Tetragonal   6. SCANNING TABLES   Laue class $D_{4h} - 4/mmm$

No. 135 $P4_2/mbc$ D_{4h}^{13}

$$\mathcal{G} = P\frac{4_2}{m}\frac{2_1}{b}\frac{2}{c}$$

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_2/mbc$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pbam$	L44
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p\bar{4}b2$	L60
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pba2$	L25
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$Pcma$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p12/m1$	L14
(010)	$-\mathbf{a}$	$\mathbf{c}$	$\mathbf{b}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1ma$	L28
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$p1m1$	L11
(110)	$(-\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})$	$Bbmb$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pbmn$	L42
(1$\bar{1}$0)	$(\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})$	$[(\mathbf{a}'+\mathbf{d})/4]$	$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pbmb\ (\mathbf{a}'/4)$	L38
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pbm2\ [(\mathbf{a}'+\mathbf{b}')/4]$	L24

No. 136 $P4_2/mnm$ D_{4h}^{14}

$$\mathcal{G} = P\frac{4_2}{m}\frac{2_1}{n}\frac{2}{m}$$

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_2/mnm$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$\widehat{c}mmm$	L47
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p\bar{4}2_1m\ (\mathbf{a}/2\ \text{or}\ \mathbf{b}/2)$	L58
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$\widehat{c}mm2$	L26
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$Pnmn$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p12/m1$	L14
(010)	$-\mathbf{a}$	$\mathbf{c}$	$\mathbf{b}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1mn$	L32
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$p1m1$	L11
(110)	$(-\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})$	$Bmmm$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pmmm$	L37
(1$\bar{1}$0)	$(\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pmma\ (\mathbf{a}'/4)$	L41
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pmm2$	L23

No. 137 $P4_2/nmc$ D_{4h}^{15}

$$\mathcal{G} = P\frac{4_2}{n}\frac{2_1}{m}\frac{2}{c} \quad \text{origin 1}$$

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_2/nmc$ (origin 1)	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p\bar{4}m2$	L59
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pmmn\ [(\mathbf{a}+\mathbf{b})/4]$	L46
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pmm2$	L23
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$Pmnm$ (origin 1) $(\mathbf{b}'/4)$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pm2m\ (\mathbf{b}'/4)$	L27
(010)	$-\mathbf{a}$	$\mathbf{c}$	$\mathbf{b}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1/m11\ [(\mathbf{a}'+\mathbf{b}')/4]$	L15
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pm11\ (\mathbf{b}'/4)$	L11
(110)	$(-\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})$	$Bbcb$ (or. 1) or $Bbcb$ (or. 2) $[(\mathbf{a}'+\mathbf{b}')/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pban\ [(\mathbf{a}'+\mathbf{b}')/4]$	L39
(1$\bar{1}$0)	$(\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pbab\ (\mathbf{b}'/4)$	L43
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pba2$	L25

No. 137 $P4_2/nmc$ D_{4h}^{15}

$$\mathcal{G} = P\frac{4_2}{n}\frac{2_1}{m}\frac{2}{c} \quad \text{origin 2}$$

Orientation orbit (hkl)	Conventional basis of the scanning group			Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
	$\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$				
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_2/nmc$ (origin 2)	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pmmn$	L46
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p\bar{4}m2\ [(\mathbf{a}+3\mathbf{b})/4$	
						or $(\mathbf{a}+3\mathbf{b})/4]$	L59
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pmm2\ [(\mathbf{a}+\mathbf{b})/4]$	L23
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$Pmnm$ (origin 2)	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p2_1/m11$	L15
(010)	$-\mathbf{a}$	$\mathbf{c}$	$\mathbf{b}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pm2m\ (\mathbf{a}'/4)$	L27
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pm11\ (\mathbf{a}'/4)$	L11
(110)	$(-\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})$	$Bbcb$ (or. 1) $[(\mathbf{a}'+\mathbf{b}')/4]$ or $Bbcb$ (or. 2)	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pban$	L39
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pbab\ (\mathbf{a}'/4)$	L43
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pba2\ [(\mathbf{a}'+\mathbf{b}')/4]$	L25
(1$\bar{1}$0)	$(\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})$	$Bbcb$ (or. 1) $[(\mathbf{b}'+\mathbf{d})/4]$ or $Bbcb$ (or. 2) $[(\mathbf{a}'+\mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pbab$	L43
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pban\ (\mathbf{a}'/4)$	L39
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pba2\ (\mathbf{b}'/4)$	L25

No. 138 $P4_2/ncm$ D_{4h}^{16}

$$\mathcal{G} = P\frac{4_2}{n}\frac{2_1}{c}\frac{2}{m} \quad \text{origin 1}$$

Orientation orbit (hkl)	Conventional basis of the scanning group			Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
	$\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$				
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_2/ncm$ (origin 1)	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p\bar{4}2_1m$	L58
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$\widehat{cmme}\ [(\mathbf{a}+3\mathbf{b})/4$	
						or $(3\mathbf{a}+\mathbf{b})/4]$	L48
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$\widehat{cmm2}\ (\mathbf{a}/2$ or $\mathbf{b}/2)$	L26
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$Pbnb$ $[(\mathbf{a}'+\mathbf{b}'+\mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pb2b\ (\mathbf{b}'/4)$	L30
(010)	$-\mathbf{a}$	$\mathbf{c}$	$\mathbf{b}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1/b11\ [(\mathbf{a}'+\mathbf{b}')/4]$	L17
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pb11\ (\mathbf{b}'/4)$	L12
(110)	$(-\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})$	$Bmcm$ $[(\mathbf{b}'+\mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pmaa\ [(\mathbf{a}'+\mathbf{b}')/4]$	L38
(1$\bar{1}$0)	$(\mathbf{a}+\mathbf{b})$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pmam\ (\mathbf{b}'/4)$	L40
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pma2\ (\mathbf{b}'/4)$	L24

No. 142 $I4_1/acd$ D_{4h}^{20}

$$\mathcal{G} = I\tfrac{4_1}{a}\tfrac{2}{c}\tfrac{2}{d} \quad \text{origin 2}$$

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

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

Centring type P

Orientation orbit (hkl)	Conventional basis of the scanning group a′ b′ d			Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$ $\widehat{\mathbf{b}}$ $\widehat{\mathbf{c}}$		
($mn0$)	$\mathbf{c}$	$n\mathbf{a} - m\mathbf{b}$	$p\mathbf{a} + q\mathbf{b}$	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$
($\bar{n}m0$)	$\mathbf{c}$	$m\mathbf{a} + n\mathbf{b}$	$-q\mathbf{a} + p\mathbf{b}$			
($\bar{m}n0$)	$\mathbf{c}$	$n\mathbf{a} + m\mathbf{b}$	$-p\mathbf{a} + q\mathbf{b}$			
($nm0$)	$\mathbf{c}$	$m\mathbf{a} - n\mathbf{b}$	$q\mathbf{a} + p\mathbf{b}$			
($0mn$)	$\mathbf{a}$	$n\mathbf{b} - m\mathbf{c}$	$p\mathbf{b} + q\mathbf{c}$	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$
($0\bar{m}n$)	$\mathbf{a}$	$n\mathbf{b} + m\mathbf{c}$	$-p\mathbf{b} + q\mathbf{c}$			
($m0n$)	$\mathbf{b}$	$m\mathbf{c} - n\mathbf{a}$	$q\mathbf{c} + p\mathbf{a}$	$\mathbf{c}$	$\mathbf{a}$	$\mathbf{b}$
($m0\bar{n}$)	$\mathbf{b}$	$m\mathbf{c} + n\mathbf{a}$	$-q\mathbf{c} + p\mathbf{a}$			
(hhl)	$\mathbf{a} - \mathbf{b}$	$n(\mathbf{a}+\mathbf{b}) - m\mathbf{c}$	$p(\mathbf{a}+\mathbf{b}) + q\mathbf{c}$	$\mathbf{a}+\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}-\mathbf{b}$
($\bar{h}hl$)	$\mathbf{a} - \mathbf{b}$	$n(\mathbf{a}+\mathbf{b}) + m\mathbf{c}$	$-p(\mathbf{a}+\mathbf{b}) + q\mathbf{c}$			
($h\bar{h}l$)	$\mathbf{a} + \mathbf{b}$	$n(\mathbf{b}-\mathbf{a}) - m\mathbf{c}$	$p(\mathbf{b}-\mathbf{a}) + q\mathbf{c}$	$\mathbf{b}-\mathbf{a}$	$\mathbf{c}$	$\mathbf{a}+\mathbf{b}$
($\bar{h}hl$)	$\mathbf{a} + \mathbf{b}$	$n(\mathbf{b}-\mathbf{a}) + m\mathbf{c}$	$-p(\mathbf{b}-\mathbf{a}) + q\mathbf{c}$			
l odd $\Rightarrow n = l, m = 2h;$ l even $\Rightarrow n = l/2, m = h$						

Arithmetic class $4/mmmP$ (*cont.*)

Serial No. Group type Group	135 D_{4h}^{13} $P4_2/mbc$	136 D_{4h}^{14} $P4_2/mnm$	137 D_{4h}^{15} $P4_2/nmc$		138 D_{4h}^{16} $P4_2/ncm$	
			Origin 1	Origin 2	Origin 1	Origin 2
$(mn0)$ $(\bar{n}m0)$ $(\bar{m}n0)$ $(nm0)$	$P112/m$	$P112/m$	$P112/n$	$P112/n$	$P112/n$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$	$P112/n$
$(0mn)$ $(0\bar{m}n)$ $(m0n)$ $(m0\bar{n})$	$P112_1/a$ $P112_1/b$	$P112_1/n$	$P112_1/m$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$	$P112_1/m$	$P112_1/b$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$ $P112_1/a$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$	$P112_1/b$ $P112_1/a$
(hhl) $(\bar{h}hl)$ $(h\bar{h}l)$ $(\bar{h}hl)$	$B112/b$ $(\mathbf{a}/2$ or $\mathbf{b}/2)$	$B112/m$	$B112/b$ $(\mathbf{a}-\mathbf{b}+\mathbf{c})/4$ $B112/b$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$	$B112/b$ $(\mathbf{a}-\mathbf{b}+\mathbf{c})/4$ $B112/b$ $(\mathbf{a}/2$ or $\mathbf{b}/2)$	$B112/m$ $(\mathbf{a}-\mathbf{b}+\mathbf{c})/4$ $B112/m$ $(\mathbf{a}+\mathbf{b}+\mathbf{c})/4$	$B112/m$ $(\mathbf{a}-\mathbf{b}+\mathbf{c})/4$ $B112/m$ $(\mathbf{a}/2$ or $\mathbf{b}/2)$

Centring type *I*

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$ $\mathbf{b}'$ $\mathbf{d}$			Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$ $\widehat{\mathbf{b}}$ $\widehat{\mathbf{c}}$		
$(mn0)$ $(\bar{n}m0)$ $(\bar{m}n0)$ $(nm0)$	$\mathbf{c}$ $\mathbf{c}$ $\mathbf{c}$ $\mathbf{c}$	$n\mathbf{a}-m\mathbf{b}$ $m\mathbf{a}+n\mathbf{b}$ $n\mathbf{a}+m\mathbf{b}$ $m\mathbf{a}-n\mathbf{b}$	$p\mathbf{a}+q\mathbf{b}$ $-q\mathbf{a}+p\mathbf{b}$ $-p\mathbf{a}+q\mathbf{b}$ $q\mathbf{a}+p\mathbf{b}$	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$
$(0mn)$ $(0\bar{m}n)$ $(m0n)$ $(m0\bar{n})$	$\mathbf{a}$ $\mathbf{a}$ $\mathbf{b}$ $\mathbf{b}$	$n\mathbf{b}-m\mathbf{c}$ $n\mathbf{b}+m\mathbf{c}$ $m\mathbf{c}-n\mathbf{a}$ $m\mathbf{c}+n\mathbf{a}$	$p\mathbf{b}+q\mathbf{c}$ $-p\mathbf{b}+q\mathbf{c}$ $q\mathbf{c}+p\mathbf{a}$ $-q\mathbf{c}+p\mathbf{a}$	$\mathbf{b}$ $\mathbf{c}$	$\mathbf{c}$ $\mathbf{a}$	$\mathbf{a}$ $\mathbf{b}$
(hhl) $(\bar{h}hl)$ $(h\bar{h}l)$ $(\bar{h}hl)$	$\mathbf{a}-\mathbf{b}$ $\mathbf{a}-\mathbf{b}$ $\mathbf{a}+\mathbf{b}$ $\mathbf{a}+\mathbf{b}$	$n\widehat{\mathbf{a}}-m\mathbf{c}$ $n\widehat{\mathbf{a}}+m\mathbf{c}$ $n\widehat{\mathbf{a}}-m\mathbf{c}$ $n\widehat{\mathbf{a}}+m\mathbf{c}$	$p\widehat{\mathbf{a}}+q\mathbf{c}$ $-p\widehat{\mathbf{a}}+q\mathbf{c}$ $p\widehat{\mathbf{a}}+q\mathbf{c}$ $-p\widehat{\mathbf{a}}+q\mathbf{c}$	$(\mathbf{a}+\mathbf{b}+\mathbf{c})/2$ $(\mathbf{b}-\mathbf{a}+\mathbf{c})/2$	$\mathbf{c}$ $\mathbf{c}$	$\mathbf{a}-\mathbf{b}$ $\mathbf{a}+\mathbf{b}$
l odd $\Rightarrow n=2l,\ m=2h+l$; l even $\Rightarrow n=l,\ m=h+l/2$						

Arithmetic classes $422I$ and $4mmI$

Serial No. Group type Group	97 D_4^9 $I422$	98 D_4^{10} $I4_122$	107 C_{4v}^9 $I4mm$	108 C_{4v}^{10} $I4cm$	109 C_{4v}^{11} $I4_1md$	110 C_{4v}^{12} $I4_1cd$
$(mn0)$ $(\bar{n}m0)$ $(\bar{m}n0)$ $(nm0)$	$I112$	$I112$	$I112$	$I112$	$I112$	$I112$
$(0mn)$ $(0\bar{m}n)$ $(m0n)$ $(m0\bar{n})$	$I112$	$I112$ $(\mathbf{b}/4+\mathbf{c}/8)$ $I112$ $(\mathbf{a}/4+3\mathbf{c}/8)$	$I11m$	$I11b$ $I11a$	$I11m$	$I11b$ $I11a$
(hhl) $(\bar{h}hl)$ $(h\bar{h}l)$ $(\bar{h}hl)$	$A112$	$A112$	$A11m$	$A11m$ $(\mathbf{a}/2$ or $\mathbf{b}/2)$	$A11n$ $(\mathbf{a}-\mathbf{b})/8$ $A11n$ $3(\mathbf{a}+\mathbf{b})/8$	$A11n$ $3(\mathbf{a}-\mathbf{b})/8$ $A11n$ $(\mathbf{a}+\mathbf{b})/8$