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STANDARD

**4412-2**

Second edition  
1991-08-15

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**Hydraulic fluid power — Test code for  
determination of airborne noise levels —**

**Part 2:  
Motors**

*Transmissions hydrauliques — Code d'essai pour la détermination du  
niveau de bruit aérien —*

*Partie 2: Moteurs*



Reference number  
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## Contents

	Page
1 Scope .....	1
2 Normative references .....	1
3 Definitions .....	2
4 Measurement uncertainty .....	2
5 Test environment .....	2
6 Instrumentation .....	3
7 Installation conditions .....	3
8 Operating conditions .....	3
9 Location and number of sound measurement points .....	4
10 Test procedure .....	4
11 Information to be recorded .....	4
12 Test report .....	6
13 Identification statement (Reference to this part of ISO 4412) .....	6

## Annexes

A Calculation of sound levels .....	7
B Errors and classes of measurement .....	8
C Guidelines for the application of this part of ISO 4412 .....	9
D Bibliography .....	20

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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 4412-2 was prepared jointly by Technical Committees ISO/TC 131, *Fluid power systems*, Sub-Committee SC 8, *Product testing and contamination control* and ISO/TC 43, *Acoustics*.

This second edition cancels and replaces the first edition (ISO 4412-2:1984), of which clauses 12 and 13 have been transferred to form a new annex A. The former annex A has become annex B, and annexes C and D have been added.

ISO 4412 consists of the following parts, under the general title *Hydraulic fluid power – Test code for determination of airborne noise levels*:

- *Part 1: Pumps*
- *Part 2: Motors*
- *Part 3: Pumps – Method using a parallelepiped microphone array*

Annexes A and B form an integral part of this part of ISO 4412. Annexes C and D are for information only.

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## Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure in an enclosed circuit. Motors are components which convert rotary fluid power to mechanical power. During the process of converting hydraulic fluid power to mechanical power, airborne noise, fluid-borne vibrations and structure-borne vibrations are radiated from the motor.

The airborne noise level of a hydraulic fluid power motor is an important consideration in component selection. The noise measurement technique must, therefore, be such as to yield accurate appraisals of these airborne noise levels. The determination of noise levels is complicated by the interactions which occur during noise measurements. The fluid-borne vibrations from the motor can be transmitted to the circuit and ultimately give rise to background airborne noise levels which could affect the determination of the motor airborne noise levels.

The procedures described in this part of ISO 4412 are intended to measure only the airborne noise radiated directly from the motor under test.

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# Hydraulic fluid power — Test code for determination of airborne noise levels —

## Part 2: Motors

### 1 Scope

This part of ISO 4412 establishes a test code describing procedures, based on ISO 2204, for the determination of the sound power levels of a hydraulic fluid power motor, under controlled conditions of installation and operation, suitable for providing a basis for comparing the noise levels of motors in terms of:

- A-weighted sound power level;
- octave band sound power levels.

From these sound power levels, if required, reference sound pressure levels may be calculated for reporting purposes in accordance with annex A.

For general purposes, the frequency range of interest includes the octave bands with centre frequencies between 125 Hz and 8 000 Hz.<sup>1)</sup>

Due to the inherent difficulties in the measurement of low-speed motor performance, this part of ISO 4412 is limited to motors operating at speeds exceeding 50 r/min.

Guidelines for the application of this part of ISO 4412 are given in annex C.

This part of ISO 4412 is applicable to all types of hydraulic fluid power motors operating under steady-state conditions, irrespective of size, except for any limitations imposed by the size of the test environment (see clause 5).

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4412. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4412 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 3448:1975, *Industrial liquid lubricants — ISO viscosity classification*.

ISO 3744:1981, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for free-field conditions over a reflecting plane*.

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

ISO 5598:1985, *Fluid power systems and components — Vocabulary*.

ISO 6743-4:1982, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*.

IEC 50(801):1984, *International Electrotechnical Vocabulary — Chapter 801: Acoustics and electroacoustics*.

IEC 651:1979, *Sound level meters*.

1) 1 Hz = 1 s<sup>-1</sup>