
Tonearm & Cartridge Compatibility

When selecting a cartridge for your turntable, the total effective mass of tonearm (including cartridge and headshell plus mounting hardware) has to be taken into account in relation to the mechanical compliance (elasticity) of the cartridge cantilever system.

The high mass of this combination needs low mechanical compliance, otherwise record warps can provoke a tonearm excitation at frequencies around 2 to 5Hz that will result in loss of performance and/or compromised trackability.

Getting a resonance frequency higher than 12Hz could result in interference with the music material on the record, as for example organ music can contain frequencies as low as 16Hz. We recommend the resonance frequency to be in the range of 7-12Hz.

This correct mechanical match between cartridge and tonearm is one of the most important factors for neutral sound. A mismatch can result in bad impulse behavior (less resolution of dynamics and micro-dynamics, narrow soundstage, bloated or thin bass).

We can group the several cartridges roughly in three categories:

Low compliance:	5 to 10 $\mu\text{m/mN}$
Medium compliance:	10 to 25 $\mu\text{m/mN}$
High compliance:	30 $\mu\text{m/mN}$ and higher

To give the customer the perfect arm for his cartridge, we now offer a very wide variety of tonearms with different effective masses. This quite unique on the market and helps finding the best tonearm and cartridge combination easily.

EVO CC for cartridges with high compliance

EVO CA for cartridges with medium compliance

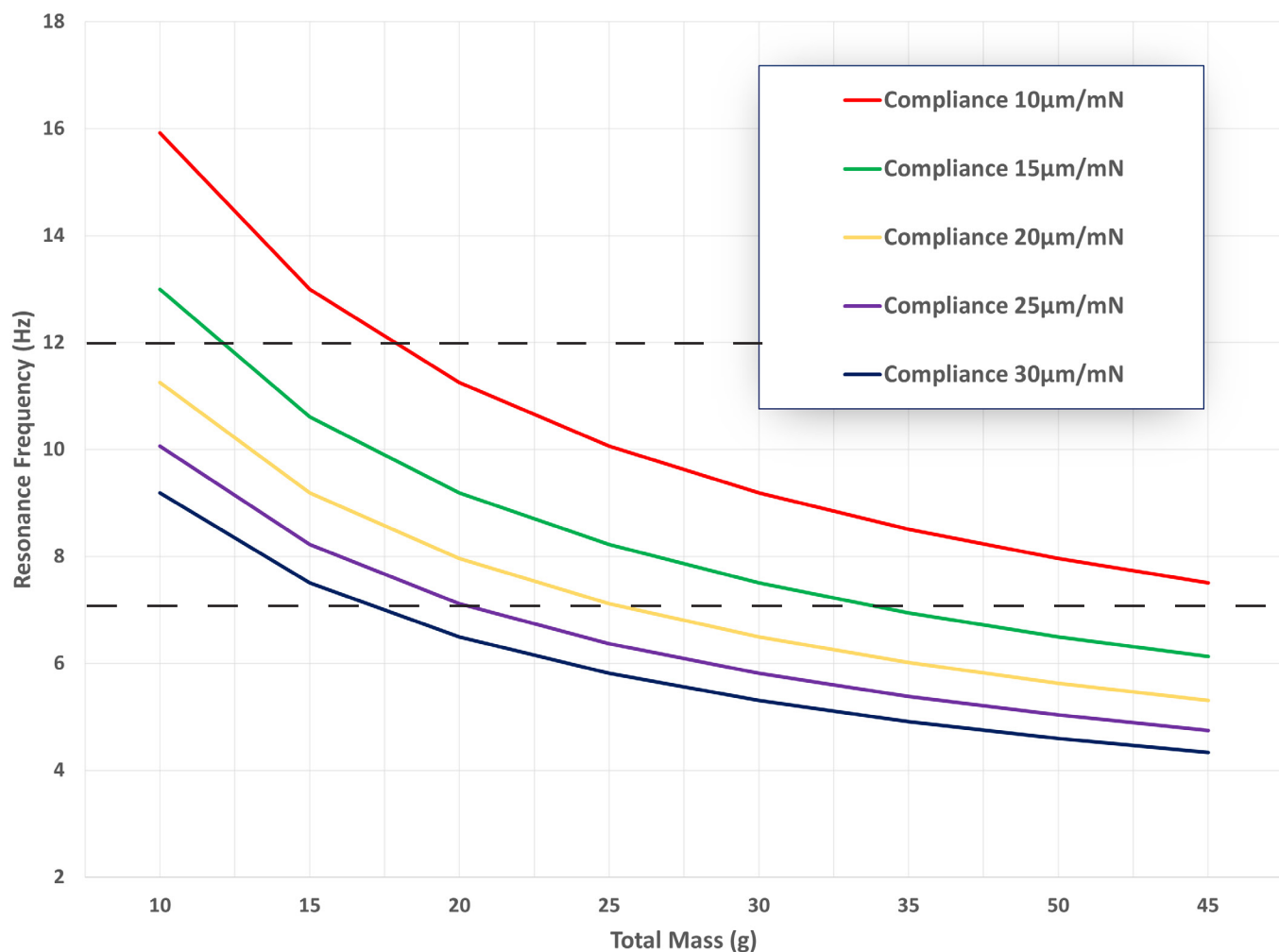
EVO AS for cartridges with low compliance

Note:

If a low compliance cartridge is used with a low mass tonearm, undesirable resonances can occur in the audible range:

- When a high compliance cartridge is mated with a moderate mass tonearm, resonances in the infrasonic range may occur.
- Resonances outside of the recommended range can, in the worst case, lead to damage of speakers and/or amplifiers due to frequencies outside the hearing spectrum amplified to a high level.

This diagram shows the dependencies between cartridge compliance, total mass (cartridge weight, mounting hardware and effective tonearm mass) and the resulting resonance frequency:



The resulting resonance frequency can be calculated by using this formula:

$$f = 1000 : (2 \times \pi \times \sqrt{(M \times C)})$$

f - Cartridge resonance frequency (Hz)

π - 3.14159265359...

C - Cartridge compliance lateral (µm/mN)

M - Total tonearm system mass (sum of cartridge, headshell, screws + effective mass of tone arm (g))

- Resonance frequency within 7-12Hz is optimal for the system.
- Resonance frequency slightly outside the optimal interval 6,5-7Hz and 12-14Hz can be considered as an option that might be used without problems.
- Resonance frequency outside the interval 6,5-7Hz and 12-14Hz is questionable, and the system might not work properly.

Here are some results when using our EVO tonearms with several known cartridges:

	EVO CC	EVO CA PREMIUM	EVO AS	EVO AS	EVO AS	EVO AS
	9" - 10" - 12"	9" - 10" - 12"	9" - 10" - 12"	9" - 10" - 12"	9" - 10" - 12"	9" - 10" - 12"
Headshell type:			no HS	Aluminium HS	Carbon HS	Wood HS
Ortofon 2M Series	8.5 - 8.3 - 7.9	6.9 - 6.8 - 6.4		6.0 - 5.9 - 5.6	6.6 - 6.4 - 6.0	6.9 - 6.7 - 6.5
Ortofon Quintet Series	10.2 - 10.1 - 9.5	8.1 - 8.0 - 7.5		7.0 - 6.9 - 6.7	7.7 - 7.5 - 7.1	8.0 - 7.8 - 7.6
Ortofon Cadenza Series	10.4 - 10.3 - 9.8	8.8 - 8.7 - 8.1		7.7 - 7.6 - 7.3	8.4 - 8.2 - 7.8	8.7 - 8.5 - 8.3
Ortofon SPU (int. HS)	/	/	9.0 - 8.9 - 8.6			
Pro-Ject Pick it PRO	11.5 - 11.3 - 10.7	9.4 - 9.3 - 8.6		8.1 - 8.0 - 7.7	8.9 - 8.7 - 8.2	9.3 - 9.1 - 8.8
Pro-Ject MC3	10.7 - 10.6 - 10.1	9.0 - 8.8 - 8.3		7.8 - 7.7 - 7.4	8.5 - 8.4 - 7.9	8.9 - 8.7 - 8.4
Pro-Ject MC9	10.7 - 10.6 - 10.2	9.0 - 8.8 - 8.4		7.8 - 7.7 - 7.5	8.5 - 8.4 - 7.1	8.9 - 8.7 - 8.4
Sumiko Songbird	9.0 - 8.9 - 8.4	7.5 - 7.4 - 6.9		6.5 - 6.4 - 6.1	7.1 - 6.9 - 6.5	7.4 - 7.2 - 7.0
Sumiko Blackbird	8.8 - 8.6 - 8.2	7.3 - 7.2 - 6.8		6.4 - 6.3 - 6.0	7.0 - 6.8 - 6.4	7.2 - 7.1 - 6.9
Sumiko Palo Santos	9.6 - 9.5 - 9.0	8.0 - 7.9 - 7.3		6.9 - 6.8 - 6.5	7.6 - 7.4 - 7.0	7.9 - 7.7 - 7.6

Note: EVO AS and AS Premium feature identical effective masses

	good
	fair
	acceptable in most cases
	possibly working ok
	not recommended