

## ELF driver selection notes & general comments

**“The ideal loudspeaker is a rigid, massless sphere able to accelerate / decelerate as fast as the electrical signal driving it” Peter Quad 1963**

Peters quote has inspired me since I read it in 1989 and I have been searching for the “fastest” driver(s) and forms of driver loading ever since....A lot of the info below applies to midrange as well as bass.... Also the best spec for open baffle is similar to ELF... Hope the following helps!

(1) Low Qts and low Qes are desirable. In general the more powerful (high BI) motors have the lowest Q because they have more “grip” or control over the cone therefore it does not bounce around on its suspension (called “cone ringing”) after the signal. Ie after a single high transient drum strike you don’t want the cone to bounce around (on a soft rubber suspension) for half a second!

(2) Low Mms and high BI – see \* below for guide lines on this. Paper or paper with carbon-fibre or nomex are all good. Metal cones / domes are bad.... “Ring like a bell”

(3) Large diameter single layer voice coils on Kapton or Nomex formers with high AES power rating. Dual layer voice coils cannot dissipate heat as quickly as single layer & have higher inductance for a given power handling. The lower the inductance the better.

(4) Good Xmax ... “Some is good more is better” But... Over driving subs and forcing them to pump in and out at or beyond Xmax is a huge mistake. As a general rule if a driver is having to work at more than 75% of its Xmax at your chosen / typical listening level use more drivers or use a bigger driver.

(5) Linen or cotton surrounds and suspensions are way better than rubber. This is a very important point. Key to a good waterfall or Cumulative Spectral Decay (CSD) performance.

(6) I find large (heavy) ferrite magnet drivers better value than the lighter Neo magnet versions.

(7) In general, more Sd (larger cone) moving less is better than smaller cone moving more. You do have to balance this against dispersion ie large cones “beam” more than smaller cones and this can lead to a muffled or dull sound off axis ie away from your listening position.... This is up to you ie if you are a solo listener in the ideal “hot seat” off axis performance is not an issue.... If you have a large sofa full of family to entertain then you need a broad and even dispersion or “power response” as its known.

\*The ratio of Mms to BI is very important.... As a general guide here are a few examples and links to good drivers which have the desirable spec. I have included a midrange and bass midrange driver as well as bass drivers. The Mms / BI ratio is the key... The smaller the number the better, but obviously bigger heavier coned drivers have more bass and will have larger ratio numbers.

6 inch midrange: Sd (surface area) 145cm square. Mms 12g. BI 12.3. Ratio = 1.16. Xmax – 4mm.

[http://www.phlaudio.com/products/?no\\_cache=1&tx\\_talanphlproducts\\_listproducts%5Buid%5D=33&tx\\_talanphlproducts\\_listproducts%5Baction%5D=generatePDF&tx\\_talanphlproducts\\_listproducts%5Bcontroller%5D=PhlProducts&cHash=2c584f63074b03c3a4babe339b584738](http://www.phlaudio.com/products/?no_cache=1&tx_talanphlproducts_listproducts%5Buid%5D=33&tx_talanphlproducts_listproducts%5Baction%5D=generatePDF&tx_talanphlproducts_listproducts%5Bcontroller%5D=PhlProducts&cHash=2c584f63074b03c3a4babe339b584738)

8 inch bass midrange: Sd (surface area) 220cm square. Mms 10g. BI 14.9. Ratio = 1.49. Xmax – 5.75mm. <http://www.eighteensound.com/Portals/0/PDFs/8NMB420.PDF>

10 inch: Sd (surface area) 350cm square. Mms 44g. BI 18.3g. Ratio = 2.4. Xmax – 8mm. <https://www.beyma.com/getpdf.php?pid=10MC500>

12 inch bass midrange: Sd (surface area) 550cm square. Mms 76g. BI. 23. Ratio = 3.3. Xmax – 7.5mm. <https://www.beyma.com/getpdf.php?pid=12P80Fe/V2>

12 inch bass: Sd (surface area) 550cm square. Mms 100g. BI 23.5. Ratio = 4.25. Xmax – 8mm. <https://www.beyma.com/getpdf.php?pid=12P1000Nd>

15 inch: Sd (surface area) 855cm square. Mms 85.2g. BI 25.39. Ratio = 3.35. Xmax – 6mm. <http://www.precision-devices.com/file-downloads/PD158-DATASHEET-310114.pdf>

15 inch: Sd (surface area) 907cm square. Mms 114.38g. BI 26.61. Ratio = 1.16. Xmax – 8.2mm. <http://www.precision-devices.com/file-downloads/PD1550-DATASHEET-310114.pdf>

18 inch bass: Sd (surface area) 1,164cm square. Mms 219.22g. BI 31.48. Ratio = 6.96 Xmax – 12mm. <http://www.precision-devices.com/file-downloads/PD1851-2-DATASHEET-310114.pdf>

21 inch: Sd (surface area) 1,734 cm square. Mms 305g. BI 33. Ratio = 9.24. Xmax –13 mm. <https://www.beyma.com/getpdf.php?pid=21LEX1600Nd>