

# INTERNATIONAL STANDARD

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## **Textile machinery acoustics — Determination of sound pressure levels and sound power levels emitted by textile machines — Engineering and survey methods**

*Acoustique du matériel pour l'industrie textile — Détermination des  
niveaux de pression acoustique et des niveaux de puissance acoustique  
émis par les machines textiles — Méthodes d'expertise et de contrôle*



Reference number  
ISO 9902:1993(E)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9902 was prepared by Technical Committee ISO/TC 72, *Textile machinery and allied machinery and accessories*.

Annexes A, B, C, D and E form an integral part of this International Standard. Annex F is for information only.

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# Textile machinery acoustics — Determination of sound pressure levels and sound power levels emitted by textile machines — Engineering and survey methods

## 1 Scope

This International Standard specifies engineering and survey methods applied to textile machinery with reference to ISO 3744 and ISO 3746 for measuring the sound pressure levels on a measurement surface enveloping the source and for calculating the sound power produced by the source. It specifies the test environment and instrumentation as well as techniques for obtaining the surface sound pressure level from which the A-weighted sound power level of the source and octave band sound pressure levels, if required, are calculated.

This International Standard provides specifications for measuring the noise emitted by textile machines into the ambient air (noise emission) according to uniform methods so that the results are comparable. It contains requirements for carrying out airborne sound measurements in the vicinity of textile machines, including at the operator position, under given operating conditions.

The term "textile machines" as used in this International Standard includes all machinery used in the textile industry for the production and processing of textile fibres, yarns and fabrics and other fibre-based textile materials, but does not include machines designed for the manufacture of clothing and other sewn or similarly assembled products.

This International Standard also specifies the measurement of sound pressure levels at the operator position for specified typical conditions, with reference to ISO 6081.

As the working parameters for many textile machines are variable, the operating conditions must be clearly defined for the specific machinery. Specifications for operating conditions for various types of machines are given in the annexes.

NOTE 1 The operating conditions specified in the annexes may also be used if the reverberation method (see ISO 3741 and ISO 3742) is used to determine the sound power of textile machines instead of the enveloping surface method.

Many textile machines are multiposition machines. As most multiposition machines are built in sections, it is possible, under certain circumstances, to make acoustic measurements on a machine part instead of on the complete machine.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3744:1993<sup>1)</sup>, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane.*

1) To be published.

ISO 3745:1977, *Acoustics — Determination of sound power levels of noise sources — Precision methods for anechoic and semi-anechoic rooms*.

ISO 3746:1979, *Acoustics — Determination of sound power levels of noise sources — Survey method*.

ISO 6081:1986, *Acoustics — Noise emitted by machinery and equipment — Guidelines for the preparation of test codes of engineering grade requiring noise measurements at the operator's or bystander's position*.

IEC 651:1979, *Sound level meters*.

IEC 804:1985, *Integrating-averaging sound level meters*.

### 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 3744, ISO 3745 and ISO 3746 apply, some of which are repeated here for the user's convenience.

**3.1 free field over a reflecting plane:** A sound field in a homogeneous, isotropic medium in the half-space above an infinite, rigid plane surface on which the source is located.

[ISO 3744:1993, 3.8]

**3.2 semi-anechoic room:** Test room with a hard, reflecting floor whose other surfaces absorb essentially all the incident sound energy over the frequency range of interest, thereby affording free-field conditions above a reflecting plane.

[ISO 3745:1977, 3.4]

**3.3 sound pressure level,  $L_p$ :** Ten times the logarithm to the base 10 of the ratio of the square of the sound pressure radiated by the sound source under test to the square of the reference sound pressure. Sound pressure levels are expressed in decibels.

The frequency weighting or the width of the frequency band used, and the time weighting (S, F or I, see IEC 651), shall be indicated. The reference sound pressure is 20  $\mu\text{Pa}$  ( $2 \times 10^{-5}$  Pa).

NOTE 2 For example, the A-weighted sound pressure level with time weighting S is  $L_{pAS}$ .

[ISO 3744:1993, 3.2]

**3.4 surface sound pressure level,  $\overline{L_{pf}}$ :** The energy-average of the time-averaged sound pressure levels at all the microphone positions on the measurement surface, with the background noise correction,  $K_1$ , and the environmental correction,  $K_2$ , applied. It is expressed in decibels.

[ISO 3744:1993, 3.4]

**3.5 sound power level,  $L_W$ :** Ten times the logarithm to the base 10 of the ratio of the sound power radiated by the sound source under test to the reference sound power. It is expressed in decibels.

The frequency weighting or the width of the frequency band used shall be indicated; for example, A-weighted sound power level ( $L_{WA}$ ). The reference sound power is 1 pW ( $10^{-12}$  W).

[ISO 3744:1993, 3.6]

**3.6 frequency range of interest:** For general purposes, the frequency range of interest includes the octave bands with centre frequencies from 125 Hz to 8 000 Hz.

[ISO 3744:1993, 3.9]

**3.7 measurement surface:** A hypothetical surface of area  $S$ , enveloping the source, on which the measuring points are located. The measurement surface terminates on one or more reflecting planes.

[ISO 3744:1993, 3.3]

**3.8 reference box:** A hypothetical surface which is the smallest rectangular parallelepiped that just encloses the source and terminates on the reflecting plane or planes.

[ISO 3744:1993, 3.10]

**3.9 measurement distance,  $d$ :** The distance from the reference box to a box-shaped measurement surface.

[ISO 3744:1993, 3.11]

**3.10 time-averaged sound pressure level,  $L_{p,eq,T}$ :** Sound pressure level of a continuous steady sound that, within a measurement time interval  $T$ , has the same mean-square sound pressure as a sound under consideration which varies with time.

Time-averaged sound pressure levels are expressed in decibels and shall be measured with an instrument which complies with the requirements of IEC 804.

[ISO 3744:1993, 3.2.1]