Shrinkage

10 cm x 20 cm x 10 cm

$S_V = 23\%$

$R + T + L = S_V$ $\quad L = 0$ $\quad T = 2R$

$R + 2R + 0 = 23\%$

$\frac{3R}{3} = \frac{23\%}{3}$

$\boxed{R = 7.6666667\%}$ — Radial shrinkage

$T = 23\% - 7.6666667\%$

$\boxed{T = 15.333333\%}$ — tangential shrinkage

Formula Derivation for final dimension

Dimensional shrinkage — $S_{D,\%} = \frac{D_i - D_f}{D_i} \times 100$

$\frac{S_{D,\%}}{100} = \frac{D_i - D_f}{D_i}$

$\frac{S_{D,\%}}{100} = 1 - \frac{D_f}{D_i}$

$\left(\frac{S_{D,\%}}{100} - 1 = -\frac{D_f}{D_i}\right) D_i$

$\left[D_i\left(\frac{S_{D,\%}}{100} - 1\right) = -D_f\right] -1$

$\boxed{D_f = -D_i\left(\frac{S_{D,\%}}{100} - 1\right)}$

Solving for final Radial Dimension

$R_i = 10$ cm

$R_f = -R_i\left(\frac{S_{R,\%}}{100} - 1\right)$

$R_f = -(10\text{cm})\left(\frac{7.6666667}{100} - 1\right)$

$\boxed{R_f = 9.23 \text{ cm}}$

Solving for final Tangential Dimension

$T_f = -T_i\left(\frac{S_{T,\%}}{100} - 1\right)$

$T_f = -(20\text{cm})\left(\frac{15.3333}{100} - 1\right)$

$\boxed{T_f = 16.93 \text{ cm}}$

Final Dimension After Shrinkage

9.23 cm x 16.93 cm x 100 cm