

# ISO 3745:2012-03 (E)

## Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms

---

### Contents

	Page
Foreword .....	v
Introduction .....	vi
1 Scope .....	1
1.1 General .....	1
1.2 Types of noise and noise sources .....	1
1.3 Test room .....	1
1.4 Measurement uncertainty .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Reference meteorological conditions .....	7
5 Test rooms .....	8
5.1 Acoustic criterion for adequacy of the test room .....	8
5.2 Criteria for background noise .....	8
5.3 Criterion for air temperature .....	9
6 Instrumentation .....	9
6.1 Instruments for acoustical measurements .....	9
6.2 Instruments for meteorological measurements .....	11
7 Definition, location, installation and operation of noise source under test .....	11
7.1 General .....	11
7.2 Auxiliary equipment .....	11
7.3 Noise source location .....	11
7.4 Mounting of the noise source .....	12
7.5 Operation of source during test .....	12
8 Measurement surface .....	13
8.1 Spherical measurement surface for use in an anechoic room .....	13
8.2 Hemispherical measurement surface for use in a hemi-anechoic room .....	13
9 Determination of sound power levels and sound energy levels .....	14
9.1 Measurements in the test room .....	14
9.2 Measurement of meteorological conditions .....	14
9.3 Microphone positions .....	14
9.4 Determination of sound power levels of a noise source which emits steady or non-steady noise .....	16
9.5 Determination of sound energy levels for a noise source which emits impulsive noise .....	20
9.6 Calculation of directivity indices .....	22
9.7 Calculation of surface sound pressure level non-uniformity index .....	23
9.8 Frequency-weighted sound power level and sound energy level .....	23
10 Measurement uncertainty .....	23
10.1 Methodology .....	23

10.2	Determination of omc .....	24
10.3	Determination of R0 .....	24
10.4	Typical upper bound values of R0 .....	25
10.5	Total standard deviation, tot, and expanded measurement uncertainty, U .....	26
11	Information to be recorded .....	27
11.1	General .....	27
11.2	Noise source under test .....	27
11.3	Test room .....	27
11.4	Instrumentation .....	27
11.5	Acoustical data .....	27
12	Test report .....	28
<b>Annex A (normative) General procedures for qualification of anechoic and hemi-anechoic rooms .....</b>		<b>29</b>
<b>Annex B (normative) Qualification procedure for spaces with test rooms used in the determination of sound power levels and sound energy levels of specific noise sources .....</b>		<b>36</b>
<b>Annex C (normative) Calculation of A-weighted sound power levels and A-weighted sound energy levels from one-third-octave band levels .....</b>		<b>38</b>
<b>Annex D (normative) Array of microphone positions on a spherical measurement surface in a freefield .....</b>		<b>40</b>
<b>Annex E (normative) Arrays of microphone positions on a hemispherical measurement surface in a hemi-freefield .....</b>		<b>43</b>
<b>Annex F (normative) Coaxial circular paths of microphones on a hemispherical measurement surface in a hemi-freefield .....</b>		<b>48</b>
<b>Annex G (normative) Meridional paths of microphones on a hemispherical measurement surface in a hemi-freefield .....</b>		<b>49</b>
<b>Annex H (normative) Spiral paths of microphones on a hemispherical measurement surface in a hemi-freefield .....</b>		<b>51</b>
<b>Annex I (informative) Guidance on the development of information on measurement uncertainty ....</b>		<b>52</b>
<b>Bibliography .....</b>		<b>62</b>