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Acoustics — Laboratory measurement procedures for ducted silencers and air-terminal units — Insertion loss, flow noise and total pressure loss

Acoustique — Modes opératoires de mesure en laboratoire pour silencieux en conduit et unités terminales — Perte d'insertion, bruit d'écoulement et perte de pression totale



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7235 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This second edition cancels and replaces the first edition (ISO 7235:1991), which has been technically revised.

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Introduction

This International Standard specifies the substitution method for determining the insertion loss of ducted silencers and a method for determining the transmission loss of air-terminal units.

In the substitution method, the sound pressure level of the transmitted wave is first determined for the test object and then when the test object has been replaced by the substitution duct. The sound pressure level of the transmitted wave can be measured

- in a reverberation room,
- in a test duct after the silencer, or
- in an essentially free field.

The methods are listed in order of preference.

The acoustic performance of silencers depends on the modal composition of the sound field at the inlet and on reflections at the outlet side, on flanking transmission and on level differences between signals and flow noise (or regenerated sound).

This International Standard describes configurations at the inlet side providing for a predominant fundamental mode that suffers the least attenuation. For the outlet side, it describes anechoic terminations and measurement procedures which are not sensitive to reflections or which allow for specified corrections. Furthermore, this International Standard gives guidance on the suppression of flanking transmission and noise signals.

The transmission loss of an air-terminal unit is determined from the results of measurements in a reverberation room and theoretical reflection coefficients of a substitution duct.

The insertion loss of a silencer is generally affected by the airflow. The insertion loss is therefore preferably measured with superimposed airflow if the silencer is to be used in ducts with high flow velocity.

For absorptive silencers where the maximum internal flow velocity falls short of 20 m/s, the flow will hardly have an effect on the insertion loss. In practice, non-uniform flow distributions will occur. Therefore, the limit velocity of 20 m/s may correspond to a design velocity of 10 m/s to 15 m/s.

An airflow through a silencer regenerates noise. This flow noise (or regenerated sound) establishes the lowest sound pressure level that can be achieved after the silencer. It is, therefore, necessary to know the sound power level of the flow noise (or regenerated sound) behind the silencer. This is preferably determined in a reverberation room connected to the object via a transmission element.

In accordance with this International Standard, the total pressure loss of a silencer to be used with flow is to be determined. It is, therefore, useful to equip the test facility with the instruments and devices necessary for the determination of the total pressure loss.