

MPG No. 15.8.136 4'/mm'm (4'/mmm' setting) [ Type III, tetragonal ] [T tensor]

\* Rank 0 tensor. \* Rank 1 tensor. \* Rank 2 tensor (s).

$$\begin{bmatrix} T_{xx} & 0 & 0 \\ 0 & -T_{xx} & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{xx} = T_{dv}^{(1)}$$

\* Rank 2 tensor (a). \* Rank 3 tensor (s). \* Rank 3 tensor (a). \* Rank 4 tensor (sss).

$$\begin{bmatrix} T_{xxxx} & 0 & T_{xxzz} & 0 & 0 & 0 \\ 0 & -T_{xxxx} & -T_{xxzz} & 0 & 0 & 0 \\ T_{xxzz} & -T_{xxzz} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & -T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxxx} = 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)}$$

$$T_{xxzz} = T_{dv}^{(1)} - T_{gv}^{(1)}$$

$$T_{yzyz} = -T_{dv}^{(2)} + T_{gv}^{(1)}$$

\* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & T_{xxyy} & T_{xxzz} & 0 & 0 & 0 \\ -T_{xxyy} & 0 & -T_{xxzz} & 0 & 0 & 0 \\ -T_{xxzz} & T_{xxzz} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxyy} = 4M_{f3}^{(1)} - 2T_{dv}^{(3)}$$

$$T_{xxzz} = -4M_{f3}^{(1)} - T_{dv}^{(3)}$$

\* Rank 4 tensor (aas).

$$\begin{bmatrix} T_{yzyz} & 0 & 0 \\ 0 & -T_{yzyz} & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{yzyz} = 2T_{dv}^{(4)}$$

\* Rank 4 tensor (aaa). \* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ T_{yzyz} & 0 & 0 \\ 0 & T_{yzyz} & 0 \\ 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$T_{yzyz} = M_{f3}^{(2)} - T_{dv}^{(5)}$$

$$T_{xyxy} = M_{f3}^{(2)} + 2T_{dv}^{(5)}$$

\* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$T_{yzyz} = M_{f3}^{(3)} - T_{dv}^{(6)}$$

$$T_{xyxy} = M_{f3}^{(3)} + 2T_{dv}^{(6)}$$

\* Rank 4 tensor (s).

$$\begin{bmatrix} T_{xxxx} & T_{xxyy} & T_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ -T_{xxyy} & -T_{xxxx} & -T_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ T_{zzxx} & -T_{zzxx} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & -T_{yzyz} & 0 & 0 & -T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} & 0 & 0 & -T_{xyxy} \end{bmatrix}$$

$$T_{xxxx} = 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)}$$

$$T_{xxyy} = 4M_{f3}^{(1)} - 2T_{dv}^{(3)}$$

$$T_{xxzz} = -4M_{f3}^{(1)} + T_{dv}^{(1)} - T_{dv}^{(3)} - T_{gv}^{(1)}$$

$$T_{zzxx} = 4M_{f3}^{(1)} + T_{dv}^{(1)} + T_{dv}^{(3)} - T_{gv}^{(1)}$$

$$T_{yzyz} = M_{f3}^{(2)} - T_{dv}^{(2)} - T_{dv}^{(5)} + T_{gv}^{(1)}$$

$$T_{yzyz} = -M_{f3}^{(2)} - T_{dv}^{(2)} + T_{dv}^{(5)} + T_{gv}^{(1)}$$

$$T_{xyxy} = M_{f3}^{(2)} + 2T_{dv}^{(5)}$$

\* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} & 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$T_{yzyz} = M_{f3}^{(3)} + 2T_{dv}^{(4)} - T_{dv}^{(6)}$$

$$T_{yzyz} = M_{f3}^{(3)} - 2T_{dv}^{(4)} - T_{dv}^{(6)}$$

$$T_{xyxy} = M_{f3}^{(3)} + 2T_{dv}^{(6)}$$

\* Rank 4 tensor (t).

$$\begin{bmatrix} T_{xxxx} & 0 & 0 \\ 0 & -T_{xxxx} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & T_{yyzz} \\ T_{zzxx} & 0 & 0 \\ 0 & -T_{yyzz} - T_{zzxx} & 0 \\ 0 & T_{yzyz} & 0 \\ 0 & 0 & T_{zzxx} \\ -T_{yzyz} - T_{zzxx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxxx} = 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)}$$

$$T_{yyzz} = -T_{dv}^{(1)} + T_{dv}^{(3)} + T_{gv}^{(1)}$$

$$T_{zzxx} = T_{dv}^{(1)} + T_{dv}^{(3)} - T_{gv}^{(1)}$$

$$T_{yzyz} = -T_{dv}^{(2)} + T_{dv}^{(5)} + T_{gv}^{(1)}$$

$$T_{zzxx} = T_{dv}^{(2)} + T_{dv}^{(5)} - T_{gv}^{(1)}$$