ERRATA for

FE Supplied-Reference Handbook

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The errata listed here have been corrected in the REVISED 8th edition of the *FE Supplied-Reference Handbook* (ISBN 978-1-932613-37-7).

p. 23, Column 1, Identities. The half-angle formula in line 21 should be:

$$\cos(\alpha / 2) = \pm\sqrt{(1 + \cos\alpha)/2}$$

p. 64, Column 1, FLUID FLOW. The fifth, sixth, and seventh notations should be:

$v_{max} = 1.18\,\overline{v}$, for fully turbulent flow

$v_{max} = 2\,\overline{v}$, for circular tubes in laminar flow and

$v_{max} = 1.5\,\overline{v}$, for parallel planes in laminar flow, where

p. 107, Column 1. The first paragraph should read as follows:

Water Content affects workability. However, an increase in water without a corresponding increase in cement reduces the concrete strength. Superplasticizers are the most typical method to increase workability. Air entrainment is used to improve durability.

p. 183, Carcinogens. The equation for carcinogens should be:

Risk = dose × toxicity = $CDI \times CSF$

where

CDI = Chronic Daily Intake

CSF = Cancer Slope Factor. Slope of the dose-response curve for carcinogenic materials.

p. 246, Column 1, Adiabatic Compression. The equation should be:

$$\dot{W}_{\text{comp}} = \frac{\dot{m} P_i k}{(k-1)\rho_i \eta_c}\left[\left(\frac{P_e}{P_i}\right)^{1-1/k} - 1\right]$$

p. 246, Column 1, Isothermal Compression. The equation should be:

$$\dot{W}_{\text{comp}} = \frac{\overline{R} T_i}{M \eta_c} \ln \frac{P_e}{P_i} (\dot{m})$$

p. 21, Column 2. The following equation and wording should appear below the figure of the ellipse: $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1;$ Center at (h, k)

p. 22, Column 1, Case 4. Circle. Replace the word "general" with the word "standard."

p. 22, Column 1, Conic Section Equation. The following lines should read:
If $B^2 - 4AC < 0$, an *ellipse* is defined.
If $B^2 - 4AC > 0$, a *hyperbola* is defined.
If $B^2 - 4AC = 0$, the conic is a *parabola*.

p. 22, Column 2, QUADRIC SURFACE (SPHERE). Replace the word "general" with the word "standard."

p. 23, Column 2, Polar Coordinates. The last equation should be:

$$\frac{r_1(\cos\theta_1 + i\sin\theta_1)}{r_2(\cos\theta_2 + i\sin\theta_2)} = \frac{r_1}{r_2}\left[\cos(\theta_1-\theta_2) + i\sin(\theta_1-\theta_2)\right]$$

p. 25, Column 2, DIFFERENTIAL CALCULUS, The Derivative. The derivative equation should be:

$$\begin{aligned} y' &= \operatorname*{limit}_{\Delta x\to 0}\left[(\Delta y)/(\Delta x)\right] \\ &= \operatorname*{limit}_{\Delta x\to 0}\left\{\left[f(x+\Delta x)-f(x)\right]/(\Delta x)\right\} \end{aligned}$$

p. 30, Column 1, CENTROIDS AND MOMENTS OF INERTIA. The equation on line 4 should be: $y_c = \frac{\int y dA}{A}$

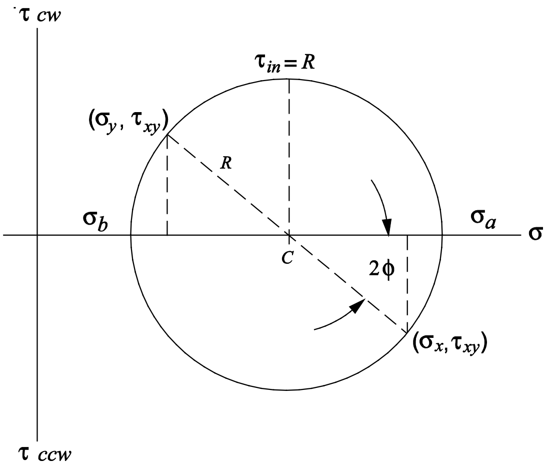
p. 30, Column 1, DIFFERENTIAL EQUATIONS. The equation on line 6 should be:

$$y_h(x) = C_1 e^{r_1 x} + C_2 e^{r_2 x} + \ldots + C_i e^{r_i x} + \ldots + C_n e^{r_n x}$$

p. 30, Column 1, DIFFERENTIAL EQUATIONS. The third line from the bottom should begin as follows: where $y_p(x)$ is any particular solution with $f(x)$ present.

p. 30, Column 2. The heading of the second column of the table should be $y_p(x)$.

p. 34, Column 2. The Mohr's Circle should be as follows:



p. 42, Column 1, Normal Distribution (Gaussian Distribution). A fourth notation should be added to the last paragraph in the section as follows:

$F(x)$ = the area under the curve from $-\infty$ to x,
$R(x)$ = the area under the curve from x to ∞,
$W(x)$ = the area under the curve between $-x$ and x, and
$F(-x) = 1-F(x)$.

p. 44. The following table should be shown at the bottom of the page:

Values of $Z_{\alpha/2}$

Confidence Interval	$\mathbf{Z_{\alpha/2}}$
80%	1.2816
90%	1.6449
95%	1.9600
96%	2.0537
98%	2.3263
99%	2.5758

p. 64, Column 2. In the equation eight lines from the bottom, *b* is the span length.

p. 68, Column 2. The equation below the table should be: $Q = CA_0\sqrt{\frac{2}{\rho}(p_1 - p_2)}$

p. 71. The range of values of e (ft) for riveted steel should be 0.003–0.03.

p. 73, Column 2. The last paragraph should read as follows:

For real gases, several equations of state are available; one such equation is the van der Waals equation with constants based on the critical point:

$$\left(P + \frac{a}{\bar{v}^2}\right)(\bar{v} - b) = \bar{R}T$$

$$\text{where } a = \left(\frac{27}{64}\right)\left(\frac{\bar{R}^2 T_c^2}{P_c}\right), \quad b = \frac{\bar{R}T_c}{8P_c}$$

where P_c and T_c are the pressure and temperature at the critical point, respectively, and $\bar{v}$ is the molar specific volume.

p. 74, Column 1, Special Cases of Closed Systems. In the equations below Isentropic (ideal gas) and Constant Temperature (***Boyle's Law***), the gas constant R should not have a bar over the top (three places).

p. 74, Column 2, Special Cases of Open Systems. In the equations below Constant Temperature and Isentropic (ideal gas), the gas constant R should not have a bar over the top (four places).

p. 87, Column 1, Turbulent Flow in Circular Tubes. The coefficient in the Sieder-Tate equation should be 0.023.

p. 106, Column 2. The table should be above the heading **HALF-LIFE.**

p. 108, BINARY PHASE DIAGRAMS. The word on line 6 should be "Peritectoid."

p. 112, Column 2, Second-Order Control System Models. For a unit step input to a normalized underdamped second-order control system, the time required to reach a peak t_p value and the value of that peak M_p are given by

$$t_p = \pi \Big/ \left(\omega_n \sqrt{1 - \zeta^2}\right)$$

$$M_p = 1 + e^{-\pi\zeta / \sqrt{1 - \zeta^2}}$$

p. 135, Column 2. The entry for q_{ULT} should read as follows:

$$q_{ULT} = \text{ultimate bearing capacity (strip footing)}$$
$$= cN_C + \gamma' D_f N_q + \frac{1}{2}\gamma' B N_\gamma$$

p. 137, UNIFIED SOIL CLASSIFICATION TABLE. The Laboratory Classification Criteria Column should read as follows:

ATTERBERG LIMITS BELOW "A" LINE OR *PI* LESS THAN 4
ATTERBERG LIMITS ABOVE "A" LINE WITH *PI* GREATER THAN 7

p. 138. In the footnote under the table, the ranges of values given below the equation for GI should be 0 to 40, 0 to 20, 0 to 40, and 0 to 20, respectively.

p. 150, Column 2, Shear – unstiffened beams. The first four lines of the section should be:

$A_w = dt_w$

Rolled W-shapes for $F_y \le 50$ ksi: $\phi = 1.0$

$\phi V_n = \phi(0.6F_y)A_w$

Built-up I-shaped beams for $F_y \ge 50$ ksi: $\phi = 0.90$

p. 150, Column 2, Column capacity – available strength:

$$\frac{KL}{r} \le \frac{802.1}{\sqrt{F_y}}: \quad \phi F_{cr} = 0.9\left[0.658^{\frac{F_y\left(\frac{KL}{r}\right)^2}{286{,}220}}\right]F_y$$

$$\frac{KL}{r} > \frac{802.1}{\sqrt{F_y}}: \quad \phi F_{cr} = \frac{225{,}910}{\left(\frac{KL}{r}\right)^2}$$

AISC Table 4-22: Available Critical Stress (ϕF_{cr}) for Compression Members

AISC Table 4-1: Available Force (ϕP_n) in Axial Compression, kips $(F_y = 50 \text{ ksi})$

p. 151, Column 1, BEAM-COLUMNS. In "Required strengths," the last equation should be: $P_{el} = \dfrac{\pi^2 EI}{(KL)_x^2}$ with respect to bending axis

p. 151, Column 1, BEAM-COLUMNS. In "Strength limit state," the second equation should be: $\dfrac{P_r}{\phi P_n} < 0.2$: $\quad \dfrac{P_r}{2(\phi P_n)} + \dfrac{M_r}{\phi M_{nx}} \le 1.0$

p. 151, Column 2, TENSION MEMBERS. The equation for hole diameter should be: $d_h = d_b + 1/16''$

p. 154. The footnote below the table should read:

$\phi_b M_{rx} = \phi_b (0.7F_y) S_x \quad BF = \dfrac{\phi_b M_{px} - \phi_b M_{rx}}{L_r - L_p}$

p. 161, Column 2, Weir Formulas. The first two lines of the section should read:

Unsubmerged suppressed

$Q = CLH^{3/2}$

Then add the following after line 2:

Unsubmerged contracted

$Q = C(L - 0.2H)H^{3/2}$

p. 162, TRANSPORTATION. Revise the definition of A to read:

A = absolute value of algebraic difference in grades (%)

Delete the definition of C.

p. 209, Column 1. The equation for a non-inverting amplifier should be: $v_0 = \left(1 + \dfrac{R_2}{R_1}\right) v_b$

p. 218, Column 1, Least Squares. The equation for the slope should be: $\hat{b} = S_{xy} / S_{xx}$.

p. 222, Column 1, PERMISSIBLE NOISE EXPOSURE (OSHA). Line 6 should read:

For $80 \le \text{SPL} \le 130$ dBA, $T_i = 2^{\left(\frac{105-\text{SPL}}{5}\right)}$ (hours)

p. 226. Table B should read as follows:

Table B. Tests on means of normal distribution—variance unknown.

Hypothesis	*Test Statistic*	*Criteria for Rejection*
H_0: $\mu = \mu_0$ H_1: $\mu \neq \mu_0$		$\lvert t_0 \rvert > t_{\alpha/2,\, n-1}$
H_0: $\mu = \mu_0$ H_1: $\mu < \mu_0$	$t_0 = \dfrac{\overline{X} - \mu_0}{S/\sqrt{n}}$	$t_0 < -t_{\alpha,\, n-1}$
H_0: $\mu = \mu_0$ H_1: $\mu > \mu_0$		$t_0 > t_{\alpha,\, n-1}$
H_0: $\mu_1 - \mu_2 = \gamma$ H_1: $\mu_1 - \mu_2 \neq \gamma$	Variances equal: $t_0 = \dfrac{\overline{X}_1 - \overline{X}_2 - \gamma}{S_p \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$ $v = n_1 + n_2 - 2$	$\lvert t_0 \rvert > t_{\alpha/2,\, v}$
H_0: $\mu_1 - \mu_2 = \gamma$ H_1: $\mu_1 - \mu_2 < \gamma$	Variances unequal: $t_0 = \dfrac{\overline{X}_1 - \overline{X}_2 - \gamma}{\sqrt{\dfrac{S_1^2}{n_1} + \dfrac{S_2^2}{n_2}}}$	$t_0 < -t_{\alpha,\, v}$
H_0: $\mu_1 - \mu_2 = \gamma$ H_1: $\mu_1 - \mu_2 > \gamma$	$v = \dfrac{\left(\dfrac{S_1^2}{n_1} + \dfrac{S_2^2}{n_2}\right)^2}{\dfrac{\left(S_1^2/n_1\right)^2}{n_1 - 1} + \dfrac{\left(S_2^2/n_2\right)^2}{n_2 - 1}}$	$t_0 > t_{\alpha,\, v}$

In Table B, $S_p^2 = [(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2]/v$

p. 232, Column 2, Power Transmission. The equation should be:

$$\sigma' = \frac{4}{\pi d^3}\left[\left(8M + Fd\right)^2 + 48T^2\right]^{1/2}$$

p. 237, Column 2. The velocities in a planetary set are related by: $\dfrac{\omega_L - \omega_{arm}}{\omega_f - \omega_{arm}} = \pm\, m_v$

The **INDEX** should include the following entries: