

# PA SYSTEMS AND IMPEDANCE

The impedance of a speaker or amplifier is an aspect of pa systems commonly misunderstood but vitally important and probably the most common reason for amplifier damage

Definition: 'Impedance' is the frequency dependent electrical resistance of the system to AC current.

Speakers have a fixed impedance, commonly 4 or 8 ohm. Usually noted next to the input, but can be checked by measuring DC resistance across input terminals. Note that DC resistance is usually lower than nominal impedance ; this does not imply a fault.

Amplifiers have a minimum load impedance, usually 4 ohm. The total impedance of the speakers connected to the amp must be equal to or greater than the minimum impedance.

A stereo amplifier can be considered as two independent amps ; consider the load on each side as a separate sum.

Amplifier outputs, and loudspeaker connections are almost always parallel. To calculate the total load impedance for cabinets in parallel use the following formula where Z denotes the impedance of each cabinet ;  $1/Z1 + 1/Z2 + 1/Z3.....+1/Zn = 1/Ztotal$

e.g. 2 x 8 ohm cabs =  $1/8 + 1/8 = 2/8$ , therefore  $Ztotal = 4$  ohm

Using a total impedance too low for the amp will cause it to overheat, and will cause more power and distortion to be delivered to the speakers, potentially damaging those also.

If you need further information on this topic or are looking for personalised information and quotes on PA systems, [click here to contact the professor](#)