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

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

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

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

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: Subperiodic 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	$\not{p}1$ 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	$\not{p}1$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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]	$p11m$ L4	s	$\not{p}1m1$ 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	$\not{p}1m1$ 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]	$p11a$ L5	s	$\not{p}1c1$ R5′
[010]	$[\bar{1}00]$	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
[010]	$[\bar{1}\bar{1}0]$	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ 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	$p11a$ L5	s	$\not{p}1c1$ R5′
Any u, odd v	Even q	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Any u, odd v	Odd q	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ 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]	$p112/m$ L6	0, 1/2 $[s, -s]$	$\not{p}12/m1$ R6′ $\not{p}1m1$ 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 $[s, -s]$	$\not{p}12/m1$ R6′ $\not{p}1m1$ R4′

$p112/a$ No. 7

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]	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′
[010]	$[\bar{1}00]$	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ R3′ $\not{p}1$ R1
[010]	$[\bar{1}\bar{1}0]$	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ 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	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′
Any u, odd v	Even q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ R3′ $\not{p}1$ R1
Any u, odd v	Odd q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ R1

$p211$ No. 8

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]	$p211$ L8	0, 1/2 $[s, -s]$	$\not{p}112$ R8 $\not{p}1$ R1
[010]	$[\bar{1}00]$	$p121$ L8′	s	$\not{p}211$ 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	$\not{p}1$ 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 $[s, -s]$	$\not p112_1$ R9 $\not p1$ R1
[010]	$[\bar{1}00]$	$p12_11$ L9′	$[s, (s + \frac{1}{2})]$	$\not p1$ 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	$\not p1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p112$ R8 $\not p112_1$ R9 $\not p1$ R1
[010]	$[\bar{1}00]$	$c121$ L10′	$[s, (s + \frac{1}{2})]$	$\not p211$ 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	$\not p1$ 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	$\not p11m$ R10
[010]	$[\bar{1}00]$	$p1m1$ L11′	0, 1/2 $[s, -s]$	$\not pm11$ R4 $\not p1$ 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	$\not p1$ R1

$pb11$ No. 12

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]	$pb11$ L12	$[s, (s + \frac{1}{2})]$	$\not p 1$ R1
[010]	$[\bar{1}00]$	$p1a1$ L12′	0, 1/2 $[s, -s]$	$\not p c11$ R5 $\not p 1$ 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	$\not p 1$ R1

$cm11$ No. 13

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]	$cm11$ L13	$[s, (s + \frac{1}{2})]$	$\not p 11m$ R10
[010]	$[\bar{1}00]$	$c1m1$ L13′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p m11$ R4 $\not p c11$ R5 $\not p 1$ R1

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	$\not p 1$ R1

$p2/m11$ No. 14

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]	$p2/m11$ L14	0, 1/2 $[s, -s]$	$\not p 112/m$ R11 $\not p 11m$ R10
[010]	$[\bar{1}00]$	$p12/m1$ L14′	0, 1/2 $[s, -s]$	$\not p 2/m11$ R6 $\not p 211$ 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 $[s, -s]$	$\not p \bar{1}$ R2 $\not p 1$ R1

$p2_1/m11$ No. 15

Penetration direction $[uv0]$ = **c**	Scanning direction **d**	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
[100]	[010]	$p2_1/m11$ L15	0, 1/2 $[s, -s]$	$\not{p}112_1/m$ R12 $\not{p}11m$ [1/4] R10
[010]	$[\bar{1}00]$	$p12_1/m1$ L15′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}m11$ R4 $\not{p}1$ R1

Penetration direction $[uv0]$ = **c**	Scanning direction **d** = $[pq0]$	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ R1

$p2/b11$ No. 16

Penetration direction $[uv0]$ = **c**	Scanning direction **d**	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
[100]	[010]	$p2/b11$ L16	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}112$ R8 $\not{p}1$ R1
[010]	$[\bar{1}00]$	$p12/a1$ L16′	0, 1/2 $[s, -s]$	$\not{p}2/c11$ R7 $\not{p}211$ [1/4] R3

Penetration direction $[uv0]$ = **c**	Scanning direction **d** = $[pq0]$	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}112_1$ R9 $\not{p}1$ R1
[010]	$[\bar{1}00]$	$p12_1/a1$ L17′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}c11$ R5 $\not{p}1$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112/m$ R11 $\not{p}112_1/m$ [1/4] R12 $\not{p}11m$ R10
[010]	$[\bar{1}00]$	$c12/m1$ L18′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}2/m11$ R6 $\not{p}2/c11$ [1/4] R7 $\not{p}211$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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 $[s, -s]$	$\nearrow 222$ R13 $\nearrow 211$ 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 $[s, -s]$	$\nearrow 121$ R3′ $\nearrow 1$ 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 $[s, -s]$	$\nearrow 222_1$ [1/4] R14 $\nearrow 211$ [1/4] R3
[010]	$[\bar{1}00]$	$p22_12$ L20′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 121$ R3′ $\nearrow 112$ R8 $\nearrow 1$ 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 $[s, -s]$	$\nearrow 121$ R3′ $\nearrow 1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 121$ R3′ $\nearrow 112_1$ R9 $\nearrow 1$ 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 $[s, -s]$	$\nearrow 121$ R3′ $\nearrow 1$ R1

*c*222 No. 22

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] $[\bar{1}00]$	*c*222 L22	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not\rho 222$ R13 $\not\rho 222_1$ R14 $\not\rho 211$ 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	$p112$ L3	0, 1/2 $[s, -s]$	$\not\rho 121$ R3′ $\not\rho 1$ R1

*pmm*2 No. 23

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] $[\bar{1}00]$	*pmm*2 L23	0, 1/2 $[s, -s]$	$\not\rho m2m$ R18′ $\not\rho 11m$ 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 $[s, -s]$	$\not\rho 121$ R3′ $\not\rho 1$ R1

*pma*2 No. 24

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]	*pma*2 L24	0, 1/2 $[s, -s]$	$\not\rho c2m$ R19′ $\not\rho 11m$ [1/4] R10
[010]	$[\bar{1}00]$	*pbm*2 L24′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not\rho 121$ R3′ $\not\rho m11$ R4 $\not\rho 1$ 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 $[s, -s]$	$\not\rho 121$ R3′ $\not\rho 1$ R1

*pba*2 No. 25

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] $[\bar{1}00]$	*pba*2 L25	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}121$ R3′ $\not{p}c11$ R5 $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ R1

*cmm*2 No. 26

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] $[\bar{1}00]$	*cmm*2 L26	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}m2m$ R18′ $\not{p}c2m$ [1/4] R19′ $\not{p}11m$ R10

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	$p112$ L3	0, 1/2 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ R1

*pm*2*m* No. 27

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]	*pm*2*m* L27	s	$\not{p}2mm$ R18
[010]	$[\bar{1}00]$	*p*2*mm* L27′	0, 1/2 $[s, -s]$	$\not{p}mm2$ R15 $\not{p}1m1$ 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	$\not{p}1m1$ R4′

$pm2_1b$ No. 28

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]	$pm2_1b$ L28	$[s, (s + \frac{1}{2})]$	$\not{p}11m$ R10
[010]	$[\bar{1}00]$	$p2_1ma$ L28′	0, 1/2 $[s, -s]$	$\not{p}mc2_1$ R17 $\not{p}1c1$ R5′

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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Even u, odd v	Odd p	$p11a$ L5	s	$\not{p}1c1$ R5′
Odd u, any v	Even p	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Odd u, any v	Odd p	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1

$pb2_1m$ No. 29

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]	$pb2_1m$ L29	$[s, (s + \frac{1}{2})]$	$\not{p}1m1$ R4′
[010]	$[\bar{1}00]$	$p2_1am$ L29′	0, 1/2 $[s, -s]$	$\not{p}cm2_1$ R17′ $\not{p}1m1$ 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	$\not{p}1m1$ R4′

$pb2b$ No. 30

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]	$pb2b$ L30	$[s, (s + \frac{1}{2})]$	$\not{p}211$ R3
[010]	$[\bar{1}00]$	$p2aa$ L30′	0, 1/2 $[s, -s]$	$\not{p}cc2$ R16 $\not{p}1c1$ R5′

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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Even u, odd v	Odd p	$p11a$ L5	s	$\not{p}1c1$ R5′
Odd u, any v	Even p	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Odd u, any v	Odd p	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1

*pm*2*a* 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]	*pm*2*a* L31	s	$\nearrow 2cm$ R19
[010]	$[\bar{1}00]$	*p*2*mb* L31′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 112$ R8 $\nearrow m11$ R4 $\nearrow 1$ 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	*p*11*a* L5	s	$\nearrow 1c1$ R5′
Any u, odd v	Even q	*p*11*b* L5′	$[s, (s + \frac{1}{2})]$	$\nearrow 1$ R1
Any u, odd v	Odd q	*p*11*n* L5′	$[s, (s + \frac{1}{2})]$	$\nearrow 1$ 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]	$pm2_1n$ L32	$[s, (s + \frac{1}{2})]$	$\nearrow 11m$ R10
[010]	$[\bar{1}00]$	$p2_1mn$ L32′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow m11$ R4 $\nearrow 112_1$ R9 $\nearrow 1$ 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	*p*11*a* L5	s	$\nearrow 1c1$ R5′
Even u OR even v	Odd p, q	*p*11*b* L5′	$[s, (s + \frac{1}{2})]$	$\nearrow 1$ R1
Even u, odd v Odd u, even v	Even q Even p	*p*11*n* L5′	$[s, (s + \frac{1}{2})]$	$\nearrow 1$ R1

$pb2_1a$ No. 33

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]	$pb2_1a$ L33	$[s, (s + \frac{1}{2})]$	$\not{p}1c1$ R5′
[010]	$[\bar{1}00]$	$p2_1ab$ L33′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112_1$ R9 $\not{p}c11$ R5 $\not{p}1$ 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	$p11a$ L5	s	$\not{p}1c1$ R5′
Any u, odd v	Even q	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Any u, odd v	Odd q	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1

$pb2n$ No. 34

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]	$pb2n$ L34	$[s, (s + \frac{1}{2})]$	$\not{p}211$ R3
[010]	$[\bar{1}00]$	$p2an$ L34′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112$ R8 $\not{p}c11$ R5 $\not{p}1$ 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	$p11a$ L5	s	$\not{p}1c1$ R5′
Even u OR even v	Odd p, q	$p11b$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p11n$ L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1

*cm*2*m* No. 35

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]	*cm*2*m* L35	$[s, (s + \frac{1}{2})]$	$\not{p}2mm$ R18
[010]	$[\bar{1}00]$	*c*2*mm* L35′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}mm2$ R15 $\not{p}cm2_1$ R17′ $\not{p}1m1$ R4′

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*11*m* L4	s	$\not{p}1m1$ R4′

*cm*2*e* No. 36

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]	*cm*2*e* L36	$[s, (s + \frac{1}{2})]$	$\not{p}2cm$ R19
[010]	$[\bar{1}00]$	*c*2*me* L36′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}cc2$ R16 $\not{p}mc2_1$ R17 $\not{p}1c1$ R5′

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, even v OR even u, odd v	$[u, v, 0]$	Even p, q OR odd p, q	*p*11*a* L5	s	$\not{p}1c1$ R5′
Odd u, v	$[u, v, 0]/2$	Even p, q	*p*11*b* L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1
Odd u, v	$[u, v, 0]/2$	Odd p, q	*p*11*n* L5′	$[s, (s + \frac{1}{2})]$	$\not{p}1$ R1

pmmm No. 37

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 $[s, -s]$	$\not p mmm$ R20 $\not p 2mm$ 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 $[s, -s]$	$\not p 12/m1$ R6′ $\not p 1m1$ R4′

pmaa No. 38

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]	*pmaa* L38	0, 1/2 $[s, -s]$	$\not p ccm$ R21 $\not p 2cm$ [1/4] R19
[010]	$[\bar{1}00]$	*pbmb* L38′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 2/m11$ R6 $\not p 222$ R13 $\not p 211$ 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, even v	Odd q	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not p 12/c1$ R7′ $\not p 1c1$ R5′
Any u, odd v	Even q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ R3′ $\not p 1$ R1
Any u, odd v	Odd q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ [1/4] R3′ $\not p 1$ R1

pban No. 39

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] $[\bar{1}00]$	*pban* L39	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p2/c11$ R7 $p222$ [1/4] R13 $p211$ [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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, odd v	Any p, q	$p112/a$ L7	0, 1/2 $[s, -s]$	$p12/c1$ R7′ $p1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p\bar{1}$ R2 $p121$ R3′ $p1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p\bar{1}$ R2 $p121$ [1/4] R3′ $p1$ R1

pmam No. 40

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]	*pmam* L40	0, 1/2 $[s, -s]$	$pcmm$ R22′ $p2mm$ [1/4] R18
[010]	$[\bar{1}00]$	*pbmm* L40′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p12/m1$ R6′ $pmm2$ R15 $p1m1$ 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 $[s, -s]$	$p12/m1$ R6′ $p1m1$ R4′

pmma No. 41

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]	*pmma* L41	0, 1/2 $[s, -s]$	$\mathscr{p}mcm$ R22 $\mathscr{p}2cm$ R19
[010]	$[\bar{1}00]$	*pmmb* L41′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\mathscr{p}112/m$ R11 $\mathscr{p}m2m$ R18′ $\mathscr{p}11m$ 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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, even v	Odd q	$p112/a$ L7	0, 1/2 $[s, -s]$	$\mathscr{p}12/c1$ R7′ $\mathscr{p}1c1$ R5′
Any u, odd v	Even q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\mathscr{p}\bar{1}$ R2 $\mathscr{p}121$ R3′ $\mathscr{p}1$ R1
Any u, odd v	Odd q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\mathscr{p}\bar{1}$ R2 $\mathscr{p}121$ [1/4] R3′ $\mathscr{p}1$ 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]	*pman* L42	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 112/m$ R11 $\not p c2m$ [1/4] R19′ $\not p 11m$ R10
[010]	$[\bar{1}00]$	*pbmn* L42′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 2/m11$ R6 $\not p 222_1$ R14 $\not p 211$ 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	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not p 12/c1$ R7′ $\not p 1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ R3′ $\not p 1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ [1/4] R3′ $\not p 1$ R1

pbaa No. 43

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]	*pbaa* L43	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\wp 12/c1$ R7′ $\wp cc2$ R16 $\wp 1c1$ R5′
[010]	$[\bar{1}00]$	*pbab* L43′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\wp 2/c11$ R7 $\wp 222_1$ [1/4] R14 $\wp 211$ [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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, even v	Odd q	$p112/a$ L7	0, 1/2 $[s, -s]$	$\wp 12/c1$ R7′ $\wp 1c1$ R5′
Any u, odd v	Even q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\wp \bar{1}$ R2 $\wp 121$ R3′ $\wp 1$ R1
Any u, odd v	Odd q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\wp \bar{1}$ R2 $\wp 121$ [1/4] R3′ $\wp 1$ R1

pbam No. 44

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] $[\bar{1}00]$	*pbam* L44	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\wp 12/m1$ R6′ $\wp cm2_1$ R17′ $\wp 1m1$ 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 $[s, -s]$	$\wp 12/m1$ R6′ $\wp 1m1$ R4′

pbma No. 45

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]	*pbma* L45	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}12/c1$ R7′ $\not{p}mc2_1$ R17 $\not{p}1c1$ R5′
[010]	$[\bar{1}00]$	*pmab* L45′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112_1/m$ R12 $\not{p}c2m$ R19′ $\not{p}11m$ [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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, even v	Odd q	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′
Any u, odd v	Even q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ R3′ $\not{p}1$ R1
Any u, odd v	Odd q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ R1

pmmn No. 46

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] $[\bar{1}00]$	*pmmn* L46	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112_1/m$ R12 $\not{p}m2m$ [1/4] R18′ $\not{p}11m$ [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 $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
Odd u, odd v	Any p, q	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ R3′ $\not{p}1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ R1

cmmm No. 47

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] $[\bar{1}00]$	*cmmm* L47	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	*mmm* R20 *cmm* [1/4] R22′ *2mm* R18

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	$p112/m$ L6	0, 1/2 $[s, -s]$	12/m1 R6′ 1m1 R4′

cmme No. 48

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]	*cmme* L48	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	*ccm* R21 *mcm* [1/4] R22 *2cm* [1/4] R19
[010]	$[\bar{1}00]$	*cmme* L48 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	*mcm* R22 *ccm* [1/4] R21 *2cm* R19

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, even v OR even u, odd v	$[u, v, 0]$	Even p, q OR odd p, q	$p112/a$ L7	0, 1/2 $[s, -s]$	12/c1 R7′ 1c1 R5′
Odd u, v	$[u, v, 0]/2$	Even p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\bar{1}$ R2 121 R3′ 1 R1
Odd u, v	$[u, v, 0]/2$	Odd p, q	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\bar{1}$ R2 121 [1/4] R3′ 1 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $[s, -s]$	$\not{p}12/m1$ R6′ $\not{p}1m1$ 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 $[s, -s]$	$\not{p}12/m1$ R6′ $\not{p}1m1$ R4′

$p4/n$ No. 52

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] $[\bar{1}00]$	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ R1
[110] $[1\bar{1}0]$	$[\bar{1}00]$ [100]	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′

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	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not{p}12/c1$ R7′ $\not{p}1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ R3′ $\not{p}1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}\bar{1}$ R2 $\not{p}121$ [1/4] R3′ $\not{p}1$ R1

$p422$ No. 53

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 $[s, -s]$	$\not{p}222$ R13 $\not{p}211$ R3
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$c222$ L22	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}222$ R13 $\not{p}222_1$ R14 $\not{p}211$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ R1

$p42_12$ No. 54

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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p121$ R3′ $\not p112_1$ R9 $\not p1$ R1
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$c222$ L22 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p222_1$ [1/4] R14 $\not p222$ [1/4] R13 $\not p211$ [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 $[s, -s]$	$\not p121$ R3′ $\not p1$ R1

$p4mm$ No. 55

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] $[\bar{1}00]$	$pmm2$ L23	0, 1/2 $[s, -s]$	$\not pm2m$ R18′ $\not p11m$ R10
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$cmm2$ L26	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not pm2m$ R18′ $\not pc2m$ [1/4] R19′ $\not p11m$ 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 $[s, -s]$	$\not p121$ R3′ $\not p1$ R1

*p*4*bm* 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}$00]	*pba*2 L25	[0, 1/2] [1/4, 3/4] [$\pm s$, ($\frac{1}{2} \pm s$)]	$\not p$121 R3′ $\not p c$11 R5 $\not p$1 R1
[110] [1$\bar{1}$0]	[$\bar{1}$10] [110]	*cmm*2 L26 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] [$\pm s$, ($\frac{1}{2} \pm s$)]	$\not p c$2*m* R19′ $\not p m$2*m* [1/4] R18′ $\not p$11*m* [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 $[s, -s]$	$\not p$121 R3′ $\not p$1 R1

p$\bar{4}$2*m* 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 $[s, -s]$	$\not p$222 R13 $\not p$211 R3
[110] [1$\bar{1}$0]	[$\bar{1}$10] [110]	*cmm*2 L26	[0, 1/2] [1/4, 3/4] [$\pm s$, ($\frac{1}{2} \pm s$)]	$\not p m$2*m* R18′ $\not p c$2*m* [1/4] R19′ $\not p$11*m* 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 $[s, -s]$	$\not p$121 R3′ $\not p$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 $s\mathbf{d}$	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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}121$ R3′ $\not{p}112_1$ R9 $\not{p}1$ R1
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$cmm2$ L26 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}c2m$ R19′ $\not{p}m2m$ [1/4] R18′ $\not{p}11m$ [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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010]	[010] $[\bar{1}00]$	$pmm2$ L23	0, 1/2 $[s, -s]$	$\not{p}m2m$ R18′ $\not{p}11m$ R10
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$c222$ L22	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}222$ R13 $\not{p}222_1$ R14 $\not{p}211$ 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 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 121$ R3′ $\not p c11$ R5 $\not p 1$ R1
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$c222$ L22 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 222_1$ [1/4] R14 $\not p 222$ [1/4] R13 $\not p 211$ [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 $[s, -s]$	$\not p 121$ R3′ $\not p 1$ 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 $[s, -s]$	$\not p mmm$ R20 $\not p 2mm$ R18
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	$cmmm$ L47	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p mmm$ R20 $\not p cmm$ [1/4] R22′ $\not p 2mm$ 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 $[s, -s]$	$\not p 12/m1$ R6′ $\not p 1m1$ R4′

$p4/nbm$ No. 62

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] $[\bar{1}00]$	*pban* L39	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p2/c11$ R7 $p222$ [1/4] R13 $p211$ [1/4] R3
[110]	$[\bar{1}10]$	*cmme* L48	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$pccm$ R21 $pmcm$ [1/4] R22 $p2cm$ [1/4] R19
$[1\bar{1}0]$	[110]	*cmme* L48 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$pmcm$ R22 $pccm$ [1/4] R21 $p2cm$ R19

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	$p112/a$ L7	0, 1/2 $[s, -s]$	$p12/c1$ R7′ $p1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p\bar{1}$ R2 $p121$ R3′ $p1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p\bar{1}$ R2 $p121$ [1/4] R3′ $p1$ R1

$p4/mbm$ No. 63

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] $[\bar{1}00]$	*pbam* L44	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$p12/m1$ R6′ $pcm2_1$ R17′ $p1m1$ R4′
[110] $[1\bar{1}0]$	$[\bar{1}10]$ [110]	*cmmm* L47 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$pcmm$ R22′ $pmmm$ [1/4] R20 $p2mm$ [1/4] 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 $[s, -s]$	$p12/m1$ R6′ $p1m1$ R4′

$p4/nmm$ No. 64

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] $[\bar{1}00]$	*pmmn* L46	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p 112_1/m$ R12 $\not p m2m$ [1/4] R18′ $\not p 11m$ [1/4] R10
[110]	$[\bar{1}10]$	*cmme* L48 [1/4, 1/4, 0]	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p mcm$ R22 $\not p ccm$ [1/4] R21 $\not p 2cm$ R19
$[1\bar{1}0]$	[110]	*cmme* L48	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p ccm$ R21 $\not p mcm$ [1/4] R22 $\not p 2cm$ [1/4] R19

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	$p112/a$ L7	0, 1/2 $[s, -s]$	$\not p 12/c1$ R7′ $\not p 1c1$ R5′
Even u OR even v	Odd p, q	$p112/b$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ R3′ $\not p 1$ R1
Even u, odd v Odd u, even v	Even q Even p	$p112/n$ L7′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p \bar{1}$ R2 $\not p 121$ [1/4] R3′ $\not p 1$ R1

$p3$ No. 65

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] $[\bar{1}00]$	$p1$ L1	s	$\not p 1$ 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	$\not p 1$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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 $[s, -s]$	$\not{p}\bar{1}$ R2 $\not{p}1$ 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′	$[s, (s + \frac{1}{2})]$	$\not{p}211$ R3
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c211$ L10	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112$ R8 $\not{p}112_1$ R9 $\not{p}1$ 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	$\not{p}1$ R1

$p321$ 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] $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$c211$ L10	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}112$ R8 $\not{p}112_1$ R9 $\not{p}1$ R1
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c121$ L10′	$[s, (s + \frac{1}{2})]$	$\not{p}211$ 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	$\not{p}1$ R1

$p3m1$ 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] $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$cm11$ L13	$[s, (s + \frac{1}{2})]$	$\not{p}11m$ R10
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c1m1$ L13′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}m11$ R4 $\not{p}c11$ R5 $\not{p}1$ 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	$\not{p}1$ R1

$p31m$ No. 70

Penetration direction $[uv0]$ = **c**	Scanning direction **d**	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
[100]	[120]	$c1m1$ L13′	[0, 1/2]	$\nearrow m11$ R4
[010]	$[\bar{2}\bar{1}0]$		[1/4, 3/4]	$\nearrow c11$ R5
[110]	$[\bar{1}10]$		$[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 1$ R1
$[1\bar{1}0]$	[110]	$cm11$ L13	$[s, (s + \frac{1}{2})]$	$\nearrow 11m$ R10
[120]	$[\bar{1}00]$			
[210]	[010]			

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

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

Penetration direction $[uv0]$ = **c**	Scanning direction **d**	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
[100]	[120]	$c12/m1$ L18′	[0, 1/2]	$\nearrow 2/m11$ R6
[010]	$[\bar{2}\bar{1}0]$		[1/4, 3/4]	$\nearrow 2/c11$ [1/4] R7
[110]	$[\bar{1}10]$		$[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 211$ R3
$[1\bar{1}0]$	[110]	$c2/m11$ L18	[0, 1/2]	$\nearrow 112/m$ R11
[120]	$[\bar{1}00]$		[1/4, 3/4]	$\nearrow 112_1/m$ [1/4] R12
[210]	[010]		$[\pm s, (\frac{1}{2} \pm s)]$	$\nearrow 11m$ R10

Penetration direction $[uv0]$ = **c**	Scanning direction **d** = $[pq0]$	Scanning group (**c**, **d**, **z**)	Location s**d**	Penetration rod group (**d**, **z**, **c**)
Any u, v	Any p, q	$p\bar{1}$ L2	0, 1/2	$\nearrow \bar{1}$ R2
			$[s, -s]$	$\nearrow 1$ 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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p112/m$ R11 $\not p112_1/m$ [1/4] R12 $\not p11m$ R10
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c12/m1$ L18′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not p2/m11$ R6 $\not p2/c11$ [1/4] R7 $\not p211$ 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 $[s, -s]$	$\not p\bar{1}$ R2 $\not p1$ 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 $[s, -s]$	$\not p121$ R3′ $\not p1$ 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 $[s, -s]$	$\not p121$ R3′ $\not p1$ 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	$p1m1$ 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	$p1m1$ 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 $[s, -s]$	$p12/m1$ R6′ $p1m1$ 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 $[s, -s]$	$p12/m1$ R6′ $p1m1$ R4′

*p*622 No. 76

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}$0] [120] [210]	[120] [$\bar{2}\bar{1}$0] [$\bar{1}$10] [110] [$\bar{1}$00] [010]	*c*222 L22	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}222$ R13 $\not{p}222_1$ R14 $\not{p}211$ 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*112 L3	0, 1/2 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ R1

*p*6*mm* No. 77

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}$0] [120] [210]	[120] [$\bar{2}\bar{1}$0] [$\bar{1}$10] [110] [$\bar{1}$00] [010]	*cmm*2 L26	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}m2m$ R18′ $\not{p}c2m$ [1/4] R19′ $\not{p}11m$ 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*112 L3	0, 1/2 $[s, -s]$	$\not{p}121$ R3′ $\not{p}1$ 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 $s\mathbf{d}$	Penetration rod group $(\mathbf{d}, \mathbf{z}, \mathbf{c})$
[100] [010] [110]	[120] $[\bar{2}\bar{1}0]$ $[\bar{1}10]$	$cm2m$ L35	$[s, (s + \frac{1}{2})]$	$\not{p}2mm$ R18
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$c2mm$ L35′	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}mm2$ R15 $\not{p}cm2_1$ R17′ $\not{p}1m1$ 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	$\not{p}1m1$ 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 $s\mathbf{d}$	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] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}mm2$ R15 $\not{p}cm2_1$ R17′ $\not{p}1m1$ R4′
$[1\bar{1}0]$ [120] [210]	[110] $[\bar{1}00]$ [010]	$cm2m$ L35	$[s, (s + \frac{1}{2})]$	$\not{p}2mm$ 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	$p11m$ L4	s	$\not{p}1m1$ R4′

*p*6/*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}$0] [120] [210]	[120] [$\bar{2}\bar{1}$0] [$\bar{1}$10] [110] [$\bar{1}$00] [010]	*cmmm* L47	[0, 1/2] [1/4, 3/4] $[\pm s, (\frac{1}{2} \pm s)]$	$\not{p}mmm$ R20 $\not{p}cmm$ [1/4] R22′ $\not{p}2mm$ 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 $[s, -s]$	$\not{p}12/m1$ R6′ $\not{p}1m1$ R4′