

Data Extrapolation Methods

8.D3 This problem asks that we compute the maximum allowable stress level to give a rupture lifetime of 20 days for an S-590 iron component at 923 K. It is first necessary to compute the value of the Larson-Miller parameter as follows:

$$\begin{aligned} T(20 + \log t_r) &= (923 \text{ K})\{20 + \log [(20 \text{ days})(24 \text{ h/day})]\} \\ &= 20.9 \times 10^3 \end{aligned}$$

From the curve in Figure 8.32, this value of the Larson-Miller parameter corresponds to a stress level of about 280 MPa (40,000 psi).