

CONTENTS

FOREWORD	6
INTRODUCTION	8
1 Scope	9
2 Normative references	9
3 Terms and definitions	9
4 General	10
4.1 Procedure for setting up and commissioning an audio-frequency induction loop system	10
4.2 Suitability of the site for the installation of an audio-frequency induction-loop system	10
4.3 Relation of the magnetic field strength level at the telecoil to the sound pressure level at the microphone.	11
5 Using components of a sound system in an induction-loop system	11
5.1 General	11
5.2 Microphones	11
5.3 Mixer	11
5.4 Power amplifier	11
6 Meters and test signals	11
6.1 Meters	11
6.1.1 Meters in general	11
6.1.2 Requirements common to both types	11
6.1.3 True-r.m.s. meter	12
6.1.4 Peak programme meter (PPM)	12
6.2 Test signals in general	12
6.3 Speech signals	13
6.3.1 Live speech signals	13
6.3.2 Recorded speech material	13
6.3.3 Simulated speech material	13
6.4 Pink noise signal	13
6.5 Sinusoidal signal	13
6.6 Combi signal	14
7 Magnetic background noise level of the installation site	14
7.1 Method of measurement	14
7.2 Recommended maximum magnetic noise levels	15
8 Characteristics to be specified, methods of measurement and requirements	15
8.1 General	15
8.2 Magnetic field strength	16
8.2.1 Characteristic to be specified	16
8.2.2 Method of measurement with a simulated speech signal	16
8.2.3 Method of measurement with pink noise	17
8.2.4 Method of measurement with a sinusoidal signal	17
8.2.5 Method of measurement with a combi signal	17
8.2.6 Method of measurement – Other	17
8.2.7 Requirements	17
8.3 Frequency response of the magnetic field	18
8.3.1 Characteristic to be specified	18

8.3.2	Method of measurement with a simulated speech signal	18
8.3.3	Method of measurement with pink noise	18
8.3.4	Method of measurement with a sinusoidal signal	18
8.3.5	Method of measurement with combi signal.....	19
8.3.6	Method of measurement – Other.....	19
8.3.7	Requirements	19
8.4	Useful magnetic field volume	19
8.4.1	Characteristic to be specified.....	19
8.4.2	Methods of measurement	19
8.4.3	Requirements	19
9	Small-volume systems	19
9.1	Inapplicability of the 'useful magnetic field volume' concept	19
9.2	Disabled refuge and similar call-points.....	20
9.3	Requirements for disabled refuge and similar call-points.....	22
9.4	Counter systems	22
9.5	Requirements for counter systems	24
10	Setting up (commissioning) the system	24
10.1	Procedure	24
10.2	Magnetic noise level due to the system	24
10.2.1	Explanation of term.....	24
10.2.2	Method of measurement with a speech signal.....	24
10.2.3	Method of measurement with pink noise	25
10.2.4	Method of measurement with a sinusoidal signal	25
10.2.5	Method of measurement with a combi signal.....	25
10.2.6	Method of measurement – Other (no input signal).....	25
10.2.7	Requirements	25
10.3	Amplifier overload at 1,6 kHz	25
10.3.1	Explanation of term.....	25
10.3.2	Methods of test.....	25
10.4	Requirements	25
Annex A (informative)	Systems for small useful magnetic field volumes	27
A.1	Overview.....	27
A.2	Body-worn audio systems	27
A.3	Small volume, defined seating, mainly in households.....	27
A.4	Specific locations such as help and information points, ticket and bank counters, etc.	27
Annex B (informative)	Measuring equipment	30
B.1	Overview.....	30
B.2	Signal sources	30
B.2.1	Real speech	30
B.2.2	Simulated speech	30
B.2.3	Pink noise.....	30
B.2.4	Sine wave.....	30
B.3	Magnetic field strength level meter.....	31
B.3.1	General recommendations	31
B.3.2	Peak-programme meter (PPM) type	31
B.3.3	True r.m.s. meter type	31
B.4	Field strength level meter calibrator	32
B.5	Spectrum analyzer	32

Annex C (informative) Provision of information.....	33
C.1 General.....	33
C.2 Information to be provided to the hearing aid user	33
C.3 Information to be provided to system installers and by them to users	34
C.4 Information to be provided by the manufacturer of the amplifying equipment.....	34
Annex D (informative) Measuring speech signals	35
Annex E (informative) Basic theory and practice of audio-frequency induction-loop systems	36
E.1 Properties of the loop and its magnetic field.....	36
E.2 Directional response of the telecoil of a hearing aid	37
E.3 Supplying the loop current	42
E.4 Signal sources and cables	43
E.4.1 Microphones	43
E.4.2 Other signal sources.....	44
E.4.3 Cables	44
E.5 Care of the system.....	44
E.6 Magnetic units	44
Annex F (informative) Effects of metal in the building structure on the magnetic field.....	45
Annex G (informative) Calibration of field-strength meters	47
Annex H (informative) Effect of the aspect ratio of the loop on the magnetic field strength	49
H.1 Overview.....	49
H.2 Effect of aspect ratio on field patterns	49
Annex I (informative) Overspill of magnetic field from an induction-loop system	51
I.1 General.....	51
I.2 Examples of overspill issues	51
I.3 Addressing overspill issues	51
Bibliography.....	53
Figure 1 – Flow chart for the operations in this standard	10
Figure 2 – Measurement points for disabled refuge and similar call-points	21
Figure 3 – Measurement points for a counter system	23
Figure A.1 – Field pattern of a vertical loop.....	28
Figure A.2 – Contour plot of field strength of vertical loop	29
Figure C.1 – Graphical symbol: inductive coupling	33
Figure E.1 – Perspective view of a loop, showing the magnetic field vector paths	37
Figure E.2 – Strengths of the components of the magnetic field due to current in a horizontal rectangular loop at points in a plane above or below the loop plane.....	38
Figure E.3 – Field patterns of the vertical component of the magnetic field of a horizontal loop	39
Figure E.4 – Field patterns of the vertical component of the magnetic field of a vertical loop 0,75 m square	40
Figure E.5 – Perspective view of the variation of the vertical field strength level at an optimum height above a horizontal rectangular loop.....	41
Figure E.6 – Directional response of the magnetic pick-up coil (telecoil) of a hearing aid	42
Figure F.1 – Magnetic field pattern of a 10 m by 14 m loop, 1,2 m above its plane	45

Figure F.2 – Magnetic field pattern of a 10 m by 14 m loop, 1,2 m above its plane, showing the effect of metal (iron) in the floor 46

Figure G.1 – Triple Helmholtz coil for calibration of meters 47

Figure H.1 – Variation of the current required to produce a specified magnetic field strength at a specific point with the dimensions and aspect ratio of the loop 49

Figure H.2 – Square and rectangular loops 50

Table 1 – Application of signals 12

Table 2 – Specification of the combi signal 14

Table 3 – Magnetic field strengths typically produced by different test signals, with an amplifier having peak-detecting AGC 17