

ERRATA SHEET FOR ANSI/ASHRAE STANDARD 103-2017
Methods of Testing for Annual Fuel Utilization Efficiency of
Residential Central Furnaces and Boilers

May 10, 2022

The corrections listed in this errata sheet apply to ANSI/ASHRAE Standard 103-2017. The first printing is identified on the outside back cover as “Product code: 86316 7/17”. Shaded items have been added since the previously published errata sheet dated April 25, 2019 was distributed.

Page Erratum

- 31 Table 8 Fuel Characteristics and Parameters for Calculating Steady-State Sensible Heat Loss ($L_{s,ss}$) and Steady-State Efficiency (Eff_{ss}).** The parenthesis “)” currently located between “(CA(i))” and the square bracket “]” in the equation for $L_{s,ss}$ should be moved after “(CF(i))” as shown below.

TABLE 8 Fuel Characteristics and Parameters for Calculating Steady-State Sensible Heat Loss ($L_{s,ss}$) and Steady-State Efficiency (Eff_{ss})

$$L_{s,ss} = \frac{100}{HHV_A \times K_6} \sum_{i=1}^5 \left\{ \left[\left(1 + \frac{A}{F} \right) (CF(i)) + \left(\frac{A}{F} \right) (R_{T,a} - 1) (CA(i)) \right] \times \left[(T_{a,ss,x} + T_{abs}) \times K_7 \right]^i - \left[(T_{RA} + T_{abs}) \times K_7 \right]^i \right\}$$

← Move closing bracket

The corrected equation $L_{s,ss}$ is shown below.

$$L_{s,ss} = \frac{100}{HHV_A \times K_6} \sum_{i=1}^5 \left\{ \left[\left(1 + \frac{A}{F} \right) (CF(i)) + \left(\frac{A}{F} \right) (R_{T,a} - 1) (CA(i)) \right] \times \left[(T_{a,ss,x} + T_{abs}) \times K_7 \right]^i - \left[(T_{RA} + T_{abs}) \times K_7 \right]^i \right\}$$

- 39 11.2.10.6 Off-Cycle Sensible Heat Loss.** In Section 11.2.10.6 the nomenclature for $M_{F,P}$ should be replaced as follows:

$M_{F,P}$ = rate of flue gas mass flow during the off-period during the post-purge after the burner is shut off as defined in Section 11.6.3

- 40 11.2.10.8 OFF-Cycle Infiltration Heat Loss.** In Section 11.2.10.8 for systems numbered 2, 3, and 4 for cases where t_p is intended to be less than or equal to 3 minutes, the equation for $L_{I,OFF1}$ should be:

$$L_{I,OFF1} = 100 * C_p * M_{F,P} * t_p * (T_{F,SS} + T_{abs}) * \left[\frac{1}{t_{ON} \frac{Q_{IN}}{60}} \right] * \left[\frac{T_{IA} - T_{OA}}{C_{TS}(T_{F,SS} - T_{F,OFF}(t_p))} \right] * \ln \left[\frac{T_{RA} + T_{abs} + C_{TS}(T_{F,SS} - T_{RA})}{T_{RA} + T_{abs} + C_{TS}(T_{F,OFF}(t_p) - T_{RA})} \right]$$

The nomenclature for $M_{F,P}$ should be replaced as follows:

$M_{F,P}$ = rate of flue gas mass flow during the off-period during the post-purge after the

- 42 11.3.11.1 Latent Heat Gain under Part-Load Conditions.** In the equation for L_G change “ h_g ” to “ h_{fg} ”.
- 44 11.4.8.3 Average Outdoor Temperature.** In the two equations for $T_{OA,H}$ in Section 11.4.8.3 delete the square bracket “[“ from each of the equations identified below in red text.

$$T_{OA,H}(T_C \text{ in } ^\circ\text{F}) = 6.86 \times 10^{-7} (T_C)^4 - 1.96 \times 10^{-4} (T_C)^3 + [1.08 \times 10^{-2} (T_C)^2 + 5.50 \times 10^{-1} (T_C) + 2.33$$

Or for temperature in $^\circ\text{C}$ use the following:

$$T_{OA,H}(T_C \text{ in } ^\circ\text{C}) = 4.00 \times 10^{-6} (T_C)^4 - 3.51 \times 10^{-4} (T_C)^3 - [6.84 \times 10^{-3} (T_C)^2 + 7.29 \times 10^{-1} (T_C) - 3.73$$

- 69-75 Figures E-9 through E-15.** Replace Figures E-9 through E-15 on pages 69 through 75 with the corrected figures shown on the attached pages.

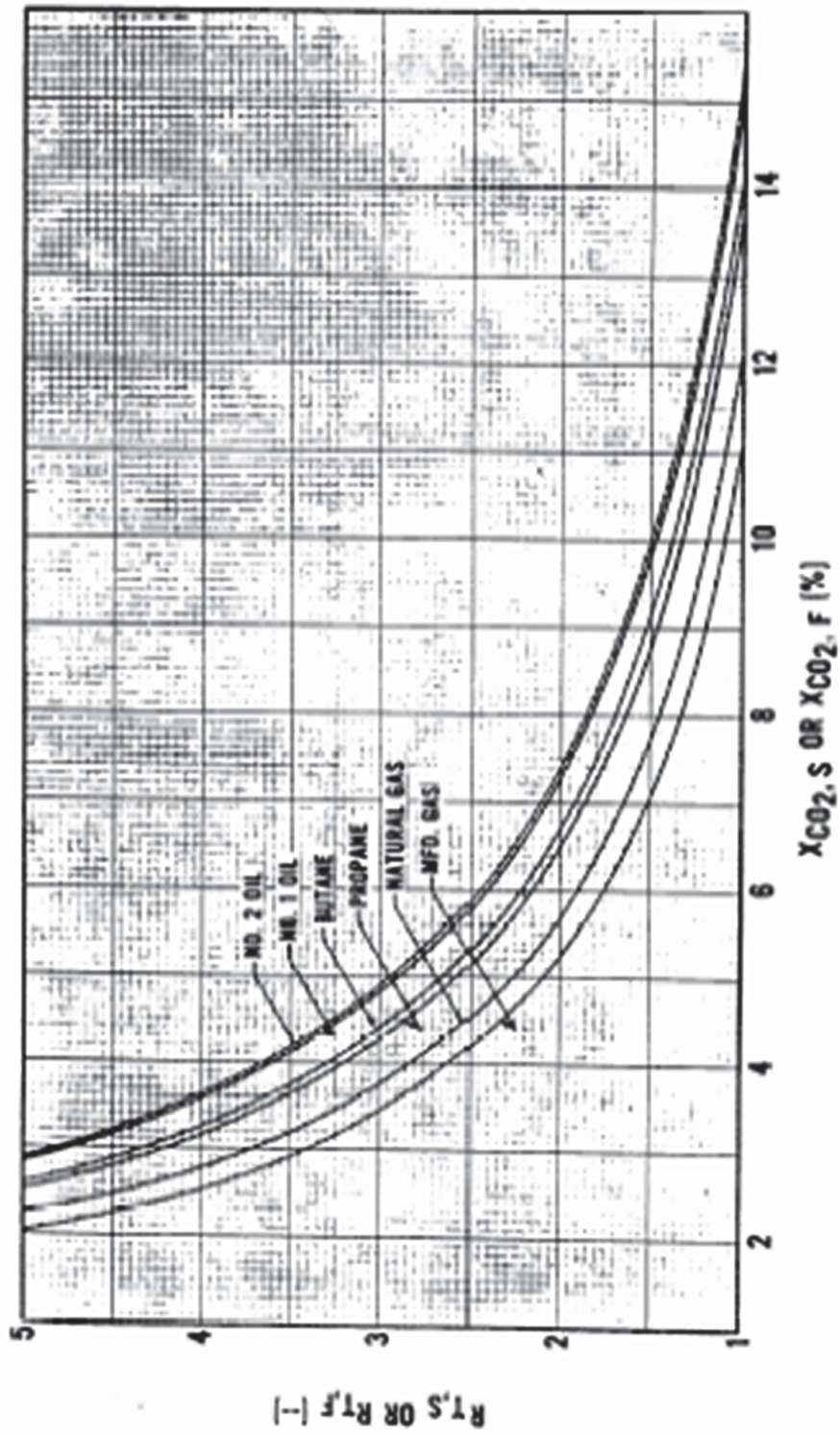


FIGURE E-9 Ratio of total combustion to stoichiometric air versus carbon dioxide (CO_2) concentration.

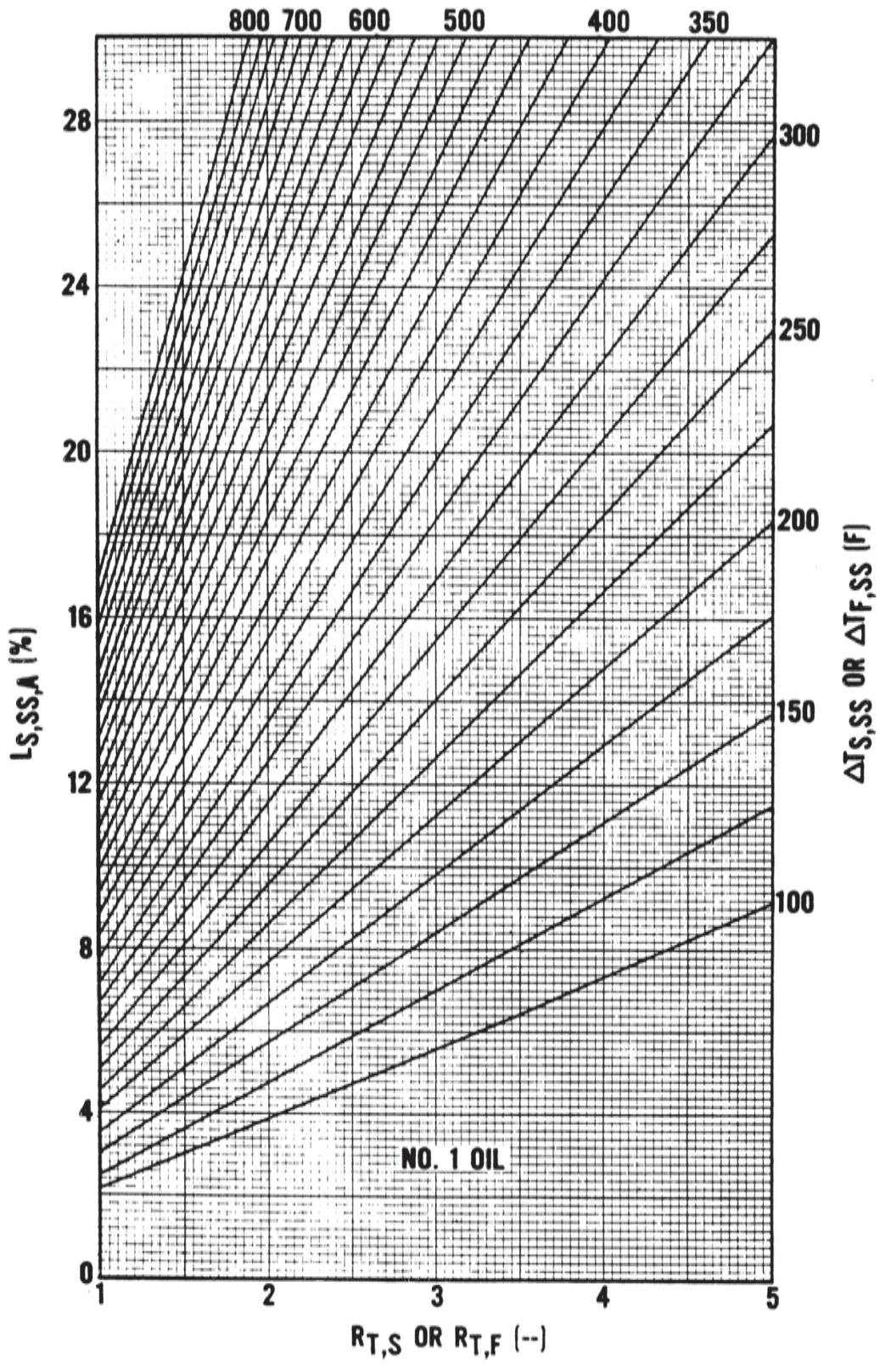


FIGURE E-10 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for No. 1 oil).

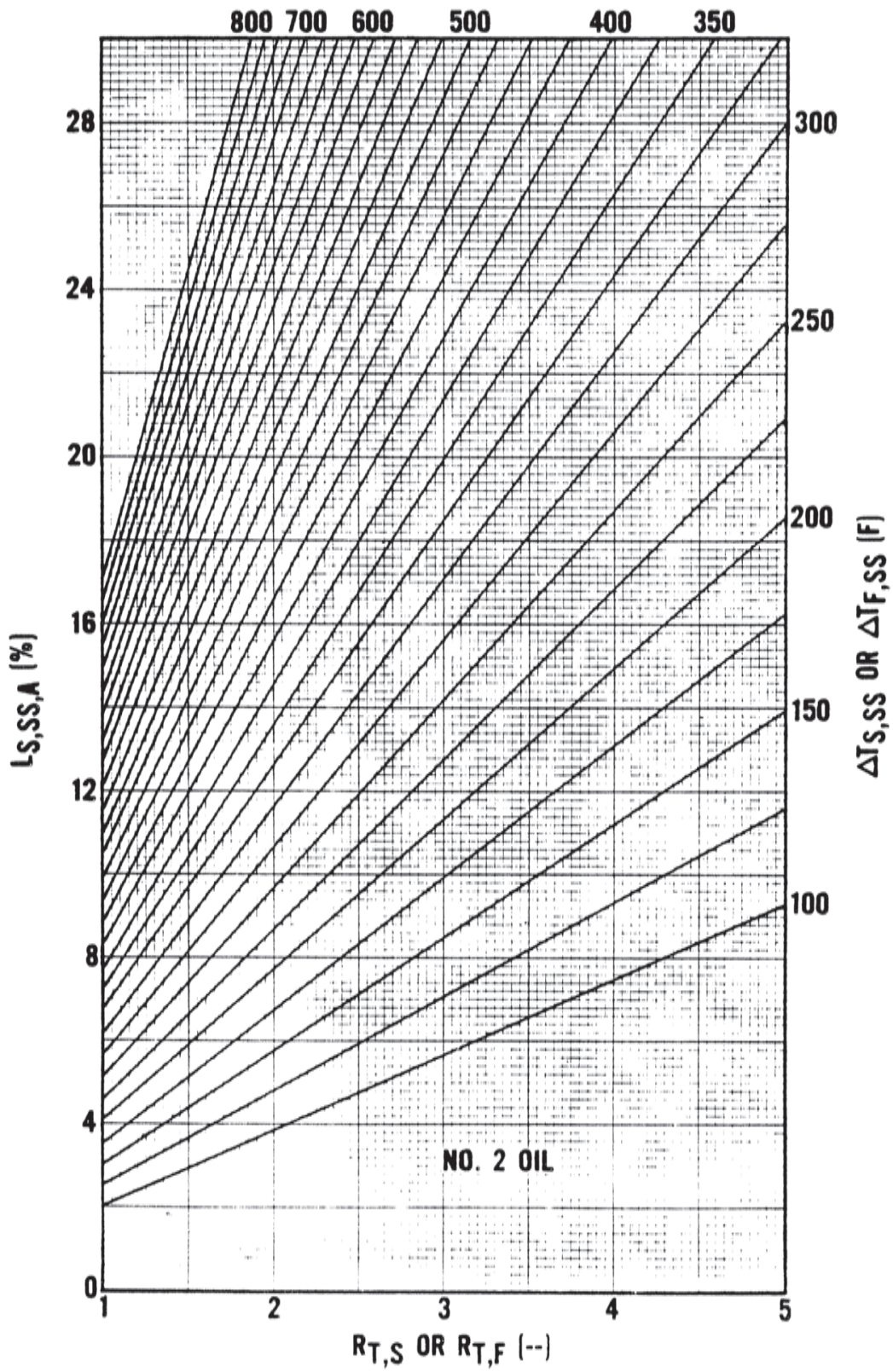


FIGURE E-11 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for No. 2 oil).

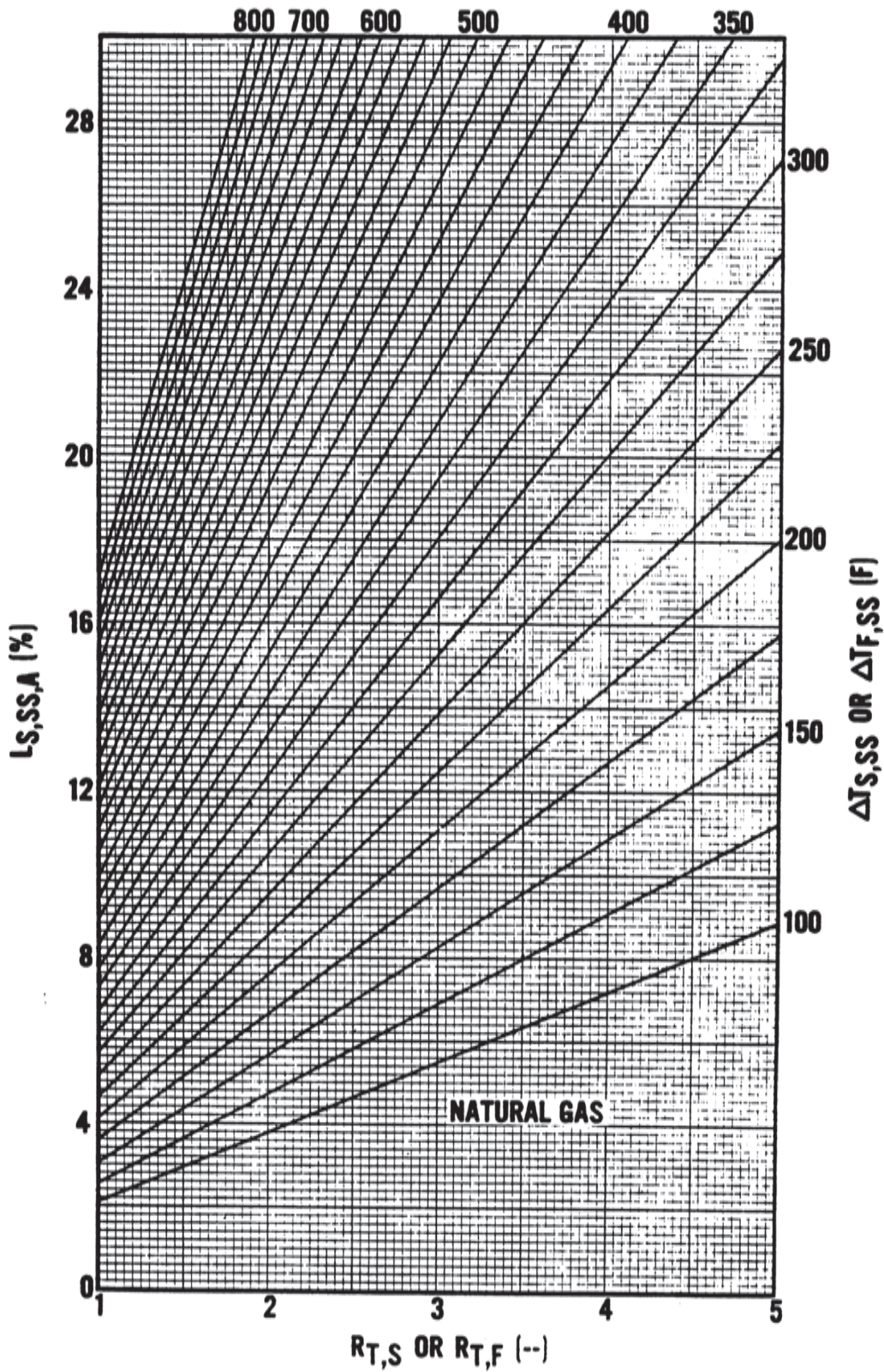


FIGURE E-12 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for natural gas).

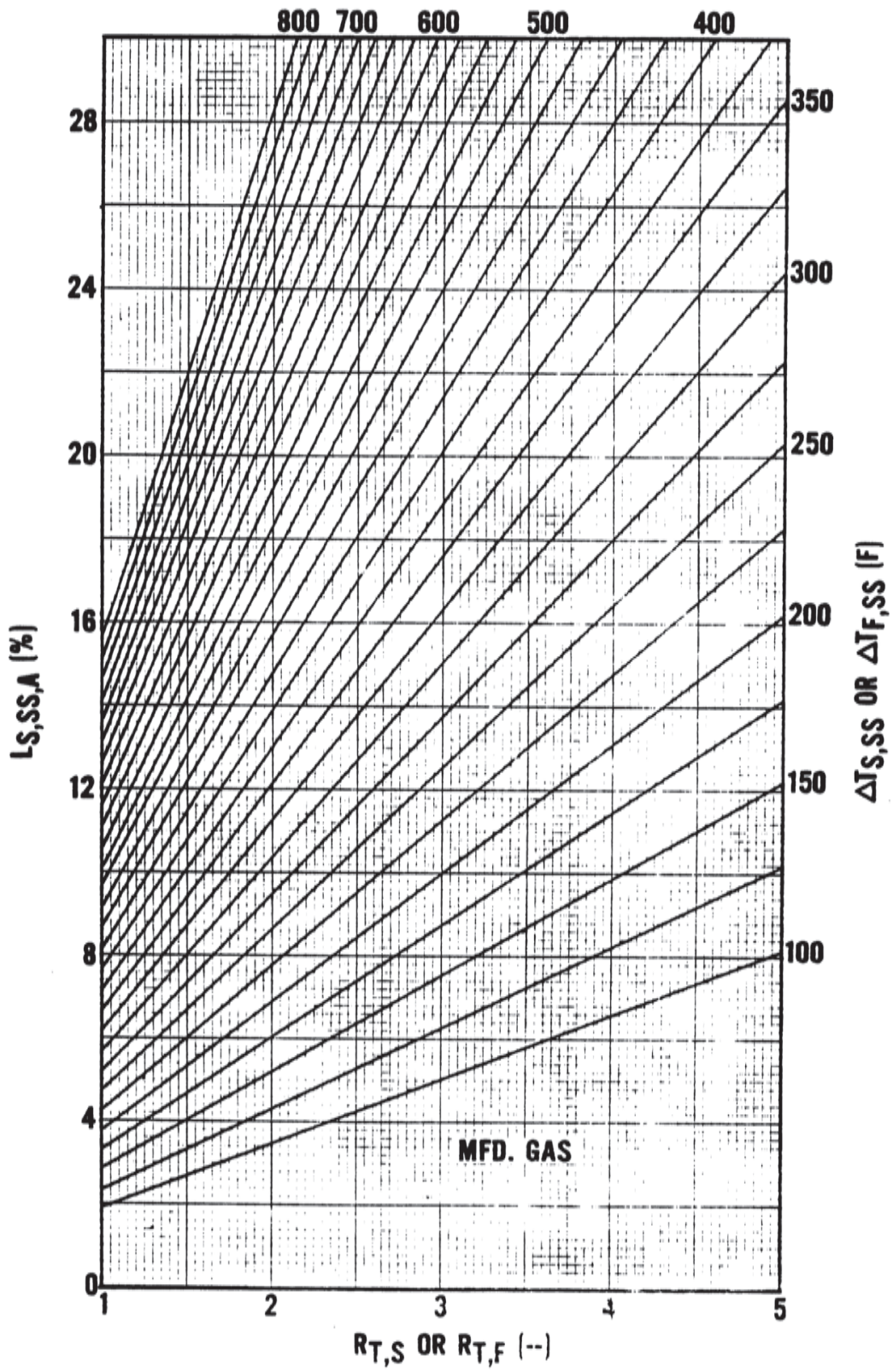


FIGURE E-13 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for manufactured gas).

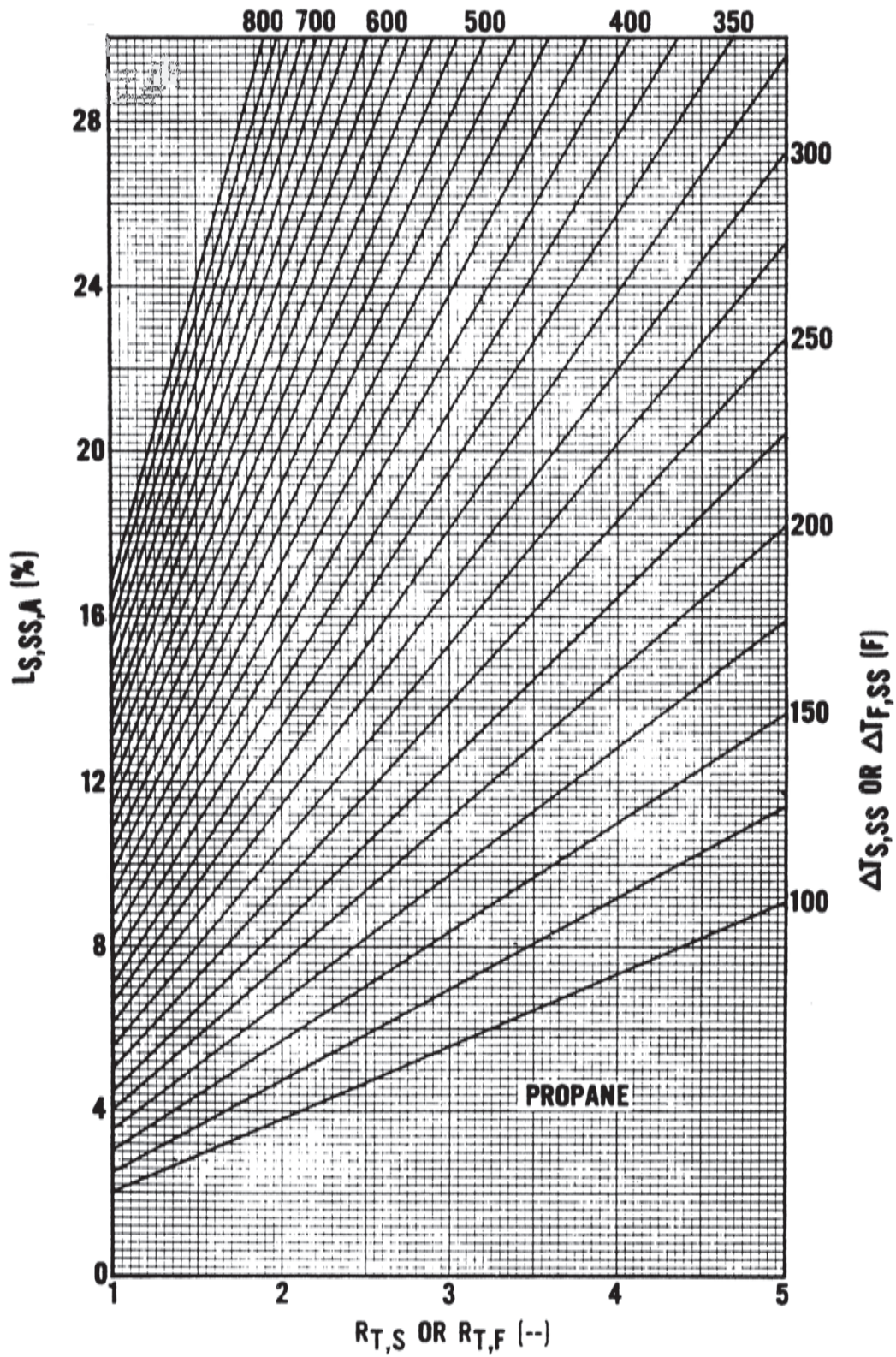


FIGURE E-14 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for propane).

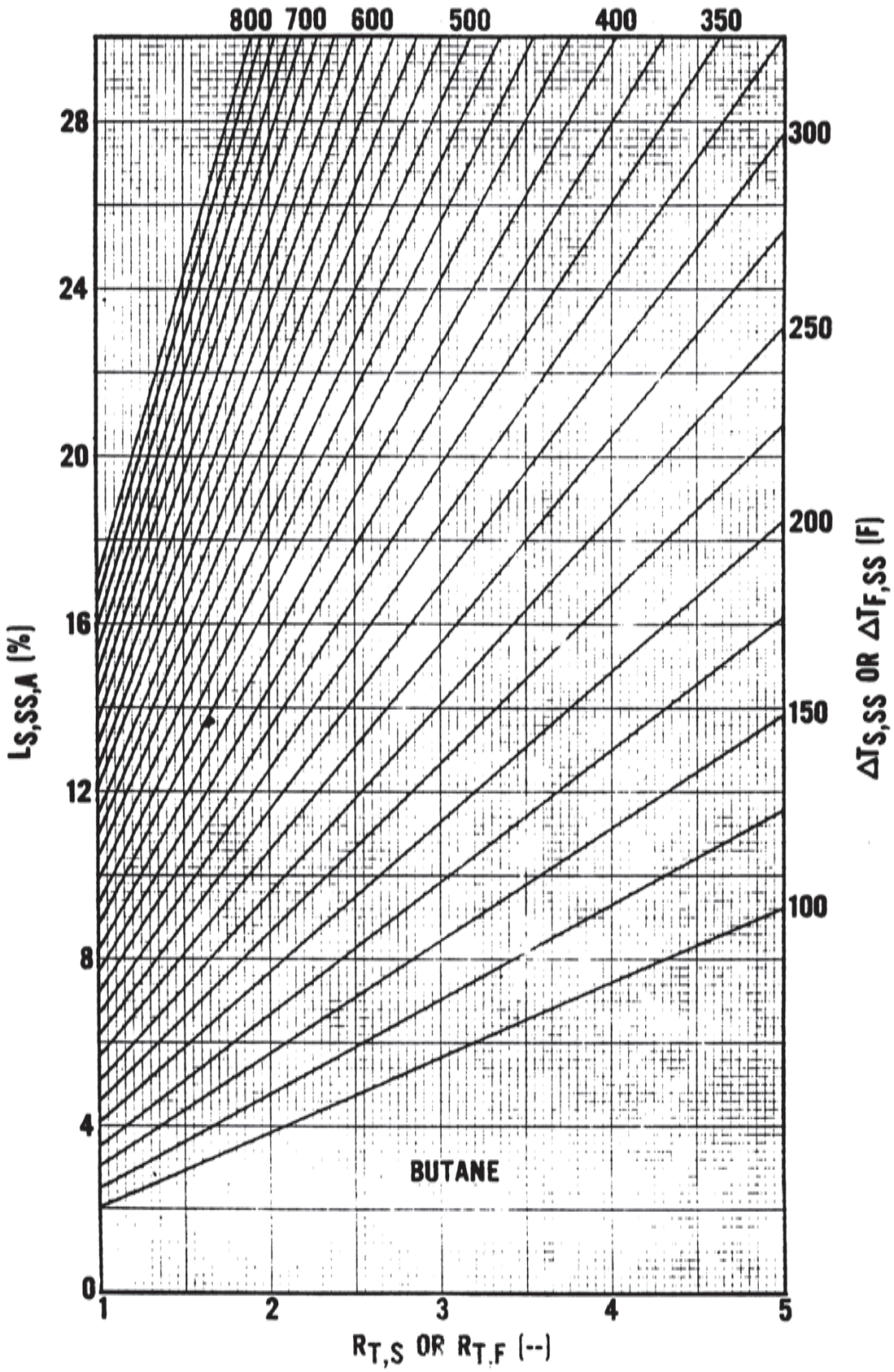


Figure E-15 Steady-state sensible heat loss versus ratio of total combustion to stoichiometric air (for butane).