Errata

VIII-2 2023 Edition
Summay of Changes

Page	*Location*	*Change*
76	3.11.2.3	Subparagraph (a) revised
77	3.11.2.4	Revised
77	3.11.2.5	*(1)* Steps 2 and 3 revised *(2)* In subpara. (d), first sentence revised
79	3.11.2.9	In subpara. (b), second sentence revised
82	3.11.4.5	Subparagraph (c) revised
83	3.11.6.1	Revised
85	3.11.8	*(1)* In 3.11.8.1, subpara. (b) revised *(2)* In 3.11.8.2, title and subparas. (a) through (c) revised *(3)* 3.11.8.3 revised in its entirety *(4)* In 3.11.8.4, title and subparas. (a), (b), and (c)(1)(-c) revised
89	Table 3.1	*(1)* Entries for $2\frac{1}{4}$Cr–1Mo revised *(2)* Note (1) added
90	Table 3.4	Revised
91	Table 3.5	*(1)* For SA-320, cross-references in last column revised *(2)* For SA-453, entries revised
93	Table 3.12	Title revised
94	Table 3.13	Title revised
97	Table 3.18	Deleted
100	Figure 3.3	Title revised
101	Figure 3.3M	Title revised
102	Figure 3.4	Title revised
103	Figure 3.4M	Title revised
105	Figure 3.6	Arrowhead added by errata
105	Figure 3.6M	Arrowhead added by errata
106	Figure 3.7	Title revised
108	Figure 3.7M	Title revised
110	Figure 3.8	Title revised
112	Figure 3.8M	Title revised
123	Figure 3.17	Added
125	Table 3-A.1	For SA-283, Grade B deleted
138	Table 3-A.5	Revised
151	Table 3-D.1	*(1)* Revised *(2)* Note (1) added
151	Table 3-D.2	"$2\frac{1}{4}$Cr–$\frac{1}{2}$Mo" revised to "$2\frac{1}{4}$Cr–1Mo"
153	Table 3-D.2M	"$2\frac{1}{4}$Cr–$\frac{1}{2}$Mo" revised to "$21\frac{1}{4}$Cr–1Mo"
156	3-F.1.2	Subparagraph (b) revised
158	3-F.2.1	Subparagraph (b) revised
163	Figure 3-F.3	Title revised

Highlighted should read:
"2¼Cr-1Mo"

Table 3-D.2M
Cyclic Stress–Strain Curve Data

(23)

Material Description	Temperature, °C	n_{css}	K_{css}, MPa
Carbon Steel (20 mm — base metal)	20	0.128	757
	200	0.134	728
	300	0.093	741
	400	0.109	666
Carbon Steel (20 mm — weld metal)	20	0.110	695
	200	0.118	687
	300	0.066	695
	400	0.067	549
Carbon Steel (50 mm — base metal)	20	0.126	693
	200	0.113	636
	300	0.082	741
	400	0.101	643
Carbon Steel (100 mm — base metal)	20	0.137	765
	200	0.156	798
	300	0.100	748
	400	0.112	668
1Cr–½Mo (20 mm — base metal)	20	0.116	660
	200	0.126	656
	300	0.094	623
	400	0.087	626
1Cr–½Mo (20 mm — weld metal)	20	0.088	668
	200	0.114	708
	300	0.085	683
	400	0.076	599
1Cr–½Mo (50 mm — base metal)	20	0.105	638
	200	0.133	684
	300	0.086	607
	400	0.079	577
1Cr–1Mo–¼V	20	0.128	1 082
	400	0.128	912
	500	0.143	815
	550	0.133	693
	600	0.153	556
2¼Cr–1Mo	20	0.100	796
	300	0.109	741
	400	0.096	730
	500	0.105	652
	600	0.082	428
9Cr–1Mo	20	0.117	975
	500	0.132	693
	550	0.142	609
	600	0.121	443
	650	0.125	343
Type 304	20	0.171	1 227
	400	0.095	590
	500	0.085	550
	600	0.090	450
	700	0.094	306
Type 304 (annealed)	20	0.334	2 275

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f_{re} = factor for the overall efficiency of welded and expanded joints. This is the maximum of the efficiency of the weld alone, $f_r(b)$, and the net efficiency of the welded and expanded joint.
= max$[f_e f_r f_y f_T, f_r(b)]$
F_t = axial tube strength
f_T = factor to account for the increase or decrease of tube joint strength due to radial differential thermal expansion at the tube-to-tubesheet joint. Acceptable values of f_T may range from 0 to greater than 1. When the f_T value is negative, it shall be set to 0.
f_w = weld strength factor
f_y = factor for differences in the mechanical properties of tubesheet and tube materials. f_y = min$[(S_y/S_y\ t), 1.0]$ for expanded joints. When f_y is less than 0.60, qualification tests in accordance with 4.21.3.3 and 4.21.3.4 are required.
k = tube load factor
= 1.0 for loads due to pressure-induced axial forces
= 1.0 for loads due to thermally induced or pressure plus thermally induced axial forces on welded-only joints where the thickness through the weld throat is less than the nominal tube wall thickness t
= 2.0 for loads due to thermally induced or pressure plus thermally induced axial forces on all other tube-to-tubesheet joints
l = expanded tube length
$L_{1,\text{test}}$ = lowest axial load at which failure occurs at operating temperature
$L_{2,\text{test}}$ = lowest axial load at which failure of heat soaked specimen tested at room temperature occurs
$L_{\max}$ = maximum allowable axial load in either direction on the tube-to-tubesheet joint
L_{test} = axial load at which failure of the test specimens occur
P_e = tube expanding pressure
P_o = interface pressure between the tube and tubesheet that remains after expanding the tube at fabrication. This pressure may be established analytically or experimentally, but shall consider the effect of change in material strength at operating temperature.
P_T = interface pressure between the tube and tubesheet due to differential thermal growth. This pressure may be established analytically or experimentally.
R_m = mean tube radius
r_o = tube outside radius
S = allowable stress from Annex 3-A for the tube at the design temperature. For a welded tube, S is the equivalent allowable stress for a seamless tube.
S_T = tensile strength for tube material from the material test report
S_t = allowable stress from Annex 3-A of the material to which the tube is welded (see 3.3.7.4)
S_u = tensile strength for tube material at operating temperature from Annex 3-D
S_{ua} = tensile strength for tube material at room temperature from Annex 3-D
S_w = allowable stress in weld, $S_w = [S, S_t]$
S_y = tubesheet specified minimum yield strength at the design temperature from Annex 3-D
$S_{y,t}$ = tube specified minimum yield strength at the design temperature from Annex 3-D
T = tubesheet design temperature
t = nominal tube wall thickness
T_a = ambient temperature
α = mean coefficient of thermal expansion of tubesheet material at T
α_t = mean coefficient of thermal expansion of tube material at T

Highlighted should read:
"$S_W = min\ [S, S_t]$"

P_e = tube expanding pressure.

P_o = interface pressure between the tube and tubesheet that remains after expanding the tube at fabrication. This pressure may be established analytically or experimentally, but shall consider the effect of change in material strength at operating temperature.

P_T = interface pressure between the tube and tubesheet due to differential thermal growth. This pressure may be established analytically or experimentally.

R_m = mean tube radius.

r_o = tube outside radius.

S = allowable stress from Annex 3-A for the tube at the design temperature. For a welded tube, S is the equivalent allowable stress for a seamless tube.

S_T = tensile strength for tube material from the material test report

S_t = allowable stress from Annex 3-A of the material to which the tube is welded (see 3.3.7.4)

S_u = tensile strength for tube material at operating temperature from Annex 3-D.

S_{ua} = tensile strength for tube material at room temperature from Annex 3-D.

S_w = allowable stress in weld, $S_w = \min[S, S_t]$

$S_{y,t}$ = tube specified minimum yield strength at the design temperature from Annex 3-D.

S_y=tubesheet specified minimum yield strength at the design temperature from Annex 3-D.

T = tubesheet design temperature

T_a = ambient temperature.

t = nominal tube wall thickness.

α = mean coefficient of thermal expansion of tubesheet material at T.

α_t = mean coefficient of thermal expansion of tube material at T.