9.23: Twin index

A twin operation overlaps both the direct and reciprocal lattices of the individuals that form a twin; consequently, the nodes of the individual lattices are overlapped (restored) to some extent (twinning). The reciprocal *n* of the fraction 1/*n* of (quasi)restored nodes is called *twin index*

Let (*hkl*) be the twin plane and [*uvw*] the lattice direction (quasi)-normal to it. alternatively, let [*uvw*] be the twin axis and (*hkl*) the lattice plane (quasi)-normal to it. For *twofold operations*(180º rotations or reflections) the twin index is:

$n = X/\mathrm{f}$, $X = |uh+vk+wl|$

where f depends on the lattice type and on the parities of *X*, *h*, *k*, *l*, *u*, *v* and *w*, as in the following table

Lattice type	condition on *hkl*	condition on *uvw*	condition on *X*	*n*
P	none	none	X odd	$n = X$
			X even	$n = X/2$
C	*h*+*k* odd	none	none	$n = X$
	h+*k* even	*u*+*v* and *w* not both even	*X* odd	$n = X$
			X even	$n = X/2$
		u+*v* and *w* both even	*X*/2 odd	$n = X/2$
			X/2 even	$n = X/4$
B	*h*+*l* odd	none	none	$n = X$
	h+*l* even	*u*+*w* and *v* not both even	*X* odd	$n = X$
			X even	$n = X/2$
		u+*w* and *v* both even	*X*/2 odd	$n = X/2$
			X/2 even	$n = X/4$
A	*k*+*l* odd	none	none	$n = X$
	k+*l* even	*v*+*w* and *u* not both even	*X* odd	$n = X$
			X even	$n = X/2$
		v+*w* and *u* both even	*X*/2 odd	$n = X/2$
			X/2 even	$n = X/4$
I	*h*+*k*+*l* odd	none	none	$n = X$
	h+*k*+*l* even	*u*, *v* and *w* not all odd	*X* odd	$n = X$
			X even	$n = X/2$
		u, *v* and *w* all odd	*X*/2 odd	$n = X/2$
			X/2 even	$n = X/4$
F	none	*u*+*v*+*w* odd	none	$n = X$
h, *k*, *l* not all odd	u+v+w even	*X* odd	$n = X$	
		X even	$n = X/2$	
h, *k*, *l* all odd	u+v+w even	*X*/2 odd	$n = X/2$	
		X/2 even	$n = X/4$	

When the twin operation is a rotation of higher degree about [*uvw*], in general the rotational symmetry of the two-dimensional mesh in the (*hkl*) plane does no longer coincide with that of the twin operation. The degree of restoration of lattice nodes must now take into account the two-dimensional coincidence index Ξ for a plane of the family (*hkl*), which defines a super mesh in the twin lattice. Moreover, such a super mesh may exist in ξ planes out of N, depending on where is located the intersection of the [*uvw*] twin axis with the plane. The twin index n is finally given by:

$n = N\Xi/\xi$