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Sound system equipment
Part 1: General

12. Measurements in a uniform alternating magnetic field

12.1 *Method of producing a uniform alternating magnetic field*

A convenient and fairly accurate method of producing a uniform alternating magnetic field makes use of the arrangement of three square coils according to Figure 3, page 23, in which $a = 0.375 b$, where a is the distance between the coils and b the dimension of the side of each coil. The coils are supplied with a current at the required frequency.

Between the three coils 1, 2 and 3 having turns in the ratios of:

$$\frac{n_1}{100} = \frac{n_2}{36} = \frac{n_3}{100}$$

when the same current I flows through each coil in the same direction, a field is produced that may be considered to be uniform to within $\pm 2\%$, inside a spherical space having a diameter of $d = 0.5 b$, the centre of which coincides with the geometrical centre of coil 2.

The resulting magnetizing force H and field strength B will be approximately:

$$H = 1.35 \frac{n_1 I}{b} \text{ A/m} \qquad B = 1.70 \frac{n_1 I}{b} \mu\text{T}$$

The magnetic field strength shall be measured before the device is placed into the field. This can be done with a search coil, in accordance with Sub-clause 12.2.

12.2 *Measuring the magnetic field strength*

For measuring the magnetic field strength, the use of a search coil, according to Figure 4, page 23, is recommended, which will produce an e.m.f. of 1 mV in a magnetic field with a strength of 1 A/m at a frequency of 50 Hz, the voltage being proportional to both the magnetic field strength and the frequency.

Notes (not a part of the IEC Standard):

- Wire diameter of 0.13 mm corresponds to Nr 36 AWG.
- The e.m.f. E and the magnetic field H are the same kind of average: if E is the rms value, then H is the rms value.
- If the frequency is 60 Hz, then for 1 mV corresponds to 1 A/m, wind the coil with 3750 turns instead of 4500 turns.
- H of 1 A/m corresponds to B in vacuum of 1.25 microteslas (μT), or 12.5 milligauss.

The search coil output voltage should also be measured with the magnetic field switched off. If the output voltage under these conditions exceeds one third of the output voltage with the field present, a selective measurement is required. If possible, the search coil output voltage should be measured using a voltmeter with balanced input.

12.3 *Positioning the sample*

The sample under test shall be placed in the magnetic field and the position of the sample relative to the pattern of the field shall be varied until the interference is at maximum.

The sample under test shall not project from the spherical space of diameter d .

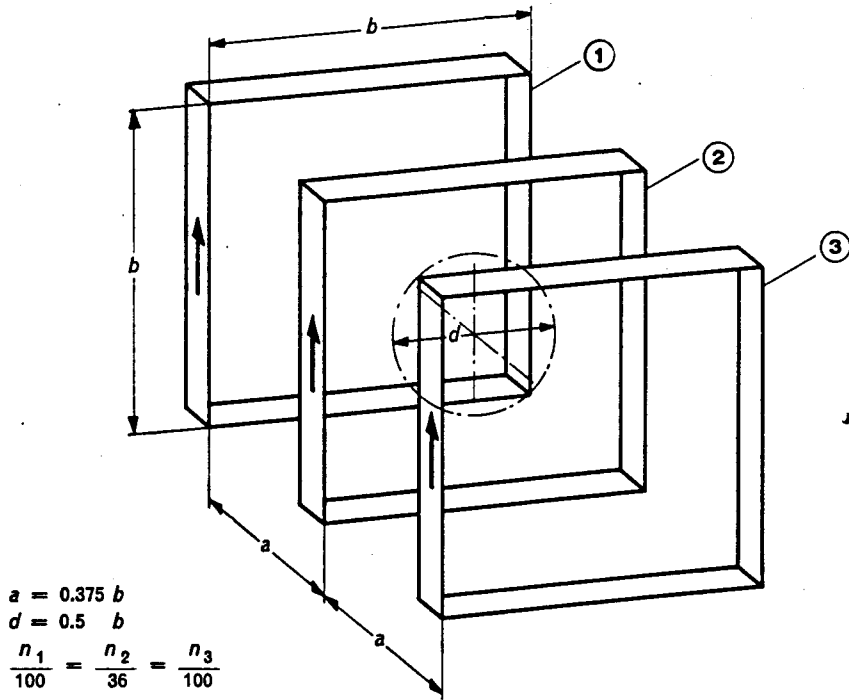


FIG. 3. — Arrangement of three coils for the production of a uniform alternating magnetic field.

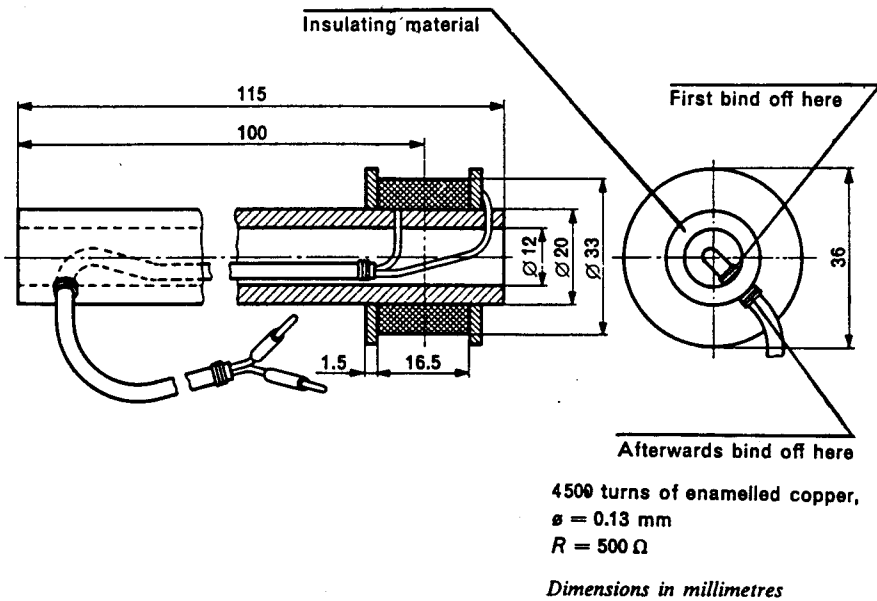


FIG. 4. — Search coil for measuring the magnetic field strength.