

Other Possibilities:

$P^L(C_k)$: linear valid inequalities
 $a^T x - \alpha \leq 0$

$P^1(C_k)$: rank-1 valid inequalities
 $-(a^T x - \alpha)(a^T x - \beta) \leq 0$

$P^S(C_k)$: spherical valid inequalities
 $(x-d)^T(x-d) - \rho \leq 0$

$P^E(C_k)$: ellipsoidal valid inequalities
 $(x-d)^T Q(x-d) - \rho \leq 0$
(Q is sym. p.s.d.)

$P^C(C_k)$: convex quadratic valid inequalities
 $x^T Q x + 2q^T x + \gamma \leq 0$
(Q is sym. p.s.d.)

$P^\#(C_k)$: all quadratic valid inequalities