

## FAQ about tube Burn-in

Dear customer,

you have bought a new production tube, and this tube will need a so called burn-in.

These tubes are burned-in initially in the factory, to allow selection and testing. They need 50...100 hours extended burn-in under normal home use. A good burn-in will assure maximum lifetime and develop the final sound. Some occasional blue glow effects will disappear during burn-in. Use different loudness levels from the beginning, and increase the maximum loudness gradually. Let the tubes cool down after each use. During burn-in, do not use the stand-by mode. You need to use the tubes the normal way, every day a few hours, and let them cool down until the next day.

### Q: What happens during burn-in?

A: Several things happen. The main are : **First**, a tube is a mechanical product, and all piece parts need some time to set, and loose the mechanical tension. After this, the plates and grids will be not too tight in the mica, giving the kind of lower resonance which makes the tube sound good, and natural. Specially triodes seem to benefit from this. **Second**, the cathode active surface can only format itself best under normal use conditions. When the tube is new, it even tends to adapt to the particular way the tube is used. **Third**, any residual contaminations that are always there, will be absorbed by the getter. During that time the filament will develop a good quality, and make the tube last long.

### Q: Why are tubes not sold already burned in?

A: The cathode active surface is just a few microns thin. It is not a smooth layer, but is formed out of many active points. These points can grow or shrink. They will grow during burn-in, and they will shrink during the cold rest period of the tube. So, during cold condition, this burn-in process reverses partially. As long as the tube is new, this reverse process can take place in a few months. So the effect of the factory burn-in will disappear anyway. There is something like a memory in the tube. The more often the tube is used, the cathode starts to „remember“ this use condition, and will not reverse to the „not burn-in“ state very quickly again. So, the condition gets stabile after several weeks of normal use, specially when it includes many rest times. In fact just NORMAL use will do this! In the factory, there is simply no time for that, and besides the „bad memory“ of a fresh tube will make that the burn-in would disappear after a few months when the tube is at stock, waiting to be sold.

### Q: How can I make sure, the tube will last long?

A: Three things. **First**. Take just the filament voltage as on the datasheet. This will help very much. A 15% too low filament voltage can do damage in just three minutes! A 15% too high voltage will do damage after hours. **5% is the maximum deviation in either direction** When you know that the mains voltage will already vary a few percent, you have only a small margin left for yourself. **Second**: Don't stress the tube with heat. This will really accelerate the wear-out very much. Don't heat the tube more than you need. 10% less heat will increase the lifetime with a factor 2 (all tubes, all brands). Stay away safely from any MAXIMUM specification if lifetime is an issue for you. (For math lovers: the relation is to the power 7). If your car engine can rev. up to 6300rpm (by the book) it means you can do it sometimes, but not all of the time. Any mechanical product that is stressed will have similar behaviour. **Third**: Don't overdrive the tube, also not very short to try what it „sounds like“!

### Q: Must I use the stand-by mode?

A: No! You can use it after burn-in, but there is no benefit for the tube. If the stand-by period is going to be longer than 4 hours, it is better to switch the amp off anyway.

### IMPORTANT NOTE:

NEVER tap on a hot tube to test it's microphnics. This can cause permanent damage.

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