

Methods for

Testing and rating fan coil units, unit heaters and unit coolers

**Part 4. Determination of sound power
levels of fan coil units, unit heaters and
unit coolers using reverberation rooms**

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Foreword

This revision has been prepared by Technical Subcommittee RHE/6/1, and supersedes BS 4856 : Part 4 : 1978 and BS 4856 : Part 5 : 1979, which are both withdrawn.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

Introduction

This British Standard specifies a method for determining the sound power levels of fan coil units, unit heaters and unit coolers, in a reverberation room. It is based on BS 4196 : Part 1 and BS 4196 : Part 2, which describe the acoustic test facilities, instrumentation and procedures to be used for precision grade determination of sound power levels in octave and one-third octave bands of a noise source, having a volume less than 1 % of the volume of the reverberation room.

1 Scope

This British Standard establishes general rules for acoustic testing of fan coil units, unit heaters and unit coolers, in order to determine sound power levels. This standard is applicable to equipment operating under steady state conditions. It applies to sources that produce steady broad-band noise, and to sources that may produce significant discrete frequency components or narrow band noises.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publications apply to this standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this standard, the definitions given in BS 4727 : Part 3 : Group 08 apply, together with the following.

3.1 breakout/casing noise

The amount of sound energy transmitted via the unit case.

3.2 fan coil unit, unit heater, unit cooler

A fluid-to-air heat exchanger apparatus through which air is passed by an electrically powered fan.

NOTE. This unit may or may not contain filters.

3.3 frequency range of interest

The frequency range that includes octave bands with centre frequencies between 125 Hz and 8000 Hz, or the one-third octave bands with centre frequencies between 100 Hz and 10000 Hz.

3.4 inlet noise

The amount of sound energy transmitted from the inlet of the unit.

3.5 open inlet sound power level

The sound power level transmitted from the inlet of the unit.

3.6 open outlet sound power level

The sound power level transmitted from the outlet of the unit.

3.7 outlet noise

The amount of sound energy transmitted from the outlet of the unit.

3.8 steady state condition

The condition considered to exist, for test purposes, if the air volume flow rate does not vary by more than $\pm 2\%$ from the mean value during the test.

3.9 unit noise

The total amount of sound energy attributable to the unit, equal to the sum of inlet noise, outlet noise, and breakout/casing noise, and applicable to non-ducted units only.

4 Test facility, instrumentation and procedures

4.1 General

The acoustic test facilities, instrumentation, and procedures, including room qualification tests, shall be in accordance with BS 4196 : Part 1 or BS 4196 : Part 2.

NOTE. BS 4196 : Part 1 and BS 4196 : Part 2 offer two methods for reverberation room measurements for determining sound power levels: the comparison method uses a reference sound source having a known sound power output, and the direct method uses knowledge of the reverberation time of the room in which the determination is made.

If there are substantial variations in the reverberant room characteristics, due to the presence of the source to be tested, then the test room shall also be qualified according to BS 4196 : Part 1 : 1991 and BS 4196 : Part 2 : 1991, with all the equipment in the room.

4.2 Broad-band noise

BS 4196 : Part 1 shall apply if the noise emitted by the source has a broad-band frequency spectrum without significant narrow-band or discrete frequency components.

NOTE. This is typically the case for the aerodynamic sound of the equipment to be tested in accordance with this standard.

Broad-band sound power levels shall be determined in one-third octave bands and shall be reported in both one-third octave bands and octave bands.