

Tetragonal

6. SCANNING TABLES

 Laue class  $D_{4h} - 4/mmm$ 

 No. 110  $I4_1cd$ 

$$\mathcal{G} = I4_1cd$$

 $C_{4v}^{12}$ 

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(\mathbf{sd})$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$I4_1cd$	$[\mathbf{sd}, (s + \frac{1}{4})\mathbf{d}, (s + \frac{1}{2})\mathbf{d}, (s + \frac{3}{4})\mathbf{d}]$	$pb2$	L25
(100)	<b>b</b> <b>c</b> <b>a</b>	$Ic2a$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pb2b$	L30
(010)	$-\mathbf{a}$ <b>c</b> <b>b</b>		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$pb2_1a$ ( $\mathbf{a}'/4$ ) $pb11$	L33 L12
(110)	$(-\mathbf{a}+\mathbf{b})$ <b>c</b> $(\mathbf{a}+\mathbf{b})$	$Fd2d$ $[(\mathbf{a}' + \mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}, \frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d}, \frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{4})\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}, (\pm s + \frac{3}{4})\mathbf{d}]$	$c121$ $c121$ ( $\mathbf{a}'/4$ ) $\widehat{p}11a$ ( $\mathbf{a}'/4$ ) $\widehat{p}11b$ ( $\mathbf{a}'/4$ )	L10 L10 L05 L05
( $\bar{1}\bar{1}0$ )	$(\mathbf{a}+\mathbf{b})$ <b>c</b> $(\mathbf{a}-\mathbf{b})$		$Fd2d$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}, \frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d}, \frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{4})\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}, (\pm s + \frac{3}{4})\mathbf{d}]$	$c121$ $c121$ ( $\mathbf{a}'/4$ ) $\widehat{p}11b$ $\widehat{p}11a$ $p1$

**Geometric classes  $D_{2d} - \bar{4}2m$  and  $\bar{4}m2$** 

 No. 111  $P\bar{4}2m$ 

$$\mathcal{G} = P\bar{4}2m$$

 $D_{2d}^1$ 

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(\mathbf{sd})$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$P\bar{4}2m$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\mathbf{sd}, -\mathbf{sd}]$	$p\bar{4}2m$ $\widehat{c}mm2$	L57 L26
(100)	<b>b</b> <b>c</b> <b>a</b>	$P222$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$	$p222$	L19
(010)	$-\mathbf{a}$ <b>c</b> <b>b</b>		$[\mathbf{sd}, -\mathbf{sd}]$	$p112$	L03
(110)	$(-\mathbf{a}+\mathbf{b})$ <b>c</b> $(\mathbf{a}+\mathbf{b})$	$Bm2m$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pm2m$	L27
( $\bar{1}\bar{1}0$ )	$(\mathbf{a}+\mathbf{b})$ <b>c</b> $(\mathbf{a}-\mathbf{b})$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$pm2a$ ( $\mathbf{a}'/4$ ) $pm11$	L31 L11

No. 142  $I4_1/acd$

$$\mathcal{G} = I_{a c d}^{4, 2, 2} \text{ origin } 2$$

$D_{4h}^{20}$

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(sd)$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$I4_1/acd$ (origin 2)	$[0d, \frac{1}{2}d;$ $\frac{1}{4}d, \frac{3}{4}d]$ $[\frac{1}{8}d, \frac{5}{8}d;$ $\frac{3}{8}d, \frac{7}{8}d]$ $[\pm sd, (\pm s + \frac{1}{4})d,$ $(\pm s + \frac{1}{2})d, (\pm s + \frac{3}{4})d]$	<i>pbab</i> <i>pbaa</i> [( <b>a</b> + <b>b</b> )/4] <i>p<math>\bar{4}</math>b2</i> (3 <b>b</b> /4) <i>p<math>\bar{4}</math>b2</i> ( <b>b</b> /4) <i>pba2</i> ( <b>b</b> /4)	L43 L43 L60 L60 L25
(100)	<b>b</b> <b>c</b> <b>a</b>	<i>Ibca</i>	$[0d, \frac{1}{2}d]$ $[\frac{1}{4}d, \frac{3}{4}d]$ $[\pm sd, (\pm s + \frac{1}{2})d]$	<i>pbab</i> <i>pbaa</i> [( <b>a'</b> + <b>b'</b> )/4] <i>pba2</i> ( <b>b'</b> /4)	L43 L43 L25
(010)	<b>-a</b> <b>c</b> <b>b</b>	<i>Ibca</i> [( <b>a'</b> + <b>b'</b> + <b>d</b> )/4]	$[0d, \frac{1}{2}d]$ $[\frac{1}{4}d, \frac{3}{4}d]$ $[\pm sd, (\pm s + \frac{1}{2})d]$	<i>pbaa</i> <i>pbab</i> [( <b>a'</b> + <b>b'</b> )/4] <i>pba2</i> ( <b>a'</b> /4)	L43 L43 L25
(110)	<b>(-a+b)</b> <b>c</b> <b>(a+b)</b>	<i>Fddd</i> (or. 1) [3( <b>a'</b> + <b>b'</b> + <b>d</b> )/8] or <i>Fddd</i> (or. 2)	$[0d, \frac{1}{2}d;$ $\frac{1}{4}d, \frac{3}{4}d]$ $[\frac{1}{8}d, \frac{5}{8}d;$ $\frac{3}{8}d, \frac{7}{8}d]$ $[\pm sd, (\pm s + \frac{1}{4})d;$ $(\pm s + \frac{1}{2})d, (\pm s + \frac{3}{4})d]$	$\widehat{p}112/b$ $\widehat{p}112/a$ ( <b>a'</b> /4 or <b>b'</b> /4) <i>c222</i> [( <b>a'</b> + <b>b'</b> )/8] <i>c222</i> [3( <b>a'</b> + <b>b'</b> )/8]	L16 L16 L22 L22
( $\bar{1}\bar{1}0$ )	<b>(a+b)</b> <b>c</b> <b>(a-b)</b>	<i>Fddd</i> (or. 1) [( <b>a'</b> + <b>b'</b> + 3 <b>d</b> )/8] or <i>Fddd</i> (or. 2) [( <b>a'</b> + <b>b'</b> )/4]	$[0d, \frac{1}{2}d;$ $\frac{1}{4}d, \frac{3}{4}d]$ $[\frac{1}{8}d, \frac{5}{8}d;$ $\frac{3}{8}d, \frac{7}{8}d]$ $[\pm sd, (\pm s + \frac{1}{4})d;$ $(\pm s + \frac{1}{2})d, (\pm s + \frac{3}{4})d]$	$\widehat{p}112/b$ $\widehat{p}112/a$ ( <b>a'</b> /4 or <b>b'</b> /4) <i>c222</i> [3( <b>a'</b> + <b>b'</b> )/8] <i>c222</i> [( <b>a'</b> + <b>b'</b> )/8] $\widehat{p}112$ [( <b>a'</b> + <b>b'</b> )/8]	L16 L16 L22 L22 L03

**Auxiliary tables for Laue class  $D_{4h} - 4/mmm$**

**Centring type *P***

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>			Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$ $\widehat{\mathbf{b}}$ $\widehat{\mathbf{c}}$		
( <i>mn</i> 0)	<b>c</b>	<b>na - mb</b>	<b>pa + qb</b>	<b>a</b>	<b>b</b>	<b>c</b>
( $\bar{m}$ <i>n</i> 0)	<b>c</b>	<b>ma + nb</b>	<b>-qa + pb</b>			
( $\bar{m}$ $\bar{n}$ 0)	<b>c</b>	<b>na + mb</b>	<b>-pa + qb</b>			
( <i>nm</i> 0)	<b>c</b>	<b>ma - nb</b>	<b>qa + pb</b>			
(0 <i>mn</i> )	<b>a</b>	<b>nb - mc</b>	<b>pb + qc</b>	<b>b</b>	<b>c</b>	<b>a</b>
(0 $\bar{m}$ <i>n</i> )	<b>a</b>	<b>nb + mc</b>	<b>-pb + qc</b>			
( <i>m</i> 0 <i>n</i> )	<b>b</b>	<b>mc - na</b>	<b>qc + pa</b>	<b>c</b>	<b>a</b>	<b>b</b>
( <i>m</i> 0 $\bar{n}$ )	<b>b</b>	<b>mc + na</b>	<b>-qc + pa</b>			
( <i>hhl</i> )	<b>a - b</b>	<b>n(a + b) - mc</b>	<b>p(a + b) + qc</b>	<b>a + b</b>	<b>c</b>	<b>a - b</b>
( $\bar{h}$ <i>hl</i> )	<b>a - b</b>	<b>n(a + b) + mc</b>	<b>-p(a + b) + qc</b>			
( <i>h<math>\bar{h}</math><i>l</i>)</i>	<b>a + b</b>	<b>n(b - a) - mc</b>	<b>p(b - a) + qc</b>	<b>b - a</b>	<b>c</b>	<b>a + b</b>
( $\bar{h}$ $\bar{h}$ <i>l</i> )	<b>a + b</b>	<b>n(b - a) + mc</b>	<b>-p(b - a) + qc</b>			

$l$  odd  $\Rightarrow n = l, m = 2h; l$  even  $\Rightarrow n = l/2, m = h$

Arithmetic class  $422P$

Serial No.	89	90	91	92	93	94	95	96
Group type	$D_4^1$	$D_4^2$	$D_4^3$	$D_4^4$	$D_4^5$	$D_4^6$	$D_4^7$	$D_4^8$
Group	$P422$	$P4_212$	$P4_122$	$P4_12_12$	$P4_222$	$P4_22_12$	$P4_322$	$P4_32_12$
$(mn0)$	$P112$	$P112$	$P112_1$	$P112_1$	$P112$	$P112$	$P112_1$	$P112_1$
$(\bar{m}00)$								
$(\bar{m}n0)$								
$(nm0)$								
$(0mn)$	$P112$	$P112_1$	$P112$	$P112_1$	$P112$	$P112_1$	$P112$	$P112_1$
$(0\bar{m}n)$		$(b/4)$	$(c/4)$	$(b/4 + 3c/8)$		$(b + c)/4$	$(c/4)$	$(b/4 + c/8)$
$(m0n)$		$P112_1$	$P112$	$P112_1$		$P112_1$	$P112$	$P112_1$
$(m0\bar{n})$		$(a/4)$		$(a/4 + c/8)$		$(a + c)/4$		$(a/4 + 3c/8)$
$(hhl)$	$B112$	$B112$	$B112$	$B112$	$B112$	$B112$	$B112$	$B112$
$(\bar{h}\bar{h}l)$			$(c/8)$	$(c/4)$	$(c/4)$		$(3c/8)$	$(c/4)$
$(h\bar{h}l)$			$B112$	$B112$			$B112$	$B112$
$(\bar{h}hl)$			$(3c/8)$				$(c/8)$	

Arithmetic class  $4mmP$

Serial No.	99	100	101	102	103	104	105	106
Group type	$C_{4v}^1$	$C_{4v}^2$	$C_{4v}^3$	$C_{4v}^4$	$C_{4v}^5$	$C_{4v}^6$	$C_{4v}^7$	$C_{4v}^8$
Group	$P4mm$	$P4bm$	$P4_2cm$	$P4_2nm$	$P4cc$	$P4nc$	$P4_2mc$	$P4_2bc$
$(mn0)$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$
$(\bar{m}00)$								
$(\bar{m}n0)$								
$(nm0)$								
$(0mn)$	$P11m$	$P11a$	$P11b$	$P11n$	$P11b$	$P11n$	$P11m$	$P11a$
$(0\bar{m}n)$		$(a/4)$						$(a/4)$
$(m0n)$		$P11b$	$P11a$		$P11a$			$P11b$
$(m0\bar{n})$		$(b/4)$						$(b/4)$
$(hhl)$	$B11m$	$B11m$	$B11m$	$B11m$	$B11b$	$B11b$	$B11b$	$B11b$
$(\bar{h}\bar{h}l)$		$(a - b)/4$				$(a - b)/4$		$(a - b)/4$
$(h\bar{h}l)$		$B11m$				$B11b$		$B11b$
$(\bar{h}hl)$		$(a + b)/4$				$(a + b)/4$		$(a + b)/4$

Arithmetic classes  $\bar{4}2mP$  and  $\bar{4}m2P$

Serial No.	111	112	113	114	115	116	117	118
Group type	$D_{2d}^1$	$D_{2d}^2$	$D_{2d}^3$	$D_{2d}^4$	$D_{2d}^5$	$D_{2d}^6$	$D_{2d}^7$	$D_{2d}^8$
Group	$P\bar{4}2m$	$P\bar{4}2c$	$P\bar{4}2_1m$	$P\bar{4}2_1c$	$P\bar{4}m2$	$P\bar{4}c2$	$P\bar{4}b2$	$P\bar{4}n2$
$(mn0)$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$	$P112$
$(\bar{m}00)$								
$(\bar{m}n0)$								
$(nm0)$								
$(0mn)$	$P112$	$P112$	$P112_1$	$P112_1$	$P11m$	$P11b$	$P11a$	$P11n$
$(0\bar{m}n)$		$(c/4)$	$(b/4)$	$(b + c)/4$			$(a/4)$	$(a/4)$
$(m0n)$			$P112_1$	$P112_1$		$P11a$	$P11b$	$P11n$
$(m0\bar{n})$			$(a/4)$	$(a + c)/4$			$(b/4)$	$(b/4)$
$(hhl)$	$B11m$	$B11b$	$B11m$	$B11b$	$B112$	$B112$	$B112$	$B112$
$(\bar{h}\bar{h}l)$			$(a - b)/4$	$(a - b)/4$		$(c/4)$	$(a + b)/4$	$(a + b + c)/4$
$(h\bar{h}l)$			$B11m$	$B11b$			$B112$	$B112$
$(\bar{h}hl)$			$(a + b)/4$	$(a + b)/4$			$(a - b)/4$	$(a - b + c)/4$