ERRATA for
PE Metallurgical and Materials Practice Exam
ISBN 978-1-947801-13-4
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Errata posted 01/20/2023
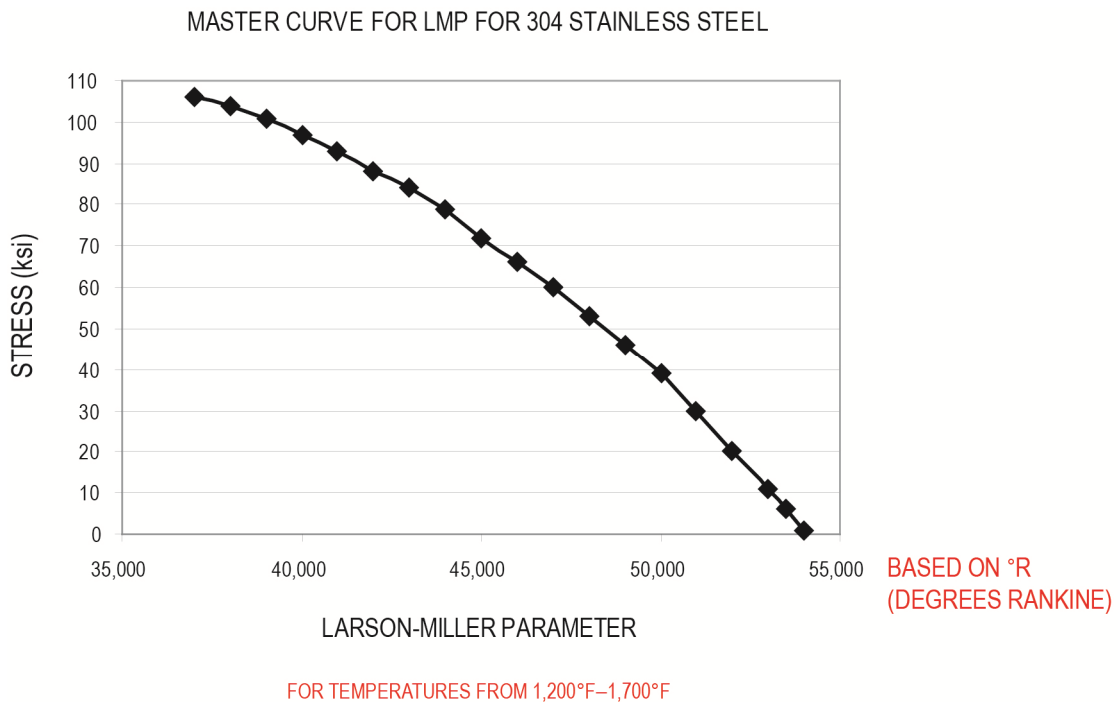
Revisions are shown in red.

Question 3, p. 9:
The Tabulation of the Error Function table has been removed. It is available in the supplied reference handbook.

- ○   A.   1.10%
- ○   B.   0.78%
- ○   C.   0.55%
- ○   D.   0.035%

Question 67, p. 44:
After 10 years, a continuously operated, ultra-high-pressure boiler suffers from a superheater tube failure. The tube is composed of ASME SA 304 stainless steel, and the tube was at a temperature of 1,600°F (871°C). Use the stress-LMP curve for 304 stainless steel shown, and assume the LMP constant related to the stainless steel is equal to 20. The stress (ksi) on the tube at failure is most nearly:

MASTER CURVE FOR LMP FOR 304 STAINLESS STEEL

BASED ON °R (DEGREES RANKINE)

FOR TEMPERATURES FROM 1,200°F–1,700°F

Solution 3, p. 54:

$$\frac{C_x - C_0}{C_s - C_0} = 1\text{-erf}\, \frac{x}{2\sqrt{Dt}}$$

where
$C_x = C$ at x
$C_s = 0.6$
$C_0 = 0.1$
$x\ = 0.3\,\text{cm}$
$t\ \ = 3{,}600\ \text{s}$
$D\ = 2.311 \cdot 10^{-7}\ \dfrac{\text{cm}^2}{\text{s}}$

$$\text{erf}\left(\frac{0.3\,\text{cm}}{2\left(2.311 \cdot 10^{-7} \cdot 3{,}600\right)^{1/2}}\right)$$

$$\text{erf}\,(5.2)$$

$$\text{erf}\,(z) = \frac{2}{\sqrt{\pi}}\left(\int_0^z e^{-y^z}\,dy\right)$$

$$\text{erf}\,(5.2) = \frac{2}{\sqrt{\pi}}\left(1.8 \cdot 10^{-12} - 1\right)$$

$$= -1.13$$

$$\frac{C_x - 0.1}{0.6 - 0.1} = 1 - (-1.13)$$

$$= 2.13$$

$$\frac{C_x - 0.1}{0.5} = 2.13$$

$$C_x - 0.1 = 1.065$$

$$C_x = 1.165$$

$$= 1.10\%$$

THE CORRECT ANSWER IS: A