

# ELF Magnetic Field Security Zones around High Voltage Power Lines

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**Abstract.** In this paper it is presented the ELF Magnetic Field Security Zones around High Voltage Power Lines (HVPLs) for the limit values set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), ie  $100 \mu\text{T}$ , and for the lower limit value of  $0.4 \mu\text{T}$ . The study was elaborated for the two types of HVPLs more used in Portugal, ie 60 kV and 220 kV. It is shown the ground level security zones ‘vis a vis’ the administrative servitude used in Portugal. It is presented a good analytical approximation for the Magnetic Field variation with distance for the two types of HVPLs, as well as a schematic picture of the Magnetic Field security zones around these HVPLs.

The work was developed using the 3D software package CEM\_ELF.LAT developed by the author, under a Research Project developed for the Portuguese Utilities REN-SA and EDP-Energia SA.

The magnetic field calculator is based on the Biot-Savart law. The catenary of each HVPL is approximated by straight lineal segments defined by a cubic spline polynomial. It is shown in Fig. 1 the Magnetic Field distribution zone for  $B \geq 100 \mu\text{T}$  for the 220kV Line.

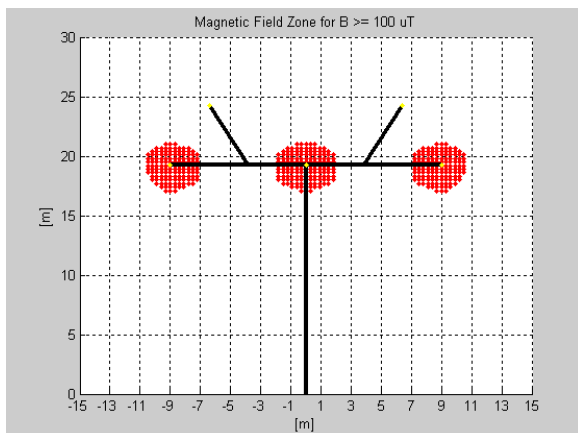


Fig. 1 - Magnetic Field Zone,  $B \geq 100 \mu\text{T}$  for 220kV Line

In Fig. 2 and Fig. 3 it is presented the schematic picture of the Magnetic Field security zones around these HVPLs.

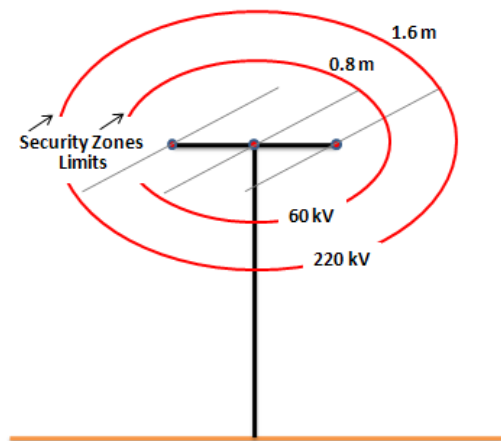


Fig. 2– Schematic Picture of Magnetic Field Security Zones around High Voltage Power Lines for  $B \geq 100 \mu\text{T}$

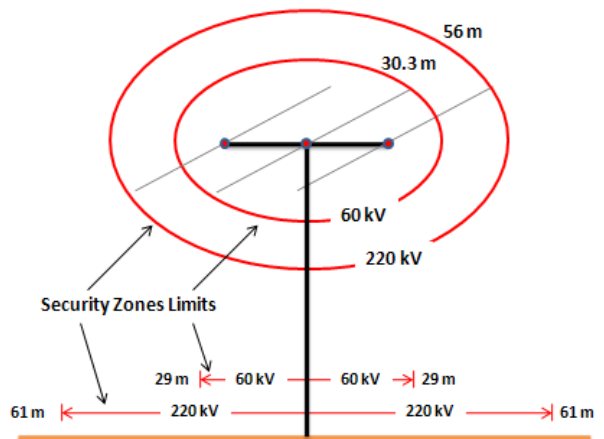


Fig. 3 – Schematic Picture of Magnetic Field Security Zones around High Voltage Power Lines for  $B \geq 0.4 \mu\text{T}$

## References

[Carlos Lemos Antunes, “CEM\_ELF.LAT – Simulator of ELF Electric and Magnetic Fields emanated from High Voltage Power Lines” (in Portuguese), CD-Rom ISBN: 978-972-8822-17-0, Editor: Carlos Lemos Antunes, 2008.