

STANDARDS AUSTRALIA

Amendment No. 1

to

AS 1210—2010**Pressure vessels****REVISED TEXT**

The 2010 edition of AS 1210 is amended as follows; the amendments should be inserted in the appropriate places.

SUMMARY: This Amendment applies to Clauses 2.6.3.2, 3.19.1, 3.19.2, 3.21.5.4.2, 3.21.6.2, 3.26.3.4, Figures 3.15.1 and 3.21.6.2 and Appendices B, H, I, J, L and M.

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Clause 2.6.3.2

Delete Equation 2.6.3 and *replace* with the following:

$$T_R = T_{\min} + T_S - T_L + T_{PPWHT} - T_{SHOCK} - T_C - T_{STRAIN} - T_H \quad \dots 2.6.3$$

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Figure 3.15.1

Item (a), 2nd row below the 4th column heading, *delete* the equation and *replace* with the following:

$$I \geq \left(1.1 - 0.8 \frac{t_s^2}{t_h^2} \right) \sqrt{(Dt_h)}$$

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Clause 3.19.1

Add the following after existing paragraph:

In addition to the requirements of this Clause, consideration shall be given to connections subject to loadings as specified in Clause 3.2.3. The design for local nozzle and structural non-pressure loads shall be according to Appendix N.

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Clause 3.19.2

Delete the first paragraph and *replace* with the following:

‘The following meet the requirements of Clause 3.19.2 for pressure loading and do not require strength calculations:

- Welded connections that comply with Figure 3.19.3(A), illustrations (a), (b), (c), (d), (e), (f), (g), (h), (j) and (k); Figure 3.19.3(B), illustrations (f), (g), (h), (j) and (k); Figure 3.19.3(C), illustrations (a) and (c); Figure 3.19.4, illustrations (e), (f), (k), (o) and (p); Figure 3.19.6, illustrations (g), (h) and (j); Figure 3.19.9(b), (c), (d), (e) and (f).

NOTE: Strength calculations may be required for connections subject to loadings as specified in Clause 3.2.3 or where directed in the notes to the relevant figure.

- If A_1 is found to be greater than A in Clause 3.18 above.
- If the conditions stated in Clause 3.18.6.1 are met.

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Clause 3.21.5.4.2

Item (a), *delete* text and *replace* with the following:

- (a) Materials for bolts (including screws, studs, stud-bolts and clamp bolts) shall comply with the specifications listed in Table B2, Appendix B (which also gives design strengths). Additional materials or grades specifically listed as bolting material in ASME BPV-VIII may be used, provided design stresses determined are in accordance with this Standard.

Alternatively, other non-bolting materials to recognized international Standards may be used, provided—

- (i) the selected material Standard lists yield and tensile strength at the design temperature of the equipment;
- (ii) the design strength is calculated in accordance with Table A1, Appendix A;
- (iii) the grain direction of the material is parallel to the axis of the fastener; and
- (iv) nuts meet the requirements of Clause 3.21.5.4.3 and load tested in accordance with the requirements of a nut material Standard listed in Table B2, Appendix B.

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Figure 3.21.6.2

Delete Note 6 and *replace* with the following:

6 Closure elements shall comply with Items (h) to (k) of Clause 3.27.2.

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Clause 3.26.3.4

Delete Item (f) and *replace* with the following:

- (f) *Class 1H, 2H, 1S and 2S vessels*—fatigue loads and cycles to be agreed between the designer, purchaser/owner and design verifier (see Appendix M).

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Appendix B, Paragraph B1

Delete text of Paragraph B1 and *replace* with the following:

Tables B1(A) to (J) give design strength (*f*) values for a range of materials for use in vessel design. Table B1(A) gives design strength values for Classes 1H and 2H designs where $R_m/2.35$. Tables B1(B) to (H) give design strength values at $R_m/3.5$, for Classes 1, 2A, 2B and 3 vessels.

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Appendix B, Table B1(E)

Delete title of Table and *replace* with the following:

**DESIGN TENSILE STRENGTH FOR CLASS 1, 2A, 2B AND 3 VESSELS (MPa)—
COPPER AND COPPER ALLOYS**

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Appendix B, Table B2 Notes

Delete the current numbering for the Notes and *replace* as follows:

NOTES:

- 1 Stresses at intermediate temperatures may be obtained by linear interpolation.
 - 2 $T_R = T_{CV} - 3^\circ\text{C}$.
 - 3 For $d \leq 152$ mm, $T_R = T_{CV} - 3^\circ\text{C}$. For $d > 152$ mm, $T_R = T_{CV}$.
 - 4 For $d \leq 203$ mm, $T_R = T_{CV} - 3^\circ\text{C}$. For $d > 203$ mm, $T_R = T_{CV}$.
 - 5 For $d \leq 178$ mm, $T_R = T_{CV} - 3^\circ\text{C}$. For $d > 178$ mm, $T_R = T_{CV}$.
 - 6 For $d \leq 205$ mm, $T_R = T_{CV} - 3^\circ\text{C}$. For $d > 205$ mm, $T_R = T_{CV}$.
 - 7 For $d \leq 241$ mm, $T_R = T_{CV} - 3^\circ\text{C}$.
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Appendix H, Paragraph H4.2

Delete—

‘thus $t = \frac{PD}{2f - P}$ which is Equation 3.7.3(1) with joint efficiency (η) equal to 1, and with $K = 1$ (Table 3.1.5)’

and *replace* with the following:

thus $t = \frac{PD}{2f - P}$ which is Equation 3.7.3(1) with joint efficiency (η) equal to 1, and with $k = 1$ (Table 3.1.6)

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Appendix H, Paragraph H5 (new)

Add the following new Paragraph H5, as follows:

H5 VON MISES CRITERION

While this Standard generally cites the Tresca criterion, the Tresca criterion is a linear approximation of the von Mises criterion. Accordingly, it is permissible for the purposes of stress analyses in this Standard to substitute von Mises stresses for Tresca stresses.

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Appendix I, Paragraph I7

Delete Paragraph I7 and *replace* with the following:

I7 STRENGTH DESIGN BASED ON STRAINS FROM NON-LINEAR ANALYSIS

I7.1 General

As an alternative to the strength design methods, based on linear elastic analysis and stress categories, given in Appendix H, this Paragraph provides a means to demonstrate the design integrity of a vessel or pressure component with respect to strength, using non-linear finite element analysis.

NOTE: While this Paragraph specifically addresses design for strength using non-linear finite element analysis, many vessels will also have deformation-related serviceability limits that may be analysed concurrently with the strength requirements.