

ILC Damping Rings Baseline Configuration Lattice Specifications

23 January 2006 – 650 MHz RF frequency

General Parameters

Circumference	6642.4784 m
Energy	5 GeV
RF frequency	650 MHz
Harmonic number	14402
Transverse damping time, e ⁺ DR (e ⁻ DR)	<25 ms (<50 ms)
Normalized natural emittance	5 μm
Equilibrium bunch length	6 mm
Equilibrium energy spread	<0.13%
Momentum compaction	~ 4×10 ⁻⁴
Damping wiggler peak field	1.67 T
Damping wiggler period	0.4 m
Energy acceptance	δ <0.5%
Dynamic aperture	A _x +A _y <0.09 m-rad (up to δ =0.5%)

Fill Patterns (Electron Damping Ring)

Ring circumference [m]	6642.4784									
Harmonic number	14402									
Ring RF frequency [MHz]	650									
Linac RF frequency [GHz]	1.3									
Linac pulse length [ms]	1.00									
Linac bunch spacing [linac RF wavelengths]	480	450	400	384	360	320	300	288	240	
Linac bunch spacing [ring RF wavelengths]	240	225	200	192	180	160	150	144	120	
Linac bunch spacing [ns]	369.23	346.15	307.69	295.38	276.92	246.15	230.77	221.54	184.62	
Ring bunch spacing [linac RF wavelengths]	5.2									
Ring bunch spacing [ring RF wavelengths]	2									
Ring bunch spacing [ns]	3.08									
Bunches per train	45									
Number of bunch trains	60	64	72	75	80	90	96	100	120	
Gaps per train	75	67.5	55	51	45	35	30	27	15	
Gap length [ns]	233.85	210.77	172.31	160.00	141.54	110.77	95.38	86.15	49.23	
Total number of bunches	2700	2880	3240	3375	3600	4050	4320	4500	5400	
Bunch charge [×10 ¹⁰]	2.00	1.87	1.67	1.60	1.50	1.33	1.25	1.20	1.00	

Additional Requirements

- Fractional tunes should be below the half-integer, to minimize resistive-wall growth rates.
- Tunes should be a safe distance from coupling resonances, to minimize the sensitivity of the vertical emittance to coupling errors.
- Optics should accommodate injection and extraction systems (to be specified).
- Magnet strengths should be kept sufficiently low to accommodate vacuum chamber with required aperture (to be specified).