No. 43 $Fdd2$ C_{2v}^{19}

$\mathcal{G} = Fdd2$

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)	**a**	**b**	**c**	$Fdd2$	$[s\mathbf{d}, (s+\frac{1}{4})\mathbf{d}, (s+\frac{1}{2})\mathbf{d}, (s+\frac{3}{4})\mathbf{d}]$	$\widehat{p}112$	L03
(100)	**b**	**c**	**a**	$Fd2d$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}, \frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$c121$	L10
						$c121$ $(\mathbf{a}'/4)$	L10
					$[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d}, \frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$	$\widehat{p}11b$	L09
						$\widehat{p}11a$	L09
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{4})\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}, (\pm s+\frac{3}{4})\mathbf{d}]$	$p1$	L01
(010)	**c**	**a**	**b**	$F2dd$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}, \frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$c211$	L10
						$c211$ $(\mathbf{b}'/4)$	L10
					$[\frac{1}{8}\mathbf{d}, \frac{5}{8}\mathbf{d}, \frac{3}{8}\mathbf{d}, \frac{7}{8}\mathbf{d}]$	$\widehat{p}11b$	L09
						$\widehat{p}11a$	L09
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{4})\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}, (\pm s+\frac{3}{4})\mathbf{d}]$	$p1$	L01

No. 44 $Imm2$ C_{2v}^{20}

$\mathcal{G} = Imm2$

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)	**a**	**b**	**c**	$Imm2$	$[s\mathbf{d}, (s+\frac{1}{2})\mathbf{d}]$	$pmm2$	L23
(100)	**b**	**c**	**a**	$Im2m$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pm2m$	L27
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pm2_1n$	L32
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pm11$	L11
(010)	**c**	**a**	**b**	$I2mm$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p2mm$	L27
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1mn$	L32
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$p1m1$	L11

No. 45 $Iba2$ C_{2v}^{21}

$\mathcal{G} = Iba2$

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)	**a**	**b**	**c**	$Iba2$	$[s\mathbf{d}, (s+\frac{1}{2})\mathbf{d}]$	$pba2$	L25
(100)	**b**	**c**	**a**	$Ic2a$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$pb2b$	L30
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pb2_1a$ $(\mathbf{a}'/4)$	L33
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$pb11$	L12
(010)	**c**	**a**	**b**	$I2cb$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p2aa$	L30
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_1ab$ $(\mathbf{b}'/4)$	L33
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$p1a1$	L12

Centring type *F*

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$	$\widehat{\mathbf{b}}$	$\widehat{\mathbf{c}}$
$(hk0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{a} - \mathbf{b})/2$	$(\mathbf{a} + \mathbf{b})/2$	$\mathbf{c}$
$(\bar{h}k0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
$(0hk)$	$\mathbf{a}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{b} - \mathbf{c})/2$	$(\mathbf{b} + \mathbf{c})/2$	$\mathbf{a}$
$(0\bar{h}k)$	$\mathbf{a}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
$(k0h)$	$\mathbf{b}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{c} - \mathbf{a})/2$	$(\mathbf{c} + \mathbf{a})/2$	$\mathbf{b}$
$(k0\bar{h})$	$\mathbf{b}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
h even, k odd or h odd, k even $\Rightarrow n = h + k$, $m = h - k$ h, k odd $\Rightarrow n = (h+k)/2$, $m = (h-k)/2$						

Arithmetic classes $222F$, $mm2F$ and $mmmF$

Serial No.	22	42	43	69	70	
Group type	D_2^7	C_{2v}^{18}	C_{2v}^{19}	D_{2h}^{23}	D_{2h}^{24}	
Group	$F222$	$Fmm2$	$Fdd2$	$Fmmm$	$Fddd$	
					Origin 1	Origin 2
$(hk0)$ $(\bar{h}k0)$	$I112$	$I112$	$I112$	$I112/m$	$I112/b$ $[(\mathbf{a}+\mathbf{b}+\mathbf{c})/8]$	$I112/b$
$(0hk)$ $(0\bar{h}k)$		$I11m$	$I11b$ $(\mathbf{a}/8)$			
$(k0h)$ $(k0\bar{h})$						