

Symmetries of all lines in monolayer crystals
Supplementary information
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Scanning tables for the layer groups

Herein we present tables listing the symmetry groups (penetration rod groups) which preserve lines penetrating through each layer group. These tables scan through all possible locations and (in-plane rational) directions of the penetration lines, so are called scanning tables.

A machine-readable version of these tables, along with the source code and underlying data, is available at Field (2024).

Each layer group has two tables with similar formats: one for high-symmetry directions, and one for oblique directions (an auxiliary table). The elements of the tables are described below.

Elements of the tables

1 Header

Set above each table is the header. It gives the Hermann-Mauguin (HM) symbol and the International Tables (IT) number of the layer group that is being scanned (the “scanned group”). The scanned group is always in its standard, default setting, as defined by the *International Tables for Crystallography* volume E (Kopský and Litvin (2010)). Layer groups L52, L62, and L64 have the standard origin on the inversion centre (origin choice “2”) rather than the 4-fold axis.

2 Penetration direction

The first column is the penetration direction. It is the direction of the line penetrating through the rod group. It is given by the integer indices $[uv0]$ and defines the basis vector \mathbf{c} , which will define the translation basis of the penetration rod group.

For the auxiliary tables, the penetration direction is grouped by whether u and/or v are odd or even. u and v must also be co-prime, to ensure \mathbf{c} is a primitive lattice vector. Auxiliary tables of centred layer groups also add an extra column specifying whether the primitive basis vector \mathbf{c} is $[u, v, 0]$ or $[u/2, v/2, 0]$ for a given choice of u and v (otherwise, it is assumed that $\mathbf{c} = [u, v, 0]$).

3 Scanning direction

The second column is the scanning direction, given by the scanning vector \mathbf{d} . Each scanning direction is paired with a penetration direction. The primary role of \mathbf{d} is to define the location of the penetration line, but it is also used to form a coordinate basis. The scanning vector \mathbf{d} is chosen such that \mathbf{c} and \mathbf{d} form a right-handed conventional basis for the scanning group.

For the auxiliary tables, the scanning direction is given by the integer indices $[pq0]$, with specified constraints on p and q . A conventional right-handed basis is ensured by solving for $(\mathbf{c} \times \mathbf{d}) \cdot [001] = 1$, and choosing p, q to be co-prime. For centred groups, $\mathbf{d} = [p/2, q/2, 0]$ instead, with $(\mathbf{c} \times \mathbf{d}) \cdot [001] = 1/2$ ensuring a conventional basis.

4 Scanning group

The third column is the scanning group. The scanning group is the maximal subgroup of the scanned group whose point group preserves the penetration direction. By the scanning theorem (Kopský and Litvin (1989)), the scanning table (specifically, the location and penetration rod group columns) of the scanned group along a particular direction is identical to the scanning table of the scanning group with the same setting and origin choice.

Each scanning group applies to all entries in the same row of the table, bounded by horizontal lines. This may include multiple penetration directions and multiple locations.

The scanning group is a layer group. Its HM symbol and IT number (prefixed by L for layer group) are given. The basis is $(\mathbf{c}, \mathbf{d}, \mathbf{z})$, where $\mathbf{z} = [001]$ is an out-of-plane vector. If the scanning group is not in the default setting, the IT number is marked by a prime as a convenience for the reader. If the origin is not the conventional origin, then the position of the origin relative to the conventional origin is given in square brackets, in units of the scanning group basis.

5 Location

The fourth column is the location of the penetration line. For points given by $P + s\mathbf{d}$, where P is the scanned group origin, it gives a set of values s in the unit interval $[0, 1)$, with each row giving different penetration rod groups.

The first rows are special locations, with discrete values of s . The last row for each scanning group is the general location, which is all values of s not in a special location.

Locations are grouped using square brackets into orbits, that is, points which are the same under the operation of the scanning group. If two values of s are not bound by square brackets, then they are not in the same orbit.

6 Penetration rod group

The fifth column presents the penetration rod group for the given penetration line(s) specified by the location(s) and penetration direction(s).

The HM symbol and IT number (prefixed by R for rod group) are given. If the rod group is not in the default setting, the IT number is marked by a prime as a convenience for the reader. If the origin is not the conventional origin, then the position of the origin relative to the conventional origin in units of \mathbf{c} is given in square brackets.

The sectional rod group is given in the basis $(\mathbf{d}, \mathbf{z}, \mathbf{c})$ with an origin $P + s\mathbf{d}$, where P is the standard origin of the scanned group. Note that, due to conventions for rod and layer groups, this is a different order of basis vectors to the scanning group.

The specific penetration rod group in the original basis is readily reconstructed from the rod group in the default basis and the information in the table using the transformation QgQ^{-1} for each element g of the group in standard basis. If the rod group is in its default setting, then the transformation matrix is

$$Q = (\mathbf{d} \ \mathbf{z} \ \mathbf{c} | s\mathbf{d} + t\mathbf{c}), \quad (1)$$

where $(A|\mathbf{b})$ is an affine transformation $y = Ax + \mathbf{b}$ and t is the origin shift given in the table. If the group is not in its default setting, then the transformation matrix is instead

$$Q = (\mathbf{z} \ -\mathbf{d} \ \mathbf{c} | s\mathbf{d} + t\mathbf{c}). \quad (2)$$

References

- Field, B. (2024). GriffinGroup/scanning-tables-layer-group-data.
<https://doi.org/10.5281/zenodo.13948517>
- Kopský, V. and Litvin, D. B. (eds.) (2010). *International Tables for Crystallography: Sub-periodic groups*, vol. E. Chester, England: International Union of Crystallography, 2nd ed.
<https://doi.org/10.1107/97809553602060000109>
- Kopský, V. and Litvin, D. B. (1989). In *Group theoretical methods in physics*, edited by Y. Saint-Aubin and L. Vinet, pp. 263–266. Singapore: World Scientific.

$p1$ No. 1

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100]	[010]	$p1$ L1	s	$\rho 1$ R1
Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p1$ L1	s	$\rho 1$ R1

$p\bar{1}$ No. 2

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100]	[010]	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho\bar{1}$ R2 $\rho 1$ R1
Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho\bar{1}$ R2 $\rho 1$ R1

$p112$ No. 3

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100]	[010]	$p112$ L3	0, 1/2 [$s, -s$]	$\rho 121$ R3' $\rho 1$ R1
Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	0, 1/2 [$s, -s$]	$\rho 121$ R3' $\rho 1$ R1

***p11m* No. 4**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>p11m</i> L4	s	$\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	<i>p11m</i> L4	s	$\rho 1m1$ R4'

***p11a* No. 5**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>p11a</i> L5	s	$\rho 1c1$ R5'
[010]	$[\bar{1}00]$	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
[010]	$[\bar{1}\bar{1}0]$	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , even v	Odd q	<i>p11a</i> L5	s	$\rho 1c1$ R5'
Any u , odd v	Even q	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Any u , odd v	Odd q	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***p112/m* No. 6**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>p112/m</i> L6	0, 1/2 $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	<i>p112/m</i> L6	0, 1/2 $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

*p*112/*a* No. 7

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>p</i> 112/ <i>a</i> L7	0, 1/2 [<i>s</i> , − <i>s</i>]	ρ 12/ <i>c</i> 1 R7' ρ 1 <i>c</i> 1 R5'
[010]	$[\bar{1}00]$	<i>p</i> 112/ <i>b</i> L7'	[0, 1/2] [1/4, 3/4] [± <i>s</i> , ($\frac{1}{2} \pm s$)]	ρ $\bar{1}$ R2 ρ 121 R3' ρ 1 R1
[010]	$[\bar{1}\bar{1}0]$	<i>p</i> 112/ <i>n</i> L7'	[0, 1/2] [1/4, 3/4] [± <i>s</i> , ($\frac{1}{2} \pm s$)]	ρ $\bar{1}$ R2 ρ 121 [1/4] R3' ρ 1 R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd <i>u</i> , even <i>v</i>	Odd <i>q</i>	<i>p</i> 112/ <i>a</i> L7	0, 1/2 [<i>s</i> , − <i>s</i>]	ρ 12/ <i>c</i> 1 R7' ρ 1 <i>c</i> 1 R5'
Any <i>u</i> , odd <i>v</i>	Even <i>q</i>	<i>p</i> 112/ <i>b</i> L7'	[0, 1/2] [1/4, 3/4] [± <i>s</i> , ($\frac{1}{2} \pm s$)]	ρ $\bar{1}$ R2 ρ 121 R3' ρ 1 R1
Any <i>u</i> , odd <i>v</i>	Odd <i>q</i>	<i>p</i> 112/ <i>n</i> L7'	[0, 1/2] [1/4, 3/4] [± <i>s</i> , ($\frac{1}{2} \pm s$)]	ρ $\bar{1}$ R2 ρ 121 [1/4] R3' ρ 1 R1

*p*211 No. 8

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>p</i> 211 L8	0, 1/2 [<i>s</i> , − <i>s</i>]	ρ 112 R8 ρ 1 R1
[010]	$[\bar{1}00]$	<i>p</i> 121 L8'	<i>s</i>	ρ 211 R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any <i>u</i> , <i>v</i>	Any <i>p</i> , <i>q</i>	<i>p</i> 1 L1	<i>s</i>	ρ 1 R1

$p2_111$ No. 9

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$p2_111$ L9	0, 1/2 [$s, -s$]	ρ^{112_1} R9 ρ^1 R1
[010]	$[\bar{1}00]$	$p12_11$ L9'	$[s, (s + \frac{1}{2})]$	ρ^1 R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p1$ L1	s	ρ^1 R1

$c211$ No. 10

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$	
[100]	[010]	$c211$ L10	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρ^{112} R8 ρ^{112_1} R9 ρ^1 R1	
[010]	$[\bar{1}00]$	$c121$ L10'	$[s, (s + \frac{1}{2})]$	ρ^{211} R3	
Penetration direction $[uv0]$	\mathbf{c}	Scanning direction $\mathbf{d} = [p, q, 0]/2$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, v Even u OR even v	$[u, v, 0]/2$ $[u, v, 0]$	Even p, q OR odd p, q	$p1$ L1	s	ρ^1 R1

$pm11$ No. 11

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$pm11$ L11	s	ρ^{11m} R10
[010]	$[\bar{1}00]$	$p1m1$ L11'	0, 1/2 [$s, -s$]	ρ^{m11} R4 ρ^1 R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p1$ L1	s	ρ^1 R1

***pb11* No. 12**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>pb11</i> L12	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
[010]	$[\bar{1}00]$	<i>p1a1</i> L12'	0, 1/2 $[s, -s]$	$\rho c11$ R5 $\rho 1$ R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p1</i> L1	<i>s</i>	$\rho 1$ R1

***cm11* No. 13**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>cm</i> 11 L13	$[s, (s + \frac{1}{2})]$	ρ 11 <i>m</i> R10
[010]	$[\bar{1}00]$	<i>c</i> 1 <i>m</i> 1 L13'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρ <i>m</i> 11 R4 ρ <i>c</i> 11 R5 ρ 1 R1

Penetration direction [<i>uv</i> 0]	c	Scanning direction d = [<i>p, q, 0</i>]/2	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u, v</i> Even <i>u</i> OR even <i>v</i>	$[u, v, 0]/2$ $[u, v, 0]$	Even <i>p, q</i> OR odd <i>p, q</i>	<i>p</i> 1 L1	<i>s</i>	ρ 1 R1

***p2/m11* No. 14**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>p2/m11</i> L14	0, 1/2 $[s, -s]$	$\rho 112/m$ R11 $\rho 11m$ R10
[010]	$[\bar{1}00]$	<i>p12/m1</i> L14'	0, 1/2 $[s, -s]$	$\rho 2/m11$ R6 $\rho 211$ R3
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	$p\bar{1}$ L2	0, 1/2 $[s, -s]$	$\rho \bar{1}$ R2 $\rho 1$ R1

$p2_1/m11$ No. 15

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$p2_1/m11$ L15	0, 1/2 [$s, -s$]	$\rho 112_1/m$ R12 $\rho 11m$ [1/4] R10
[010]	$[\bar{1}00]$	$p12_1/m1$ L15'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho m11$ R4 $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho \bar{1}$ R2 $\rho 1$ R1

$p2/b11$ No. 16

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$p2/b11$ L16	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 112$ R8 $\rho 1$ R1
[010]	$[\bar{1}00]$	$p12/a1$ L16'	0, 1/2 [$s, -s$]	$\rho 2/c11$ R7 $\rho 211$ [1/4] R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho \bar{1}$ R2 $\rho 1$ R1

$p2_1/b11$ No. 17

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)	
[100]	[010]	$p2_1/b11$ L17	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 112_1$ R9 $\rho 1$ R1	
[010]	[$\bar{1}00$]	$p12_1/a1$ L17'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho c11$ R5 $\rho 1$ R1	
Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)	
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho \bar{1}$ R2 $\rho 1$ R1	

$c2/m11$ No. 18

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)	
[100]	[010]	$c2/m11$ L18	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 112/m$ R11 $\rho 112_1/m$ [1/4] R12 $\rho 11m$ R10	
[010]	[$\bar{1}00$]	$c12/m1$ L18'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 2/m11$ R6 $\rho 2/c11$ [1/4] R7 $\rho 211$ R3	
Penetration direction [$uv0$]	\mathbf{c}	Scanning direction $\mathbf{d} = [p, q, 0]/2$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Odd u, v Even u OR even v	[$u, v, 0$]/2 [$u, v, 0$]	Even p, q OR odd p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho \bar{1}$ R2 $\rho 1$ R1

$p222$ No. 19

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p222$ L19	$0, 1/2$ $[s, -s]$	ρ^{222} R13 ρ^{211} R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	ρ^{121} R3' ρ^1 R1

$p2_122$ No. 20

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$	$[010]$	$p2_122$ L20	$0, 1/2$ $[s, -s]$	ρ^{222_1} $[1/4]$ R14 ρ^{211} $[1/4]$ R3
$[010]$	$[\bar{1}00]$	$p22_12$ L20'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρ^{121} R3' ρ^{112} R8 ρ^1 R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	ρ^{121} R3' ρ^1 R1

$p2_12_12_1$ No. 21

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p2_12_12_1$ L21	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρ^{121} R3' ρ^{112_1} R9 ρ^1 R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	ρ^{121} R3' ρ^1 R1

*c*222 No. 22

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)		
[100] [010]	[010] [$\bar{1}$ 00]	<i>c</i> 222 L22	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ 222 R13 ρ 222 ₁ R14 ρ 211 R3		
Penetration direction [<i>uv</i> 0]	c	Scanning direction d = [<i>p, q, 0</i>]/2		Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u, v</i> Even <i>u</i> OR even <i>v</i>	[<i>u, v, 0</i>]/2 [<i>u, v, 0</i>]	Even <i>p, q</i> OR odd <i>p, q</i>		<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

*pmm*2 No. 23

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010]	[010] [$\bar{1}$ 00]	<i>pmm</i> 2 L23	0, 1/2 [<i>s, -s</i>]	ρm 2 <i>m</i> R18' ρ 11 <i>m</i> R10
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

*pma*2 No. 24

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>pma</i> 2 L24	0, 1/2 [<i>s, -s</i>]	ρc 2 <i>m</i> R19' ρ 11 <i>m</i> [1/4] R10
[010]	[$\bar{1}$ 00]	<i>pbm</i> 2 L24'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ 121 R3' ρm 11 R4 ρ 1 R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

***pba2* No. 25**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010]	[010] [$\bar{1}$ 00]	<i>pba2</i> L25	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ 121 R3' ρ c11 R5 ρ 1 R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

***cmm2* No. 26**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)	
[100] [010]	[010] [$\bar{1}$ 00]	<i>cmm2</i> L26	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho m2m$ $\rho c2m$ [1/4] $\rho 11m$	R18' R19' R10
Penetration direction [<i>uv</i> 0]	c	Scanning direction d = [<i>p, q, 0</i>]/2	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u, v</i> Even <i>u</i> OR even <i>v</i>	[<i>u, v, 0</i>]/2 [<i>u, v, 0</i>]	Even <i>p, q</i> OR odd <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	$\rho 121$ R3' $\rho 1$ R1

***pm2m* No. 27**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>pm2m</i> L27	<i>s</i>	ρ 2mm R18
[010]	[$\bar{1}$ 00]	<i>p2mm</i> L27'	0, 1/2 [<i>s, -s</i>]	ρ mm2 R15 ρ 1m1 R4'
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 11m L4	<i>s</i>	ρ 1m1 R4'

$pm2_1b$ No. 28

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$pm2_1b$ L28	$[s, (s + \frac{1}{2})]$	$\rho 11m$ R10
[010]	$[\bar{1}00]$	$p2_1ma$ L28'	0, 1/2 $[s, -s]$	$\rho mc2_1$ R17 $\rho 1c1$ R5'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Even u , odd v	Odd p	$p11a$ L5	s	$\rho 1c1$ R5'
Odd u , any v	Even p	$p11b$ L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Odd u , any v	Odd p	$p11n$ L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

$pb2_1m$ No. 29

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$pb2_1m$ L29	$[s, (s + \frac{1}{2})]$	$\rho 1m1$ R4'
[010]	$[\bar{1}00]$	$p2_1am$ L29'	0, 1/2 $[s, -s]$	$\rho cm2_1$ R17' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p11m$ L4	s	$\rho 1m1$ R4'

$pb2b$ No. 30

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	$pb2b$ L30	$[s, (s + \frac{1}{2})]$	$\rho 211$ R3
[010]	$[\bar{1}00]$	$p2aa$ L30'	0, 1/2 $[s, -s]$	$\rho cc2$ R16 $\rho 1c1$ R5'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Even u , odd v	Odd p	$p11a$ L5	s	$\rho 1c1$ R5'
Odd u , any v	Even p	$p11b$ L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Odd u , any v	Odd p	$p11n$ L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***pm2a* No. 31**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>pm2a</i> L31	s	$\rho 2cm$ R19
[010]	$[\bar{1}00]$	<i>p2mb</i> L31'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112$ R8 $\rho m11$ R4 $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , even v	Odd q	<i>p11a</i> L5	s	$\rho 1c1$ R5'
Any u , odd v	Even q	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Any u , odd v	Odd q	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***pm2_{1n}* No. 32**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>pm2_{1n}</i> L32	$[s, (s + \frac{1}{2})]$	$\rho 11m$ R10
[010]	$[\bar{1}00]$	<i>p2_{1mn}</i> L32'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho m11$ R4 $\rho 112_1$ R9 $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , odd v	Any p, q	<i>p11a</i> L5	s	$\rho 1c1$ R5'
Even u OR even v	Odd p, q	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Even u , odd v Odd u , even v	Even q Even p	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***pb2₁a* No. 33**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>pb2₁a</i> L33	$[s, (s + \frac{1}{2})]$	$\rho 1c1$ R5'
[010]	$[\bar{1}00]$	<i>p2₁ab</i> L33'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112_1$ R9 $\rho c11$ R5 $\rho 1$ R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u</i> , even <i>v</i>	Odd <i>q</i>	<i>p11a</i> L5	<i>s</i>	$\rho 1c1$ R5'
Any <i>u</i> , odd <i>v</i>	Even <i>q</i>	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Any <i>u</i> , odd <i>v</i>	Odd <i>q</i>	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***pb2n* No. 34**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>pb2n</i> L34	$[s, (s + \frac{1}{2})]$	$\rho 211$ R3
[010]	$[\bar{1}00]$	<i>p2an</i> L34'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112$ R8 $\rho c11$ R5 $\rho 1$ R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u</i> , odd <i>v</i>	Any <i>p, q</i>	<i>p11a</i> L5	<i>s</i>	$\rho 1c1$ R5'
Even <i>u</i> OR even <i>v</i>	Odd <i>p, q</i>	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Even <i>u</i> , odd <i>v</i> Odd <i>u</i> , even <i>v</i>	Even <i>q</i> Even <i>p</i>	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***cm2m* No. 35**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>cm2m</i> L35	$[s, (s + \frac{1}{2})]$	$\rho 2mm$ R18
[010]	$[\bar{1}00]$	<i>c2mm</i> L35'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho mm2$ R15 $\rho cm2_1$ R17' $\rho 1m1$ R4'

Penetration direction [<i>uv</i> 0]	c	Scanning direction d = [<i>p, q, 0</i>]/2	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u, v</i> Even <i>u</i> OR even <i>v</i>	$[u, v, 0]/2$ $[u, v, 0]$	Even <i>p, q</i> OR odd <i>p, q</i>	<i>p11m</i> L4	<i>s</i>	$\rho 1m1$ R4'

***cm2e* No. 36**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100]	[010]	<i>cm2e</i> L36	$[s, (s + \frac{1}{2})]$	$\rho 2cm$ R19
[010]	$[\bar{1}00]$	<i>c2me</i> L36'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho cc2$ R16 $\rho mc2_1$ R17 $\rho 1c1$ R5'

Penetration direction [<i>uv</i> 0]	c	Scanning direction d = [<i>p, q, 0</i>]/2	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u</i> , even <i>v</i> OR even <i>u</i> , odd <i>v</i>	[<i>u, v, 0</i>]	Even <i>p, q</i> OR odd <i>p, q</i>	<i>p11a</i> L5	<i>s</i>	$\rho 1c1$ R5'
Odd <i>u, v</i>	[<i>u, v, 0</i>]/2	Even <i>p, q</i>	<i>p11b</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1
Odd <i>u, v</i>	[<i>u, v, 0</i>]/2	Odd <i>p, q</i>	<i>p11n</i> L5'	$[s, (s + \frac{1}{2})]$	$\rho 1$ R1

***pmmm* No. 37**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	<i>pmmm</i> L37	0, 1/2 $[s, -s]$	$\rho pmmm$ R20 $\rho 2mm$ R18
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	<i>p112/m</i> L6	0, 1/2 $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

***pmaa* No. 38**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$	$[010]$	<i>pmaa</i> L38	0, 1/2 $[s, -s]$	ρccm R21 $\rho 2cm$ [1/4] R19
$[010]$	$[\bar{1}00]$	<i>pbmb</i> L38'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 2/m11$ R6 $\rho 222$ R13 $\rho 211$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , even v	Odd q	<i>p112/a</i> L7	0, 1/2 $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Any u , odd v	Even q	<i>p112/b</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Any u , odd v	Odd q	<i>p112/n</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

pban No. 39

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	<i>pban</i> L39	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 2/c11$ R7 $\rho 222$ $[1/4]$ R13 $\rho 211$ $[1/4]$ R3

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , odd v	Any p, q	$p112/a$ L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Even u OR even v	Odd p, q	$p112/b$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Even u , odd v Odd u , even v	Even q Even p	$p112/n$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ $[1/4]$ R3' $\rho 1$ R1

pmam No. 40

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$	$[010]$	<i>pmam</i> L40	$0, 1/2$ $[s, -s]$	ρcmm R22' $\rho 2mm$ $[1/4]$ R18
$[010]$	$[\bar{1}00]$	<i>pbmm</i> L40'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 12/m1$ R6' $\rho mm2$ R15 $\rho 1m1$ R4'

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112/m$ L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

pmma No. 41

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>pmma</i> L41	0, 1/2 [$s, -s$]	ρmcm R22 $\rho 2cm$ R19
[010]	$[\bar{1}00]$	<i>pmmb</i> L41'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 112/m$ R11 $\rho m2m$ R18' $\rho 11m$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , even v	Odd q	<i>p112/a</i> L7	0, 1/2 [$s, -s$]	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Any u , odd v	Even q	<i>p112/b</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Any u , odd v	Odd q	<i>p112/n</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

pman No. 42

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100]	[010]	<i>pman</i> L42	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112/m$ R11 $\rho c2m$ [1/4] R19' $\rho 11m$ R10
[010]	$[\bar{1}00]$	<i>pbnm</i> L42'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 2/m11$ R6 $\rho 222_1$ R14 $\rho 211$ R3

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u , odd v	Any p, q	<i>p112/a</i> L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Even u OR even v	Odd p, q	<i>p112/b</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Even u , odd v Odd u , even v	Even q Even p	<i>p112/n</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

pbaa No. 43

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100]	[010]	<i>pbaa</i> L43	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 12/c1$ R7' $\rho cc2$ R16 $\rho 1c1$ R5'
[010]	$[\bar{1}00]$	<i>pbab</i> L43'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 2/c11$ R7 $\rho 222_1 [1/4]$ R14 $\rho 211 [1/4]$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Odd u , even v	Odd q	<i>p112/a</i> L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Any u , odd v	Even q	<i>p112/b</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Any u , odd v	Odd q	<i>p112/n</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121 [1/4]$ R3' $\rho 1$ R1

pbam No. 44

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100] [010]	[010] $[\bar{1}00]$	<i>pbam</i> L44	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 12/m1$ R6' $\rho cm2_1$ R17' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	<i>p112/m</i> L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

pbma No. 45

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100]	[010]	<i>pbma</i> L45	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 12/c1$ R7' $\rho mc2_1$ R17 $\rho 1c1$ R5'
[010]	$[\bar{1}00]$	<i>pmab</i> L45'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112_1/m$ R12 $\rho c2m$ R19' $\rho 11m$ [1/4] R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Odd u , even v	Odd q	<i>p112/a</i> L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Any u , odd v	Even q	<i>p112/b</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Any u , odd v	Odd q	<i>p112/n</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

pmmn No. 46

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100] [010]	[010] $[\bar{1}00]$	<i>pmmn</i> L46	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112_1/m$ R12 $\rho m2m$ [1/4] R18' $\rho 11m$ [1/4] R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Odd u , odd v	Any p, q	<i>p112/a</i> L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Even u OR even v	Odd p, q	<i>p112/b</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Even u , odd v Odd u , even v	Even q Even p	<i>p112/n</i> L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

***cmmm* No. 47**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$		
[100] [010]	[010] [$\bar{1}00$]	<i>cmmm</i> L47	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρmmm ρcmm $\rho 2mm$	R20 R22' R18	
Penetration direction $[uv0]$	\mathbf{c}	Scanning direction $\mathbf{d} = [p, q, 0]/2$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$	
Odd u, v Even u OR even v	$[u, v, 0]/2$ $[u, v, 0]$	Even p, q OR odd p, q	$p112/m$ L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ $\rho 1m1$	R6' R4'

***cmme* No. 48**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$		
[100]	[010]	<i>cmme</i> L48	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρccm ρmcm $\rho 2cm$	R21 R22 R19	
[010]	[$\bar{1}00$]	<i>cmme</i> L48 $[1/4, 1/4, 0]$	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρmcm ρccm $\rho 2cm$	R22 R21 R19	
Penetration direction $[uv0]$	\mathbf{c}	Scanning direction $\mathbf{d} = [p, q, 0]/2$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$	
Odd u , even v OR even u , odd v	$[u, v, 0]$	Even p, q OR odd p, q	$p112/a$ L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ $\rho 1c1$	R7' R5'
Odd u, v	$[u, v, 0]/2$	Even p, q	$p112/b$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ $\rho 121$ $\rho 1$	R2 R3' R1
Odd u, v	$[u, v, 0]/2$	Odd p, q	$p112/n$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ $\rho 121$ $\rho 1$	R2 R3' R1

$p4$ No. 49

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$ $[1\bar{1}0]$	$[010]$ $[\bar{1}00]$ $[\bar{1}00]$ $[100]$	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{4}$ No. 50

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$ $[1\bar{1}0]$	$[010]$ $[\bar{1}00]$ $[\bar{1}00]$ $[100]$	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p4/m$ No. 51

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$ $[1\bar{1}0]$	$[010]$ $[\bar{1}00]$ $[\bar{1}00]$ $[100]$	$p112/m$ L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112/m$ L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

$p4/n$ No. 52

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p112/n$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1
$[110]$ $[1\bar{1}0]$	$[\bar{1}00]$ $[100]$	$p112/a$ L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Odd u , odd v	Any p, q	$p112/a$ L7	$0, 1/2$ $[s, -s]$	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Even u OR even v	Odd p, q	$p112/b$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Even u , odd v Odd u , even v	Even q Even p	$p112/n$ L7'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

$p422$ No. 53

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p222$ L19	$0, 1/2$ $[s, -s]$	$\rho 222$ R13 $\rho 211$ R3
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$c222$ L22	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 222$ R13 $\rho 222_1$ R14 $\rho 211$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location \mathbf{sd}	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p4_2$ No. 54

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p2_12_12_1$ L21	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 121$ R3' $\rho 112_1$ R9 $\rho 1$ R1
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$c222$ L22 $[1/4, 1/4, 0]$	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 222_1 [1/4]$ R14 $\rho 222 [1/4]$ R13 $\rho 211 [1/4]$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p4mm$ No. 55

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$pmm2$ L23	$0, 1/2$ $[s, -s]$	$\rho m2m$ R18' $\rho 11m$ R10
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$cm2$ L26	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho m2m$ R18' $\rho c2m [1/4]$ R19' $\rho 11m$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p4bm$ No. 56

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$pba2$ L25	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 121$ R3' $\rho c11$ R5 $\rho 1$ R1
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$cm2$ L26 $[1/4, 1/4, 0]$	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho c2m$ R19' $\rho m2m$ $[1/4]$ R18' $\rho 11m$ $[1/4]$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{4}2m$ No. 57

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p222$ L19	$0, 1/2$ $[s, -s]$	$\rho 222$ R13 $\rho 211$ R3
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$cm2$ L26	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho m2m$ R18' $\rho c2m$ $[1/4]$ R19' $\rho 11m$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{4}2_1m$ No. 58

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$p2_12_12_1$ L21	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 121$ R3' $\rho 112_1$ R9 $\rho 1$ R1
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$cmm2$ L26 $[1/4, 1/4, 0]$	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho c2m$ R19' $\rho m2m [1/4]$ R18' $\rho 11m [1/4]$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{4}m2$ No. 59

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$pmm2$ L23	$0, 1/2$ $[s, -s]$	$\rho m2m$ R18' $\rho 11m$ R10
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$c222$ L22	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 222$ R13 $\rho 222_1$ R14 $\rho 211$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{4}b2$ No. 60

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$pba2$ L25	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 121$ R3' $\rho c11$ R5 $\rho 1$ R1
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$c222$ L22 $[1/4, 1/4, 0]$	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 222_1 [1/4]$ R14 $\rho 222 [1/4]$ R13 $\rho 211 [1/4]$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p4/mmm$ No. 61

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
$[100]$ $[010]$	$[010]$ $[\bar{1}00]$	$pmmm$ L37	$0, 1/2$ $[s, -s]$	ρmmm R20 $\rho 2mm$ R18
$[110]$ $[1\bar{1}0]$	$[\bar{1}10]$ $[110]$	$cmmm$ L47	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρmmm R20 $\rho cmm [1/4]$ R22' $\rho 2mm$ R18
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p112/m$ L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'

***p4/nbm* No. 62**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010]	[010] [$\bar{1}$ 00]	<i>pban</i> L39	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 2/c11$ R7 $\rho 222$ [1/4] R13 $\rho 211$ [1/4] R3
[110]	[$\bar{1}$ 10]	<i>cmme</i> L48	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρccm R21 ρmcm [1/4] R22 $\rho 2cm$ [1/4] R19
[1 $\bar{1}$ 0]	[110]	<i>cmme</i> L48 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρmcm R22 ρccm [1/4] R21 $\rho 2cm$ R19
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u</i> , odd <i>v</i>	Any <i>p, q</i>	<i>p112/a</i> L7	0, 1/2 [<i>s</i> , − <i>s</i>]	$\rho 12/c1$ R7' $\rho 1c1$ R5'
Even <i>u</i> OR even <i>v</i>	Odd <i>p, q</i>	<i>p112/b</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 121$ R3' $\rho 1$ R1
Even <i>u</i> , odd <i>v</i> Odd <i>u</i> , even <i>v</i>	Even <i>q</i> Even <i>p</i>	<i>p112/n</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho \bar{1}$ R2 $\rho 121$ [1/4] R3' $\rho 1$ R1

***p4/mbm* No. 63**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010]	[010] [$\bar{1}$ 00]	<i>pbam</i> L44	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 12/m1$ R6' $\rho cm2_1$ R17' $\rho 1m1$ R4'
[110] [1 $\bar{1}$ 0]	[$\bar{1}$ 10] [110]	<i>cmmm</i> L47 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρcmm R22' ρmmm [1/4] R20 $\rho 2mm$ [1/4] R18
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p112/m</i> L6	0, 1/2 [<i>s</i> , − <i>s</i>]	$\rho 12/m1$ R6' $\rho 1m1$ R4'

***p4/nmm* No. 64**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010]	[010] [$\bar{1}$ 00]	<i>pmmn</i> L46	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ 112 ₁ /m R12 ρ m2m [1/4] R18' ρ 11m [1/4] R10
[110]	[$\bar{1}$ 10]	<i>cmme</i> L48 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ mcm R22 ρ ccm [1/4] R21 ρ 2cm R19
[1 $\bar{1}$ 0]	[110]	<i>cmme</i> L48	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ ccm R21 ρ mcm [1/4] R22 ρ 2cm [1/4] R19
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Odd <i>u</i> , odd <i>v</i>	Any <i>p, q</i>	<i>p</i> 112/ <i>a</i> L7	0, 1/2 [<i>s</i> , − <i>s</i>]	ρ 12/ <i>c</i> 1 R7' ρ 1 <i>c</i> 1 R5'
Even <i>u</i> OR even <i>v</i>	Odd <i>p, q</i>	<i>p</i> 112/ <i>b</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ $\bar{1}$ R2 ρ 121 R3' ρ 1 R1
Even <i>u</i> , odd <i>v</i> Odd <i>u</i> , even <i>v</i>	Even <i>q</i> Even <i>p</i>	<i>p</i> 112/ <i>n</i> L7'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ $\bar{1}$ R2 ρ 121 [1/4] R3' ρ 1 R1

***p3* No. 65**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[010] [$\bar{1}$ 00] [$\bar{1}$ 00] [100] [010] [$\bar{1}$ 00]	<i>p</i> 1 L1	<i>s</i>	ρ 1 R1
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 1 L1	<i>s</i>	ρ 1 R1

$p\bar{3}$ No. 66

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[010] [$\bar{1}$ 00] [$\bar{1}$ 00] [100] [010] [$\bar{1}$ 00]	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho\bar{1}$ R2 $\rho 1$ R1

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho\bar{1}$ R2 $\rho 1$ R1

$p312$ No. 67

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction \mathbf{d}	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
[100] [010] [110]	[120] [$\bar{2}\bar{1}$ 0] [$\bar{1}$ 10]	$c121$ L10'	[$s, (s + \frac{1}{2})$]	$\rho 211$ R3
[1 $\bar{1}$ 0] [120] [210]	[110] [$\bar{1}$ 00] [010]	$c211$ L10	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 112$ R8 $\rho 112_1$ R9 $\rho 1$ R1

Penetration direction [$uv0$] = \mathbf{c}	Scanning direction $\mathbf{d} = [pq0]$	Scanning group ($\mathbf{c}, \mathbf{d}, \mathbf{z}$)	Location $s\mathbf{d}$	Penetration rod group ($\mathbf{d}, \mathbf{z}, \mathbf{c}$)
Any u, v	Any p, q	$p1$ L1	s	$\rho 1$ R1

***p*321 No. 68**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10]	$c211$ L10	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 112$ R8 $\rho 112_1$ R9 $\rho 1$ R1
[1 $\bar{1}$ 0] [120] [210]	[110] [$\bar{1}$ 00] [010]	$c121$ L10'	[$s, (s + \frac{1}{2})$]	$\rho 211$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p1$ L1	s	$\rho 1$ R1

***p*3*m*1 No. 69**

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10]	$cm11$ L13	[$s, (s + \frac{1}{2})$]	$\rho 11m$ R10
[1 $\bar{1}$ 0] [120] [210]	[110] [$\bar{1}$ 00] [010]	$c1m1$ L13'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho m11$ R4 $\rho c11$ R5 $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p1$ L1	s	$\rho 1$ R1

$p31m$ No. 70

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10]	$c1m1$ L13'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho m11$ R4 $\rho c11$ R5 $\rho 1$ R1
[1 $\bar{1}$ 0] [120] [210]	[110] [$\bar{1}$ 00] [010]	$cm11$ L13	[$s, (s + \frac{1}{2})$]	$\rho 11m$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p1$ L1	s	$\rho 1$ R1

$p\bar{3}1m$ No. 71

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10]	$c12/m1$ L18'	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 2/m11$ R6 $\rho 2/c11$ [1/4] R7 $\rho 211$ R3
[1 $\bar{1}$ 0] [120] [210]	[110] [$\bar{1}$ 00] [010]	$c2/m11$ L18	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	$\rho 112/m$ R11 $\rho 112_1/m$ [1/4] R12 $\rho 11m$ R10
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 [$s, -s$]	$\rho \bar{1}$ R2 $\rho 1$ R1

$p\bar{3}m1$ No. 72

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$c2/m11$ L18	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 112/m$ R11 $\rho 112_1/m$ [1/4] R12 $\rho 11m$ R10
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c12/m1$ L18'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho 2/m11$ R6 $\rho 2/c11$ [1/4] R7 $\rho 211$ R3
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p\bar{1}$ L2	$0, 1/2$ $[s, -s]$	$\rho \bar{1}$ R2 $\rho 1$ R1

$p6$ No. 73

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110] $[1\bar{1}0]$ [120] [210]	[010] $[\bar{1}00]$ $[\bar{1}00]$ [100] [010] $[\bar{1}00]$	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112$ L3	$0, 1/2$ $[s, -s]$	$\rho 121$ R3' $\rho 1$ R1

$p\bar{6}$ No. 74

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[010] [$\bar{1}$ 00] [$\bar{1}$ 00] [100] [010] [$\bar{1}$ 00]	$p11m$ L4	s	$\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p11m$ L4	s	$\rho 1m1$ R4'

$p6/m$ No. 75

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[010] [$\bar{1}$ 00] [$\bar{1}$ 00] [100] [010] [$\bar{1}$ 00]	$p112/m$ L6	0, 1/2 [$s, -s$]	$\rho 12/m1$ R6' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p112/m$ L6	0, 1/2 [$s, -s$]	$\rho 12/m1$ R6' $\rho 1m1$ R4'

***p*622 No. 76**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10] [110] [$\bar{1}$ 00] [010]	<i>c</i> 222 L22	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ 222 R13 ρ 222 ₁ R14 ρ 211 R3
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

***p*6mm No. 77**

Penetration direction [<i>uv</i> 0] = c	Scanning direction d	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
[100] [010] [110] [1 $\bar{1}$ 0] [120] [210]	[120] [2 $\bar{1}$ 0] [$\bar{1}$ 10] [110] [$\bar{1}$ 00] [010]	<i>cmm</i> 2 L26	[0, 1/2] [1/4, 3/4] [$\pm s, (\frac{1}{2} \pm s)$]	ρ <i>m</i> 2 <i>m</i> R18' ρ <i>c</i> 2 <i>m</i> [1/4] R19' ρ 11 <i>m</i> R10
Penetration direction [<i>uv</i> 0] = c	Scanning direction d = [<i>pq</i> 0]	Scanning group (c, d, z)	Location sd	Penetration rod group (d, z, c)
Any <i>u, v</i>	Any <i>p, q</i>	<i>p</i> 112 L3	0, 1/2 [<i>s, -s</i>]	ρ 121 R3' ρ 1 R1

$p\bar{6}m2$ No. 78

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$	$[120]$ $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$cm2m$ L35	$[s, (s + \frac{1}{2})]$	$\rho 2mm$ R18
$[1\bar{1}0]$ $[120]$ $[210]$	$[110]$ $[\bar{1}00]$ $[010]$	$c2mm$ L35'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho mm2$ R15 $\rho cm2_1$ R17' $\rho 1m1$ R4'
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p11m$ L4	s	$\rho 1m1$ R4'

$p\bar{6}2m$ No. 79

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$	$[120]$ $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$c2mm$ L35'	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	$\rho mm2$ R15 $\rho cm2_1$ R17' $\rho 1m1$ R4'
$[1\bar{1}0]$ $[120]$ $[210]$	$[110]$ $[\bar{1}00]$ $[010]$	$cm2m$ L35	$[s, (s + \frac{1}{2})]$	$\rho 2mm$ R18
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location \mathbf{sd}	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	$p11m$ L4	s	$\rho 1m1$ R4'

p6/mmm No. 80

Penetration direction $[uv0] = \mathbf{c}$	Scanning direction \mathbf{d}	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
$[100]$ $[010]$ $[110]$ $[1\bar{1}0]$ $[120]$ $[210]$	$[120]$ $[2\bar{1}0]$ $[\bar{1}10]$ $[110]$ $[\bar{1}00]$ $[010]$	<i>cmmm</i> L47	$[0, 1/2]$ $[1/4, 3/4]$ $[\pm s, (\frac{1}{2} \pm s)]$	ρmmm R20 ρcmm $[1/4]$ R22' $\rho 2mm$ R18
Penetration direction $[uv0] = \mathbf{c}$	Scanning direction $\mathbf{d} = [pq0]$	Scanning group $(\mathbf{c}, \mathbf{d}, \mathbf{z})$	Location $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Any u, v	Any p, q	<i>p112/m</i> L6	$0, 1/2$ $[s, -s]$	$\rho 12/m1$ R6' $\rho 1m1$ R4'