

9.4 Determination of sound power levels of a noise source which emits steady or non-steady noise

9.4.1 Measurement of sound pressure levels

Time-averaged sound pressure levels from the noise source under test, $L'_{pi(ST)}$, (either in one-third-octave frequency bands or A-weighted) shall be obtained at each microphone position, or over each microphone traverse, i ($i = 1, 2, \dots, n$) over a typical period of operation of the source, for each mode of operation selected (see 7.5). Where the sound pressure levels at individual microphone positions vary with time, it is important to select carefully the period of observation and the period chosen shall be stated in the test report. For frequency bands centred on or below 160 Hz, the period of observation shall be at least 30 s. For frequency bands centred on or above 200 Hz, the period of observation shall be at least 10 s. When using a traversing microphone, the integrating time shall be an integer number of full traverses and shall include at least two full traverses.

In addition, either immediately before or immediately after the sound pressure levels from the noise source under test are measured, the time-averaged sound pressure levels of the background noise, $L_{pi(B)}$, shall be obtained at each microphone position or with the traversing microphone, over the same measurement time interval as that used for the noise source under test.

9.4.2 Corrections for background noise

The background noise correction, K_{1i} , at the i th microphone position or for the i th microphone traverse in each one-third-octave band shall be calculated using the following equation:

$$K_{1i} = -10 \lg(1 - 10^{-0,1 \Delta L_{pi}}) \text{ dB} \quad (9)$$

where

$$\Delta L_{pi} = L'_{pi(ST)} - L_{pi(B)};$$

$L'_{pi(ST)}$ is the time-averaged one-third-octave-band sound pressure level measured at the i th microphone position or for the i th microphone traverse, with the noise source under test (ST) in operation, in decibels;

$L_{pi(B)}$ is the time-averaged one-third-octave band sound pressure level of the background noise (B) measured at the i th microphone position or for the i th microphone traverse, in decibels.

If $\Delta L_{pi} \geq 15$ dB, K_{1i} is assumed equal to zero.

If $6 \text{ dB} \leq \Delta L_{pi} < 15 \text{ dB}$, for one-third-octave bands of mid-band frequency 200 Hz and below, and 6300 Hz and above, K_{1i} shall be calculated according to Equation (8).

If $10 \text{ dB} \leq \Delta L_{pi} < 15 \text{ dB}$, for one-third-octave bands of mid-band frequency 250 Hz to 5 000 Hz, K_{1i} shall be calculated according to Equation (8).

If $\Delta L_{pi} < 6$ dB for one or more one-third-octave bands of mid-band frequency 200 Hz and below and 6300 Hz and above, K_{1i} shall be set to 1,26 dB (the value for $\Delta L_{pi} = 6$ dB). If $\Delta L_{pi} < 10$ dB for one or more one-third-octave bands of mid-band frequency 250 Hz to 5 000 Hz, K_{1i} shall be set to 0,46 dB (the value for $\Delta L_{pi} = 10$ dB). In either case, it shall be clearly stated in the text of the report, as well as in graphs and tables of results, that the data in such bands represent upper bounds to the sound power level of the noise source under test.

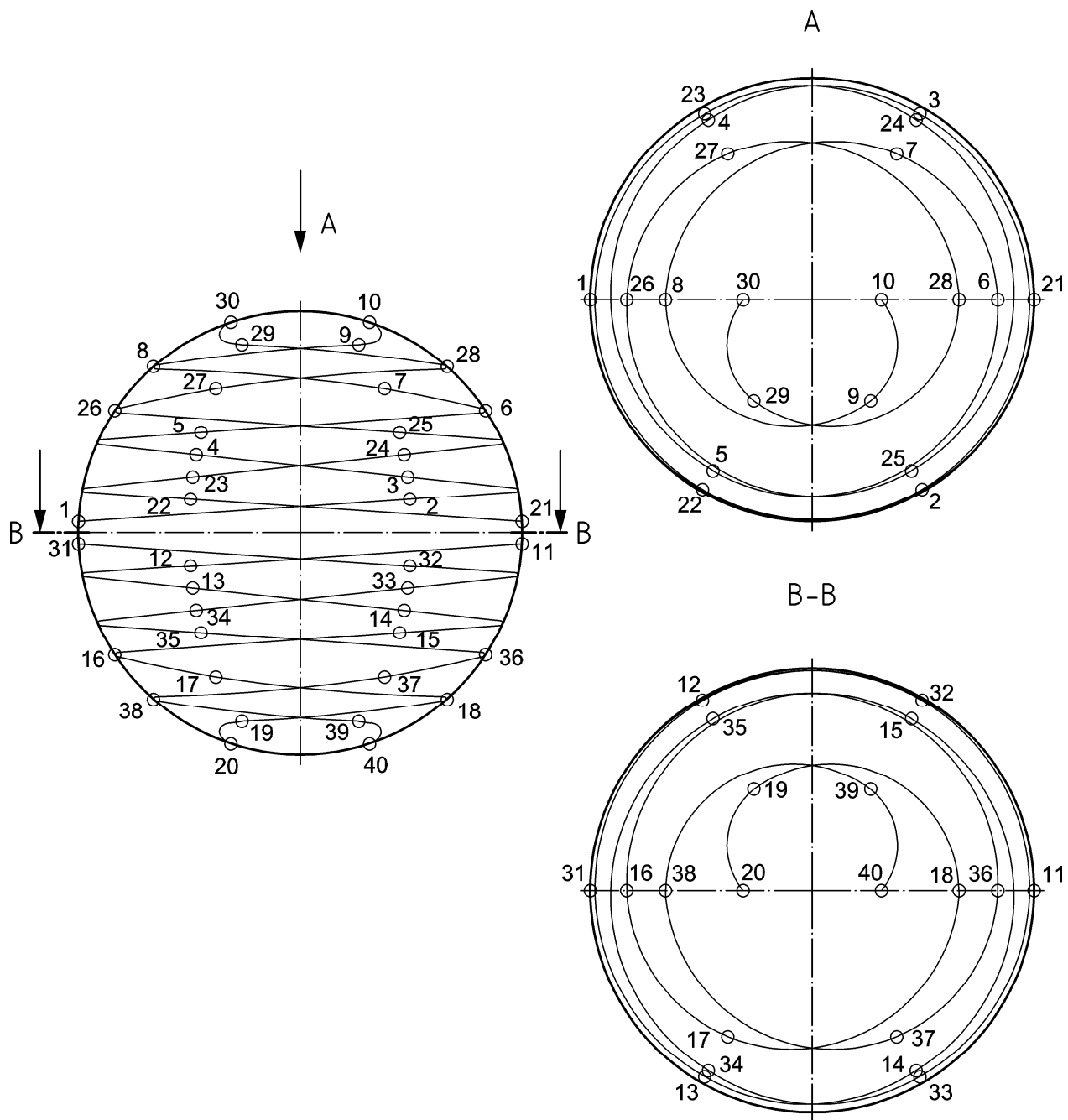
Annex D (normative)

Array of microphone positions on a spherical measurement surface in a free field

The coordinates of 40 positions associated with equal areas on the surface of a sphere of radius r , with the origin at the acoustic centre of the noise source under test, are given in Table D.1, and illustrated in Figure D.1. The z -axis is chosen perpendicularly upward from a horizontal plane ($z = 0$).

Table D.1 — Microphone positions

Position number	x/r	y/r	z/r
1	-0,999	0	0,050
2	0,494	-0,856	0,150
3	0,484	0,839	0,250
4	-0,468	0,811	0,350
5	-0,447	-0,773	0,450
6	0,835	0	0,550
7	0,380	0,658	0,650
8	-0,661	0	0,750
9	0,263	-0,456	0,850
10	0,312	0	0,950
11	0,999	0	-0,050
12	-0,494	0,856	-0,150
13	-0,484	-0,839	-0,250
14	0,468	-0,811	-0,350
15	0,447	0,773	-0,450
16	-0,835	0	-0,550
17	-0,380	-0,658	-0,650
18	0,661	0	-0,750
19	-0,263	0,456	-0,850
20	-0,312	0	-0,950
21	0,999	0	0,050
22	-0,494	-0,856	0,150
23	-0,484	0,839	0,250
24	0,468	0,811	0,350
25	0,447	-0,773	0,450
26	-0,835	0	0,550
27	-0,380	0,658	0,650
28	0,661	0	0,750
29	-0,263	-0,456	0,850
30	-0,312	0	0,950
31	-0,999	0	-0,050
32	0,494	0,856	-0,150
33	0,484	-0,839	-0,250
34	-0,468	-0,811	-0,350
35	-0,447	0,773	-0,450
36	0,835	0	-0,550
37	0,380	-0,658	-0,650
38	-0,661	0	-0,750
39	0,263	0,456	-0,850
40	0,312	0	-0,950



Key

- microphone positions on the facing side
- microphone positions on the remote side

Figure D.1 — Microphone positions on the spherical measurement surface