



Microphone Theory

Super-Cardioid / Hyper-Cardioid

We are often asked about the difference between super-cardioid and hyper-cardioid microphones, as many people seem to use the two terms as the same thing.

There are, however, important differences between the different types of cottage-loaf microphone patterns, which is why Sennheiser make super-cardioid microphones and not hyper-cardioid.

The pressure-gradient microphone with the best directivity of 4 is dubbed the hyper-cardioid. Its disadvantage, however, is the lack of rejection for sound coming directly from the rear (180°). The rejection here is only 6dB. Trying to optimise the directional characteristics, Sennheiser created a super-cardioid microphone with equal rejection at 90° and 180°. This improves the rear rejection figure without sacrificing the side rejection figure too much, and still retains a high directional coefficient of 3.86.

The theoretical figures for the various cottage-loaf microphones are:-

Hyper-Cardioid

The hyper-cardioid microphone has its angle of maximum rejection at 109.5°.

It is optimised for the maximum directivity coefficient of 4.0.

Rejection at 90° is -12dB

Rejection at 180° is -6dB

Super-Cardioid

The super-cardioid microphone has its angle of maximum rejection at 125.3°.

It is optimised for the maximum front to rear index and has a directivity coefficient of 3.73.

Rejection at 90° is -8.7dB

Rejection at 180° is -11.6dB

Sennheiser Super-Cardioid

The Sennheiser super-cardioid microphone has its angle of maximum rejection at 120°.

It is optimised for equal attenuation at 90° and 180°, it has a directivity coefficient of 3.86.

Rejection at 90° is -9.5dB

Rejection at 180° is also -9.5dB

The attenuation at 90° is equal to the attenuation at 180° (the 180° signal being out-of-phase of course), this means that the attention is concentrated on the sound coming to the front of the microphone. The disadvantage of the hyper-cardioid is that sounds from the rear can be too high due to the lack of rear attenuation, and the disadvantage of the standard super-cardioid is that its side rejection is not enough.

Please note that these are the theoretical figures which may differ slightly in practice.