

## **Introduction**

This document provides information about the application and optimal use of the ER300B vacuum tube. For all technical details please refer to the datasheet.

## **Design Goals**

The ER300B has been designed as an alternative to the 300B audio tube. The main goal was to achieve a superior sound quality. To reach this the ER300B has a radically different design. This is not only evident by the physical appearance. The most distinctive difference between the ER300B and other 300B equivalents is the use of thoriated tungsten filaments. While all other currently known 300B equivalents use oxide coated filaments, Elrog decided to use thoriated tungsten as in transmitting type triodes. The ER300B has been derived from the ER845. The parameters have been set such that the tube can be used in any amplifier designed for the 300B.

The use of thoriated tungsten filaments results in much higher current capability of the tube. Saturation occurs later as in other 300B types. This results in a more lively and dynamic sound representation with greatly improved resolution while all other sound aspects of 300B tubes are preserved. The result is a modern sound with all the beauty of directly heated triodes but without the lack of resolution or coloration as is often experienced in many tube amplifiers. Hence we called them 'The Sound Tubes'.

## **The thoriated tungsten filament**

The filament of the ER300B has been designed such that it is compatible to the original 300B specification.

In order to be able to use thoriated tungsten, some parameters needed to be deviated from the 300B specs. These are plate resistance and amplification factor. Plate resistance is slightly taller. While the 300B specifies 700 Ohms, the ER300B plate resistance is 950 Ohms. The amplification factor has been reduced to 3.3 from the 3.8 of the 300B specification. Since transconductance is directly related to these two parameters the ER300B has a transconductance of 3300 micromhos.

This compromise was necessary to keep the original 5V @1.2A specification.

## **Compatibility with other 300B types**

The ER300B is compatible for use in any properly designed 300B amplifier which operates the tube within the allowed limits. It can be used in Single Ended, Parallel Single Ended and Push-Pull amplifiers.

Some amplifiers are designed for 'uprated' 300B type tubes, which run at higher maximum plate dissipation than standard 300B tubes. The ER300B is not recommended for use in such amplifiers. If in doubt please refer to the technical specifications of your amplifier or consult the manufacturer of your amplifier.

The ER300B is slightly higher than other 300B types. If your amplifier has little clearance above the tubes, the ER300B might not fit. Please refer to the datasheet for exact physical dimensions.

The use of the ER300B in a typical 300B type amplifier will result in slightly reduced gain and in about 25% less output power. The actual numbers will depend on the amplifier. While this might appear as a disadvantage the impact in real life is minor. Due to the logarithmic behavior of the human hearing, the reduced output power is negligible. The loss in gain can be compensated by increasing the volume slightly on the volume control of the amplifier or preamplifier. Typically a 2dB increase will result in the same output level as with other 300B tubes.

We think the superior sound quality of the ER300B is well worth this compromise.

### **Optimal use of the ER300B**

To achieve optimum sound results we recommend the use of DC filament voltage. Due to the different thermal properties of thoriated tungsten, AC filament voltage can result in higher residual hum at the amplifier output. This can be evident with highly efficient speakers.

Due to the higher plate resistance of the ER300B we recommend to load the tube with 3.5k or more. The ER300B will work with lower plate loads but this might result in a decreased damping factor. The impact of this on sound quality will depend on the output transformer and speakers used.

As can be seen in the datasheet, the ER300B is capable of much higher plate voltage than other 300B tubes. If an amplifier is specifically designed for the ER300B it is possible to take advantage of this higher plate voltage capability and to achieve higher power output compared to the use in typical 300B amplifiers. Please refer to the datasheet for suggested operating points.

### **Life time**

The life time of a tube depends on the operating conditions. Important factors for a long lifetime are filament voltage and plate dissipation. The filament voltage should be kept as close to the nominal value of 5V as possible.

When used at nominal filament voltage and well below maximum plate dissipation the tube can last many years.

To prevent physical damage of the filaments avoid frequent on/off cycling of the amplifier. Don't remove the tubes from the amplifier when they are still hot. Allow 15 minutes of cooling before changing tubes. Avoid excessive mechanical shocks when handling the tubes.