MPG No. 33.4.134 $\bar{4}'2m'$ (-4'm'2 setting) [Type III, tetragonal] [M tensor]

* Rank 0 tensor.

$$[M]$$

$$M = M_s^{(1)}$$

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

$$\begin{bmatrix} M_{xx} & 0 & 0 \\ 0 & M_{xx} & 0 \\ 0 & 0 & M_{zz} \end{bmatrix}$$

$$M_{xx} = -M_{du}^{(1)} + M_s^{(1)}$$
$$M_{zz} = 2M_{du}^{(1)} + M_s^{(1)}$$

* Rank 2 tensor (a). * Rank 3 tensor (s).

$$\begin{bmatrix} 0 & 0 & M_{xxz} \\ 0 & 0 & -M_{xxz} \\ 0 & 0 & 0 \\ 0 & M_{yzy} & 0 \\ -M_{yzy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxz} = M_{fbz}^{(1)} - 2T_{dxy}^{(1)}$$
$$M_{yzy} = -M_{fbz}^{(1)} - T_{dxy}^{(1)}$$

* Rank 3 tensor (a).

$$\begin{bmatrix} 0 & M_{yzy} & 0 \\ M_{yzy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{yzy} = T_{dxy}^{(2)}$$

* Rank 4 tensor (sss).

$$\begin{bmatrix} M_{xxxx} & M_{xxyy} & M_{xxzz} & 0 & 0 & 0 \\ M_{xxyy} & M_{xxxx} & M_{xxzz} & 0 & 0 & 0 \\ M_{xxzz} & M_{xxzz} & M_{zzzz} & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{xyxy} \end{bmatrix}$$

$$M_{xxxx} = -2M_{du}^{(1)} - 4M_{du}^{(2)} - M_{gu}^{(1)} + 2M_g^{(1)} + M_s^{(1)} + 2M_s^{(2)}$$
$$M_{xxyy} = -2M_{du}^{(1)} + 2M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{xxzz} = M_{du}^{(1)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{zzzz} = 4M_{du}^{(1)} + 8M_{du}^{(2)} + 2M_{gu}^{(1)} + 2M_g^{(1)} + M_s^{(1)} + 2M_s^{(2)}$$
$$M_{yzyz} = M_{du}^{(2)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(2)}$$
$$M_{xyxy} = -2M_{du}^{(2)} + 2M_{gu}^{(1)} - M_g^{(1)} + M_s^{(2)}$$

* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & 0 & M_{xxzz} & 0 & 0 & 0 \\ 0 & 0 & M_{xxzz} & 0 & 0 & 0 \\ -M_{xxzz} & -M_{xxzz} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxzz} = 3M_{du}^{(3)}$$

* Rank 4 tensor (aas).

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

$$M_{yzyz} = -2M_{du}^{(4)} + M_{s}^{(3)}$$
$$M_{xyxy} = 4M_{du}^{(4)} + M_{s}^{(3)}$$

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

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

$$M_{yzyz} = -3M_{du}^{(5)}$$

* Rank 4 tensor (as).

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

$$M_{yzyz} = -3M_{du}^{(6)}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} M_{xxxx} & M_{xxyy} & M_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ M_{xxyy} & M_{xxxx} & M_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ M_{zzxx} & M_{zzxx} & M_{zzzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzzy} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzzy} & 0 & 0 & M_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{xyxy} & 0 & 0 & M_{xyxy} \end{bmatrix}$$

$$M_{xxxx} = -2M_{du}^{(1)} - 4M_{du}^{(2)} - M_{gu}^{(1)} + 2M_{g}^{(1)} + M_{s}^{(1)} + 2M_{s}^{(2)}$$
$$M_{xxyy} = -2M_{du}^{(1)} + 2M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(1)}$$
$$M_{xxzz} = M_{du}^{(1)} + 3M_{du}^{(3)} - M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(1)}$$
$$M_{zzxx} = M_{du}^{(1)} - 3M_{du}^{(3)} - M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(1)}$$
$$M_{zzzz} = 4M_{du}^{(1)} + 8M_{du}^{(2)} + 2M_{gu}^{(1)} + 2M_{g}^{(1)} + M_{s}^{(1)} + 2M_{s}^{(2)}$$
$$M_{yzyz} = M_{du}^{(2)} - 3M_{du}^{(5)} - M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(2)}$$
$$M_{yzzy} = M_{du}^{(2)} + 3M_{du}^{(5)} - M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(2)}$$
$$M_{xyxy} = -2M_{du}^{(2)} + 2M_{gu}^{(1)} - M_{g}^{(1)} + M_{s}^{(2)}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzzy} & 0 & 0 \\ 0 & 0 & 0 & 0 & -M_{yzzy} & 0 & 0 & -M_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{xyxy} & 0 & 0 & -M_{xyxy} \end{bmatrix}$$

$$M_{yzyz} = -2M_{du}^{(4)} - 3M_{du}^{(6)} + M_s^{(3)}$$
$$M_{yzzy} = 2M_{du}^{(4)} - 3M_{du}^{(6)} - M_s^{(3)}$$
$$M_{xyxy} = 4M_{du}^{(4)} + M_s^{(3)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} & M_{xxxx} & & 0 & 0 \\ & 0 & & M_{xxxx} & 0 \\ & 0 & & 0 & M_{zzzz} \\ & 0 & & 0 & M_{yyzz} \\ & M_{zzxx} & & 0 & 0 \\ & 0 & & M_{xxyy} & 0 \\ & 0 & & M_{yzzy} & 0 \\ & 0 & & 0 & M_{zxxz} \\ M_{xxyy} + M_{yyzz} - M_{yzzy} - M_{zxxz} + M_{zzxx} & & & 0 & 0 \\ & 0 & & 0 & 0 \end{bmatrix}$$

$$M_{xxxx} = -2M_{du}^{(1)} - 4M_{du}^{(2)} - M_{gu}^{(1)} + 2M_g^{(1)} + 3M_s^{(1)}$$
$$M_{zzzz} = 4M_{du}^{(1)} + 8M_{du}^{(2)} + 2M_{gu}^{(1)} + 2M_g^{(1)} + 3M_s^{(1)}$$
$$M_{yyzz} = M_{du}^{(1)} + 3M_{du}^{(3)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{zzxx} = M_{du}^{(1)} - 3M_{du}^{(3)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{xxyy} = -2M_{du}^{(1)} + 2M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{yzzy} = M_{du}^{(2)} + 3M_{du}^{(5)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$
$$M_{zxxz} = M_{du}^{(2)} - 3M_{du}^{(5)} - M_{gu}^{(1)} - M_g^{(1)} + M_s^{(1)}$$