International Tables for Crystallography (2006). Vol. E, Scanning table for space group 69, p. 459.

No. 68* *Ccce* D_{2h}^{22}

$\mathcal{G} = C\frac{2}{c}\frac{2}{c}\frac{2}{a}$ 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)	**a**	**b**	**c**	*Ccca* $[(\mathbf{b}+\mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*c*222	L22
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$\widehat{p}112/n$ ($\mathbf{a}/4$ or $\mathbf{b}/4$)	L07
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$\widehat{p}112$	L03
(100)	**b**	**c**	**a**	*Bbcb* $[(\mathbf{a}'+\mathbf{b}')/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*pban* $[(\mathbf{a}'+\mathbf{b}')/4]$	L39
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*pbab* ($\mathbf{b}'/4$)	L43
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	*pba*2	L25
(010)	**c**	**a**	**b**	*Abaa* $[(\mathbf{a}'+\mathbf{d})/4]$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*pban* $[(\mathbf{a}'+\mathbf{b}')/4]$	L39
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*pbaa* ($\mathbf{a}'/4$)	L43
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	*pba*2	L25

*New symbol. Old symbol: *Ccca*.

No. 68* *Ccce* D_{2h}^{22}

$\mathcal{G} = C\frac{2}{c}\frac{2}{c}\frac{2}{a}$ origin 2

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**	*Ccca*	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$\widehat{p}112/n$	L07
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*c*222 ($\mathbf{b}/4$)	L22
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	$\widehat{p}112$ ($\mathbf{a}/4$ or $\mathbf{b}/4$)	L03
(100)	**b**	**c**	**a**	*Bbcb*	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*pban*	L39
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*pbab* ($\mathbf{a}'/4$)	L43
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	*pba*2 $[(\mathbf{a}'+\mathbf{b}')/4]$	L25
(010)	**c**	**a**	**b**	*Abaa*	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*pbaa*	L43
					$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*pban* ($\mathbf{b}'/4$)	L39
					$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	*pba*2 ($\mathbf{a}'/4$)	L25

*New symbol. Old symbol: *Ccca*.

No. 69 *Fmmm* D_{2h}^{23}

$\mathcal{G} = F\frac{2}{m}\frac{2}{m}\frac{2}{m}$

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)	**a**	**b**	**c**	*Fmmm*	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	*cmmm*	L47
(100)	**b**	**c**	**a**		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	*cmme* ($\mathbf{b}'/4$)	L48
(010)	**c**	**a**	**b**		$[\pm s\mathbf{d}, (\pm s+\frac{1}{2})\mathbf{d}]$	*cmm*2	L26

Centring type *F*

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$	$\widehat{\mathbf{b}}$	$\widehat{\mathbf{c}}$
$(hk0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}}-m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$	$(\mathbf{a}-\mathbf{b})/2$	$(\mathbf{a}+\mathbf{b})/2$	$\mathbf{c}$
$(\overline{h}k0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}}+m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$			
$(0hk)$	$\mathbf{a}$	$n\widehat{\mathbf{a}}-m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$	$(\mathbf{b}-\mathbf{c})/2$	$(\mathbf{b}+\mathbf{c})/2$	$\mathbf{a}$
$(0\overline{h}k)$	$\mathbf{a}$	$n\widehat{\mathbf{a}}+m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$			
$(k0h)$	$\mathbf{b}$	$n\widehat{\mathbf{a}}-m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$	$(\mathbf{c}-\mathbf{a})/2$	$(\mathbf{c}+\mathbf{a})/2$	$\mathbf{b}$
$(k0\overline{h})$	$\mathbf{b}$	$n\widehat{\mathbf{a}}+m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}}+q\widehat{\mathbf{b}}$			
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
$(hk0)$ $(\overline{h}k0)$	$I112$	$I112$	$I112$	$I112/m$	$I112/b$ $[(\mathbf{a}+\mathbf{b}+\mathbf{c})/8]$	$I112/b$
$(0hk)$ $(0\overline{h}k)$		$I11m$	$I11b$ $(\mathbf{a}/8)$			
$(k0h)$ $(k0\overline{h})$						