

# PRO AUDIO REVIEW

EQUIPMENT REVIEW  
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## ETYMÖTIC RESEARCH ER-4S EARPHONES

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I sat alone in a hot, dark room with my ears plugged. Sounds exploded inside my head. It was just another recording job.

Actually, I was recording a band live, and I was located offstage in a large closet, monitoring the recording through Etymotic ER-4S Canal Phone™ earphones. They offer more isolation from outside sounds than any other phones that I know of. I could clearly monitor what I was recording, even though the band was just a few feet away behind a door. It was almost like working in an acoustically-isolated control room.

In addition to providing great isolation, the Etymotic ER-4S earphones are among the least colored, most detailed earphones or headphones I have heard.

### Features

The ER-4S by Etymotic Research is a set of dynamic earphones that are inserted into the ear canals. This placement provides an air-tight seal that keeps out noise and allows deep bass.

How can these small earphones, which fit in a shirt pocket, be worth \$330? Well, just give them a listen. I would call their sound “reference quality.”

One reason for this quality is that the Canal Phones’ design is based on exten-

sive research into human hearing. To sound natural, earphones and headphones should not have a flat response (as measured at the eardrum). Instead, they need a big emphasis in the upper midrange — a broad 15 dB peak at 2.8 kHz. Why is this?

When listening to sound in a reverberant room, sound approaches randomly from all directions. That is, we hear a



### AT-A-GLANCE

**Applications:** Live sound recording.

**Key Features:** Inserts into ear canals; compressible foam ear seal or triple flanges made of soft silicone rubber; four-foot cable, gold-plated mini phone plug and 1/4" phone plug adapter.

**Price:** \$330

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diffuse sound field. The head, outer ears, and ear canals affect the incoming sound by adding a big peak around 3 kHz. Since earphones bypass the head and outer ears, the

3 kHz peak is missing. It needs to be restored by tailoring the response of the earphones.

Etymotic claims that its earphones have the most accurate match to the ear’s diffuse-field response. The model ER-4B closely matches the diffuse curve. It is meant for listening to binaural recordings made with a dummy head placed in the

audience area. The model ER-4S has slightly reduced highs, and sounds more natural when used to listen to the usual closed-mike recordings of classical and popular music. The ER-4S

sounds best with most recordings.

Each black plastic earphone resembles an earplug. A red flex relief denotes the right channel; blue denotes left. The phones have a thin four-foot cable, gold-plated mini phone plug, and gold-plated 1/4" phone plug adapter. Two types of ear seals are provided: compressible foam, or triple flanged made of soft white silicone rubber. Extra ear seals are included. If your ear canals are unusual in size or shape, the tips might be uncomfortable or have a poor seal. For best fit, order custom-fitted earmolds. A shirt clip and a foam-lined case complete the package.

Since earwax can clog the filters built into the earphone tips, Etymotic suggests that you clean your ears before use. (I put some cotton swabs in the carrying case

for this purpose.) If the filters get clogged, they can be replaced with the spare filters provided. The inner end of each ear seal is about 1/4" from your eardrum when fully inserted. Some users might not like the sealed-off effect. It is like wearing earplugs. In fact, the isolation from outside sounds is excellent (24 dB or more). When wearing the Canal Phones, you are in a musical world of your own. They are great for listening in noisy environments (e.g., airplanes), or for monitoring a recording in the same room as the band.

According to Etymotic Research, quiet musical sounds on recordings are masked by the ambient noise level in homes (typically 43 dBA). This noise prevents the softest sounds from being heard unless you turn up the volume to unnatural levels. But when wearing the Canal Phones, the full dynamic range can be heard without excessive volume.

Specifications provided by Etymotic Research include a frequency response of 50 Hz–10 kHz  $\pm 2$  dB; 20 Hz–16 kHz  $\pm 4$  dB ref. nominal response, which mimics the diffuse-field response of the ear. 1 kHz sensitivity is said to be 108 dB SPL for 1.0 V input. Impedance is 100 ohms nominal, and maximum output is 115 dB SPL.

### In use

After some time, the earphones may become uncomfortable — more so than around-the-ear headphones. (Etymotic reports that some users have no discomfort, or they get used to the earphones over time). Another drawback is that they cannot be put on quickly. During a sound check, the engineer runs around fixing buzzes, talking with people, and throwing on some headphones for a cue check. This cannot be done with the ER-4S earphones. I recommend using standard headphones during the sound check, then switching to the ER-4S earphones for the mix.

When I first listened to the ER-4S with the soft flanged ear seal, I was disappoint-

ed by the weak bass and sizzly highs. The company cautions that if the earphone is not tightly sealed to the ear canal, the bass response will be reduced. I switched to the ear seals made of foam, which accommodate larger ear canals and conform better to their shape. I rolled them tightly between my fingers, put them in my ears, and let the foam expand to form a perfect seal. Then I heard plenty of deep bass.

I auditioned the ER-4S earphones playing a variety of CDs. Here are my impressions of how they reproduce musical instruments:

- Cymbals and percussion: Smooth and sweet. Naturally bright, but not sizzly.
- Drums: Naturally crisp. Good impact.
- Kick drum: Deep, clean.
- Deep bass-drum roll: Weighty.
- Piano: Clear, natural, no tubby colorations.
- Acoustic guitar: Delicate. Clear but not edgy.
- Electric guitar: Not puffy. Good bite or edge.
- Voice: Natural. Not excessively sibilant.
- Sax: Natural. Just enough edge or breathiness.
- Electric bass: Deep and articulate.
- Acoustic bass: Not tubby. Notes are even volume. Full but clean.
- Orchestra: Natural.

The overall bass seems just a bit leaner than with most other headphones, as if the low-frequency response were down in level. Maybe other headphones just exaggerate the bass. The "lean bass" effect is subtle, and may be due just to the lack of feeling the bass in the body. I compared the current version of the ER-4S with a unit I had tested several years ago. The latest unit has more bass than the earlier one — a step in the right direction.

To hear the bass with no standing waves and no resonances is a revelation! There is absolutely no boominess or bumped-up bass often heard with other headphones or speakers. The rest of the audio range

sounds accurate and neutral as well. Cymbals are every bit as crisp and airy as the real thing.

### Summary

The ER-4S earphones also offer excellent detail and low distortion. Transient response and clarity are phenomenal. Due to the low-moving mass of the earphones' diaphragm, it tracks the incoming signal accurately. These are the most transparent phones I have had the pleasure to audition. They reveal sonic differences in connector materials. I say that the ER-4S earphones compete with electrostatic headphones selling for \$1,000 or more.

If you need reference-quality sound with noise exclusion, the ER-4S earphones will give it to you. Highly recommended.

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 <b>PRODUCT POINTS</b>
<b>ETYMOTIC RESEARCH ER-4S EARPHONES</b>
<b>PLUS</b>
+Accurate +Tight and detailed +Deep bass +Terrific isolation for live recording
<b>MINUS</b>
-May become uncomfortable -Can't be put in quickly
<b>THE SCORE</b>
The ER-4S earphones provide reference-quality sound with isolation that is ideal for live recording.