

Tetragonal

6. SCANNING TABLES

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

 No. 121  $\bar{I}42m$ 

$$\mathcal{G} = \bar{I}42m$$

 $D_{2d}^{11}$ 

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>	$\bar{I}42m$	$[\mathbf{0d}, \frac{1}{2}\mathbf{d}]$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p\bar{4}2m$ $p\bar{4}2_1m$ ( <b>a</b> /2 or <b>b</b> /2) $\widehat{c}mm2$	L57 L58 L26
(100) (010)	<b>b</b> <b>c</b> <b>a</b> <b>-a</b> <b>c</b> <b>b</b>	$I222$	$[\mathbf{0d}, \frac{1}{2}\mathbf{d}]$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p222$ $p2_12_12$ $p112$	L19 L21 L03
(110) ( $\bar{1}\bar{1}0$ )	<b>(-a+b)</b> <b>c</b> <b>(a+b)</b> <b>(a+b)</b> <b>c</b> <b>(a-b)</b>	$Fm2m$	$[\mathbf{0d}, \frac{1}{2}\mathbf{d}]$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$cm2m$ $cm2a$ ( <b>a'</b> /4) $cm11$	L35 L36 L13

 No. 122  $\bar{I}42d$ 

$$\mathcal{G} = \bar{I}42d$$

 $D_{2d}^{12}$ 

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>	$\bar{I}42d$	$[\mathbf{0d}, \frac{1}{2}\mathbf{d};$ $\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d};$ $\frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{4})\mathbf{d},$ $(\pm s + \frac{1}{2})\mathbf{d}, (\pm s + \frac{3}{4})\mathbf{d}]$	$p\bar{4}$ $p\bar{4}$ ( <b>a</b> /2 or <b>b</b> /2) $p22_12$ $p2_122$ $p112$	L50 L50 L20 L20 L03
(100) (010)	<b>b</b> <b>c</b> <b>a</b> <b>-a</b> <b>c</b> <b>b</b>	$I2_12_12_1$ ( <b>a'</b> /4 + 3 <b>b'</b> /8) $I2_12_12_1$ ( <b>a'</b> /4 + <b>b'</b> /8)	$[\mathbf{0d}, \frac{1}{2}\mathbf{d}]$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$ $[\mathbf{0d}, \frac{1}{2}\mathbf{d}]$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p2_122$ ( <b>a'</b> /4 + <b>b'</b> /8) $p22_12$ ( <b>a'</b> /4 + <b>b'</b> /8) $p112$ ( <b>a'</b> /4 + <b>b'</b> /8) $p2_122$ ( <b>a'</b> /4 + 3 <b>b'</b> /8) $p22_12$ ( <b>a'</b> /4 + 3 <b>b'</b> /8) $p112$ ( <b>a'</b> /4 + 3 <b>b'</b> /8)	L20 L20 L03 L20 L20 L03
(110) ( $\bar{1}\bar{1}0$ )	<b>(-a+b)</b> <b>c</b> <b>(a+b)</b> <b>(a+b)</b> <b>c</b> <b>(a-b)</b>	$Fd2d$ $Fd2d$ [( <b>a'</b> + <b>d</b> )/4]	$[\mathbf{0d}, \frac{1}{2}\mathbf{d},$ $\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d},$ $\frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{4})\mathbf{d},$ $(\pm s + \frac{1}{2})\mathbf{d}, (\pm s + \frac{3}{4})\mathbf{d}]$ $[\mathbf{0d}, \frac{1}{2}\mathbf{d},$ $\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d},$ $\frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{4})\mathbf{d},$ $(\pm s + \frac{1}{2})\mathbf{d}, (\pm s + \frac{3}{4})\mathbf{d}]$	$c121$ $c121$ ( <b>a'</b> /4) $\widehat{p}11b$ $\widehat{p}11a$ $p1$ $c121$ $c121$ ( <b>a'</b> /4) $\widehat{p}11a$ ( <b>a'</b> /4) $\widehat{p}11b$ ( <b>a'</b> /4) $p1$	L10 L10 L05 L05 L01 L10 L10 L05 L05 L01

Arithmetic class  $4/mmmP$  (cont.)

Serial No.	135	136	137		138	
Group type	$D_{4h}^{13}$	$D_{4h}^{14}$	$D_{4h}^{15}$		$D_{4h}^{16}$	
Group	$P4_2/mbc$	$P4_2/mmm$	$P4_2/nmc$		$P4_2/ncm$	
			Origin 1	Origin 2	Origin 1	Origin 2
$(mn0)$	$P112/m$	$P112/m$	$P112/n$	$P112/n$	$P112/n$	$P112/n$
$(\bar{m}0)$					$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$	
$(\bar{m}\bar{n}0)$						
$(nm0)$						
$(0mn)$	$P112_1/a$	$P112_1/n$	$P112_1/m$	$P112_1/m$	$P112_1/b$	$P112_1/b$
$(0\bar{m}\bar{n})$			$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$		$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$	
$(m0n)$	$P112_1/b$				$P112_1/a$	$P112_1/a$
$(m0\bar{n})$					$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$	
$(hhl)$	$B112/b$	$B112/m$	$B112/b$	$B112/b$	$B112/m$	$B112/m$
$(\bar{h}\bar{h}l)$	$(\mathbf{a}/2 \text{ or } \mathbf{b}/2)$		$(\mathbf{a} - \mathbf{b} + \mathbf{c})/4$		$(\mathbf{a} - \mathbf{b} + \mathbf{c})/4$	
$(h\bar{h}l)$			$B112/b$	$B112/b$	$B112/m$	$B112/m$
$(\bar{h}hl)$			$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$	$(\mathbf{a}/2 \text{ or } \mathbf{b}/2)$	$(\mathbf{a} + \mathbf{b} + \mathbf{c})/4$	$(\mathbf{a}/2 \text{ or } \mathbf{b}/2)$

Centring type  $I$

Orientation orbit ( $hkl$ )	Conventional basis of the scanning group $\mathbf{a}' \quad \mathbf{b}' \quad \mathbf{d}$			Auxiliary basis of the scanning group $\hat{\mathbf{a}} \quad \hat{\mathbf{b}} \quad \hat{\mathbf{c}}$		
$(mn0)$	$\mathbf{c}$	$n\mathbf{a} - m\mathbf{b}$	$p\mathbf{a} + q\mathbf{b}$	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$
$(\bar{m}0)$	$\mathbf{c}$	$m\mathbf{a} + n\mathbf{b}$	$-q\mathbf{a} + p\mathbf{b}$			
$(\bar{m}\bar{n}0)$	$\mathbf{c}$	$n\mathbf{a} + m\mathbf{b}$	$-p\mathbf{a} + q\mathbf{b}$			
$(nm0)$	$\mathbf{c}$	$m\mathbf{a} - n\mathbf{b}$	$q\mathbf{a} + p\mathbf{b}$			
$(0mn)$	$\mathbf{a}$	$n\mathbf{b} - m\mathbf{c}$	$p\mathbf{b} + q\mathbf{c}$	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$
$(0\bar{m}\bar{n})$	$\mathbf{a}$	$n\mathbf{b} + m\mathbf{c}$	$-p\mathbf{b} + q\mathbf{c}$			
$(m0n)$	$\mathbf{b}$	$m\mathbf{c} - n\mathbf{a}$	$q\mathbf{c} + p\mathbf{a}$	$\mathbf{c}$	$\mathbf{a}$	$\mathbf{b}$
$(m0\bar{n})$	$\mathbf{b}$	$m\mathbf{c} + n\mathbf{a}$	$-q\mathbf{c} + p\mathbf{a}$			
$(hhl)$	$\mathbf{a} - \mathbf{b}$	$n\hat{\mathbf{a}} - m\mathbf{c}$	$p\hat{\mathbf{a}} + q\mathbf{c}$	$(\mathbf{a} + \mathbf{b} + \mathbf{c})/2$	$\mathbf{c}$	$\mathbf{a} - \mathbf{b}$
$(\bar{h}\bar{h}l)$	$\mathbf{a} - \mathbf{b}$	$n\hat{\mathbf{a}} + m\mathbf{c}$	$-p\hat{\mathbf{a}} + q\mathbf{c}$			
$(h\bar{h}l)$	$\mathbf{a} + \mathbf{b}$	$n\hat{\mathbf{a}} - m\mathbf{c}$	$p\hat{\mathbf{a}} + q\mathbf{c}$	$(\mathbf{b} - \mathbf{a} + \mathbf{c})/2$	$\mathbf{c}$	$\mathbf{a} + \mathbf{b}$
$(\bar{h}hl)$	$\mathbf{a} + \mathbf{b}$	$n\hat{\mathbf{a}} + m\mathbf{c}$	$-p\hat{\mathbf{a}} + q\mathbf{c}$			

$l \text{ odd} \Rightarrow n = 2l, m = 2h + l; l \text{ even} \Rightarrow n = l, m = h + l/2$

Arithmetic classes  $422I$  and  $4mmI$

Serial No.	97	98	107	108	109	110
Group type	$D_4^9$	$D_4^{10}$	$C_{4v}^9$	$C_{4v}^{10}$	$C_{4v}^{11}$	$C_{4v}^{12}$
Group	$I422$	$I4_122$	$I4mm$	$I4cm$	$I4_1md$	$I4_1cd$
$(mn0)$	$I112$	$I112$	$I112$	$I112$	$I112$	$I112$
$(\bar{m}0)$						
$(\bar{m}\bar{n}0)$						
$(nm0)$						
$(0mn)$	$I112$	$I112$	$I11m$	$I11b$	$I11m$	$I11b$
$(0\bar{m}\bar{n})$		$(\mathbf{b}/4 + \mathbf{c}/8)$				
$(m0n)$		$I112$		$I11a$		$I11a$
$(m0\bar{n})$		$(\mathbf{a}/4 + 3\mathbf{c}/8)$				
$(hhl)$	$A112$	$A112$	$A11m$	$A11m$	$A11n$	$A11n$
$(\bar{h}\bar{h}l)$				$(\mathbf{a}/2 \text{ or } \mathbf{b}/2)$	$(\mathbf{a} - \mathbf{b})/8$	$3(\mathbf{a} - \mathbf{b})/8$
$(h\bar{h}l)$					$A11n$	$A11n$
$(\bar{h}hl)$					$3(\mathbf{a} + \mathbf{b})/8$	$(\mathbf{a} + \mathbf{b})/8$

Arithmetic classes  $\bar{4}m2I$  and  $\bar{4}2mI$ 

Serial No.	119	120	121	122
Group type	$D_{2d}^9$	$D_{2d}^{10}$	$D_{2d}^{11}$	$D_{2d}^{12}$
Group	$\bar{I}4m2$	$\bar{I}4c2$	$\bar{I}42m$	$\bar{I}42d$
$(mn0)$	$I112$	$I112$	$I112$	$I112$
$(\bar{n}m0)$				
$(\bar{m}n0)$				
$(nm0)$				
$(0mn)$	$I11m$	$I11b$	$I112$	$I112$
$(0\bar{m}n)$				$(b/4 + c/8)$
$(m0n)$		$I11a$		$I112$
$(m0\bar{n})$				$(a/4 + 3c/8)$
$(hhl)$	$A112$	$A112$	$A11m$	$A11n$
$(\bar{h}\bar{h}l)$		$(c/4)$		$(a - b)/8$
$(h\bar{h}l)$				$A11n$
$(\bar{h}hl)$				$3(a + b)/8$

Arithmetic class  $4/mmmI$ 

Serial No.	139	140	141		142	
Group type	$D_{4h}^{17}$	$D_{4h}^{18}$	$D_{4h}^{19}$		$D_{4h}^{20}$	
Group	$I4/mmm$	$I4/mcm$	$I4_1/amd$		$I4_1acd$	
			Origin 1	Origin 2	Origin 1	Origin 2
$(mn0)$	$A112/a$	$A112/a$	$I112/b$	$I112/b$	$I112/b$	$I112/b$
$(\bar{n}m0)$			$(b + c)/8$		$(b + c)/8$	
$(\bar{m}n0)$						
$(nm0)$						
$(0mn)$	$I112/m$	$I112/b$	$I112/m$	$I112/m$	$I112/b$	$I112/b$
$(0\bar{m}n)$			$(b/4 + c/8)$		$(b/4 + c/8)$	
$(m0n)$		$I112/a$	$I112/m$	$I112/m$	$I112/a$	$I112/a$
$(m0\bar{n})$			$(a/4 + 3c/8)$	$(a + b + c)/4$	$(a/4 + 3c/8)$	$(a + b + c)/4$
$(hhl)$	$A112/m$	$A112/m$	$A112/a$	$A112/a$	$A112/a$	$A112/a$
$(\bar{h}\bar{h}l)$			$3(a/4 + c/8)$	$(a - b + c)/4$	$(a/4 + 3c/8)$	
$(h\bar{h}l)$			$A112/a$	$A112/a$	$A112/a$	
$(\bar{h}hl)$			$(a/4 + c/8)$	$(a/2 \text{ or } b/2)$	$3(a/4 + c/8)$	