaired, altered and inspected as required by this Section, except in those cases in which NRC has jurisdiction, as determined by NRC. When NRC has jurisdiction, the codes and standards reflected in the facility's Operating License, Final Safety Analysis Report, technical specifications or other licensing documents as required or approved by the NRC shall apply. For non-ISI boilers and pressure vessels over which NRC has no jurisdiction, as determined by NRC, the standards required by this Part apply. If the NRC determines that NRC has jurisdiction, but has not established standards, the Agency may propose to NRC that these or other standards be applied to such boilers and pressure vessels in nuclear power plants in Illinois.

a) All new, existing and reinstalled non-ISI boilers, including related appurtenances, shall be designed, constructed, installed, examined, tested, repaired and altered in accordance with the ASME Code or National Board Inspection Code, as applicable, and inspected in accordance with this Part. Where a non-ISI boiler is moved and reinstalled, the fittings and appliances of that boiler shall comply with this Part.

b) All non-ISI pressure vessels installed and placed in operation after December 31, 1976 and all reinstalled non-ISI pressure vessels, including related appurtenances, shall be designed, constructed, installed, tested, examined, repaired and altered in accordance with the ASME Code or National Board Inspection Code, as applicable, and inspected in accordance with this Part. Where a non-ISI pressure vessel is moved and reinstalled, the fittings and appliances of that pressure vessel shall comply with this Part.

c) Non-ISI pressure vessels and related appurtenances installed and placed in operation at nuclear facilities on or before December 31, 1976 shall be inspected in accordance with this Part and designed, constructed, installed, tested, repaired and altered, in accordance with the following requirements.

1) The MAWP for standard pressure vessels shall be determined in accordance with the applicable provisions of the ASME Code under which they were constructed and stamped.

2) MAWP for Non-standard Pressure Vessels

A) The MAWP of a non-standard pressure vessel subject to internal pressure 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 this Part, as follows:

|  |  |  |
| --- | --- | --- |
| TS x t x E | = | MAWP, in psig |
| R x FS |

where:

|  |  |  |
| --- | --- | --- |
| TS | = | ultimate tensile strength of shell plate, in psi. When the tensile strength of steel plate is not known, it shall be taken as 55,000 psi for temperature not exceeding 650° F. |
| t | = | minimum thickness of shell plate of weakest course, in inches. |
| E | = | efficiency of longitudinal joint, depending upon construction. Use the following values (in percents): |

For Fusion-Welded and Brazed Joints:

Single lap welded 40

Double lap welded 60

Single butt welded 60

Double butt welded 75

Forge welded 70

Brazed steel 80

For riveted joints − calculate riveted joint efficiency in accordance with rules given in Section I, Part PR, of the 1971 ASME Code.

|  |  |  |
| --- | --- | --- |
| R | = | inside radius for weakest shell course, in inches, provided the thickness does not exceed 10 percent of the radius. If the thickness is over 10 percent of the radius, the outer radius shall be used. |
| FS | = | factor of safety permitted shall be a minimum of 5.0. |

B) The MAWP for cylindrical non-standard pressure vessels subject to external or collapsing pressure shall be determined by the rules in Par. UG-27 and UG-28 of the ASME Code Section VIII.

C) The minimum factor of safety may be increased when deemed necessary by the Authorized Inspector to assure the operation of the vessel within safe limits. The condition of the vessel and the particular service to which it is subject will be determining factors.

D) The MAWP permitted for formed heads under pressure shall be determined by using the appropriate formulas from UG-32 or UG-33 of the ASME Code Section VIII and the tensile strength and efficiencies given in this Section.

d) All non-ISI boilers and pressure vessels, including related appurtenances, shall be inspected in accordance with the National Board Inspection Code and this subsection (d). The following general requirements shall apply to all non-ISI boilers and pressure vessels.

1) The owner shall prepare each boiler and pressure vessel for internal inspection in accordance with the National Board Inspection Code. The Authorized Inspector should not enter any boiler or pressure vessel before he or she is satisfied that all necessary safety precautions of the National Board Inspection Code have been taken, including testing the boiler or pressure vessel atmosphere for oxygen and toxic, flammable and inert gases.

2) The owner shall prepare for and apply the hydrostatic test, whenever necessary, on a date agreeable to the owner and the Authorized Inspector.

e) All cases not specifically covered by this Part shall be treated as new installations. Existing non-ISI boilers and pressure vessels shall be governed by current ASME Code and National Board Inspection Code requirements or the requirements of the ASME Code in effect at the time of construction.

(Source: Amended at 41 Ill. Reg. 645, effective January 4, 2017)