

MSG No. 141.559 $I4_1/a'm'd'$ [Type III, tetragonal]

* symmetry operation

Table 1: Symmetry operations for 3d polar vector.

No.	tag	matrix (polar)	det	TR
1	{1 0}	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	1	1
2	{4 ⁺ ₀₀₁ $\frac{1}{4}\frac{3}{4}\frac{1}{4}$ }	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{4} \\ 1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & 1 & \frac{1}{4} \end{bmatrix}$	1	1
3	{4 ⁻ ₀₀₁ $\frac{3}{4}\frac{3}{4}\frac{1}{4}$ }	$\begin{bmatrix} 0 & 1 & 0 & \frac{3}{4} \\ -1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & 1 & \frac{1}{4} \end{bmatrix}$	1	1
4	{2 ₁₀₀ 0}	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$	1	1
5	{2 ₀₁₀ 0 $\frac{1}{2}0$ }	$\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$	1	1
6	{2 ₀₀₁ 0 $\frac{1}{2}0$ }	$\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$	1	1
7	{2 ₁₁₀ $\frac{3}{4}\frac{1}{4}\frac{3}{4}$ }	$\begin{bmatrix} 0 & 1 & 0 & \frac{3}{4} \\ 1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & -1 & \frac{3}{4} \end{bmatrix}$	1	1
8	{2 ₁₋₁₀ $\frac{1}{4}\frac{1}{4}\frac{3}{4}$ }	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{4} \\ -1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & -1 & \frac{3}{4} \end{bmatrix}$	1	1
9	{-1' 0}	$\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$	-1	-1
10	{-4 ⁺ ₀₀₁ ' $\frac{3}{4}\frac{1}{4}\frac{3}{4}$ }	$\begin{bmatrix} 0 & 1 & 0 & \frac{3}{4} \\ -1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & -1 & \frac{3}{4} \end{bmatrix}$	-1	-1
11	{-4 ⁻ ₀₀₁ ' $\frac{1}{4}\frac{1}{4}\frac{3}{4}$ }	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{4} \\ 1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & -1 & \frac{3}{4} \end{bmatrix}$	-1	-1
12	{m ₁₀₀ ' 0}	$\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	-1	-1
13	{m ₀₁₀ ' 0 $\frac{1}{2}0$ }	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$	-1	-1

continued ...

Table 1

No.	tag	matrix (polar)	det	TR
14	$\{m_{001}' 0\frac{1}{2}0\}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$	-1	-1
15	$\{m_{110}' \frac{1}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{4} \\ -1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & 1 & \frac{1}{4} \end{bmatrix}$	-1	-1
16	$\{m_{1-10}' \frac{3}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & 1 & 0 & \frac{3}{4} \\ 1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & 1 & \frac{1}{4} \end{bmatrix}$	-1	-1
17	$\{1 \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	1	1
18	$\{4_{001}^+ \frac{3}{4}\frac{1}{4}\frac{3}{4}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{3}{4} \\ 1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 1 & \frac{3}{4} \end{bmatrix}$	1	1
19	$\{4_{001}^- \frac{1}{4}\frac{1}{4}\frac{3}{4}\}$	$\begin{bmatrix} 0 & 1 & 0 & \frac{1}{4} \\ -1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 1 & \frac{3}{4} \end{bmatrix}$	1	1
20	$\{2_{100} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$	1	1
21	$\{2_{010} \frac{1}{2}0\frac{1}{2}\}$	$\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$	1	1
22	$\{2_{001} \frac{1}{2}0\frac{1}{2}\}$	$\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	1	1
23	$\{2_{110} \frac{1}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & 1 & 0 & \frac{1}{4} \\ 1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & -1 & \frac{1}{4} \end{bmatrix}$	1	1
24	$\{2_{1-10} \frac{3}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{3}{4} \\ -1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & -1 & \frac{1}{4} \end{bmatrix}$	1	1
25	$\{-1' \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$	$\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$	-1	-1
26	$\{-4_{001}^+ \frac{1}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & 1 & 0 & \frac{1}{4} \\ -1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & -1 & \frac{1}{4} \end{bmatrix}$	-1	-1
27	$\{-4_{001}^- \frac{3}{4}\frac{3}{4}\frac{1}{4}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{3}{4} \\ 1 & 0 & 0 & \frac{3}{4} \\ 0 & 0 & -1 & \frac{1}{4} \end{bmatrix}$	-1	-1

continued ...

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No.	tag	matrix (polar)	det	TR
28	$\{m_{100}' \frac{1}{2} \frac{1}{2} \frac{1}{2}\}$	$\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	-1	-1
29	$\{m_{010}' \frac{1}{2} 0 \frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	-1	-1
30	$\{m_{001}' \frac{1}{2} 0 \frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$	-1	-1
31	$\{m_{110}' \frac{3}{4} \frac{1}{4} \frac{3}{4}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{3}{4} \\ -1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 1 & \frac{3}{4} \end{bmatrix}$	-1	-1
32	$\{m_{1-10}' \frac{1}{4} \frac{1}{4} \frac{3}{4}\}$	$\begin{bmatrix} 0 & 1 & 0 & \frac{1}{4} \\ 1 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 1 & \frac{3}{4} \end{bmatrix}$	-1	-1