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**Acoustics—Laboratory measurements
of the reduction of transmitted impact
sound by floor coverings on a solid
standard floor—Part 2 : Method using
standard heavy impact sources**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Land, Infrastructure and Transport through deliberations at the Japanese Industrial Standards Committee as the result of proposal for establishing a Japanese Industrial Standard submitted by Japan Testing Center for Construction Materials (JTCCM)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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JIS A 1440 consists of the following 2 parts under the general title “*Acoustics—Laboratory measurements of the reduction of transmitted impact sound by floor coverings on a solid standard floor*”:

Part 1: Method using standard light impact source

Part 2: Method using standard heavy impact sources

Acoustics—Laboratory measurements of the reduction of transmitted impact sound by floor coverings on a solid standard floor—Part 2 : Method using standard heavy impact sources

Introduction

The method using the standard light impact source as the measurement method of the reduction of impact sound pressure level of floor coverings installed on a concrete floor is specified in **JIS A 1440-1** which corresponds to **ISO 140-8 : 1997** *Acoustics—Measurement of sound insulation in buildings and of building elements—Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*. This method aims to measure the reduction of impact sound pressure level corresponding to the case where comparatively lightweight and hard impacts such as a walk with shoes worn are exerted on the floor, by using the standard light impact source. On the other hand, aside from this kind of impact, there is a case where it is necessary to measure the reduction of impact sound pressure level corresponding to the case where comparatively heavyweight and soft impacts such as a bare-feet walk of an adult, jumping up and down and running around of a child are exerted on the floor.

This Japanese Industrial Standard newly specifies the method of laboratory measurements of the reduction of impact sound pressure level of floor coverings installed on a concrete floor using the standard heavy impact sources.

In addition, the corresponding International Standard is not established as of now.

1 Scope

This part of **JIS A 1440** specifies the laboratory measurement method of the reduction of heavyweight impact sound pressure level of the floor covering installed directly on the concrete slabs in buildings (hereafter referred to as “specimens”) except specimens supported only by the periphery of floor slabs or specimens supported by walls and beams.

NOTE 1 In this part of **JIS A 1440**, floor coverings refer to the multi-layered products or the single-layered products such as the floor structures prepared for finishing on the upper part of a concrete floor, the floor covering installed directly on the upper part of a concrete floor.

NOTE 2 The method of measuring the impact sound insulation performance of buildings using standard heavy impact sources is specified in **JIS A 1418-2**.

NOTE 3 Among the floor coverings under Category II specified in **6.2**, there are floor coverings of which the generation of heavyweight impact sound significantly depends on the construction building frame, and of which, therefore, the reduction of impact sound pressure level changes when it is subjected to the constructional change of an actual building in which it is installed. In the case of such floor coverings, applying the

reduction of impact sound pressure level obtained by this part of **JIS A 1440** to the actual buildings is often inappropriate.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of **JIS A 1440**. For standards with the indication of the year, the edition of the indicated year shall be applied so that any revision (including amendments) made thereafter is not applied, and for those without, the most recent edition (including amendments) shall be applied.

JIS A 1409 *Method for measurement of sound absorption coefficients in a reverberation room*

JIS A 1418-2 *Acoustics—Measurement of floor impact sound insulation of buildings—Part 2: Method using standard heavy impact sources*

JIS C 1509-1 *Electroacoustics—Sound level meters—Part 1: Specifications*

JIS C 1514 *Electroacoustics—Octave-band and fractional-octave-band filters*

JIS C 1515 *Electroacoustics—Sound calibrators*

JIS Z 1528 *Pressure sensitive adhesive double coated tapes*

JIS Z 8401 *Guide to the rounding of numbers*

ISO 140-2:1991 *Acoustics—Measurement of sound insulation in buildings and of building elements—Part 2: Determination, verification and application of precision data*

3 Terms and definitions

For the purpose of this part of **JIS A 1440**, the following terms and definitions apply.

3.1 maximum sound pressure level L_{Fmax}

the maximum of sound pressure level for each excitation at the specified measurement point, measured using the time-weighted characteristics F of a sound level meter

It is expressed in decibels (dB).

3.2 impact sound pressure level $L_{i,Fmax,k}$

the average energy value of the maximum sound pressure level in the receiving room when the floor under test is excited by the standard heavy impact source specified in Annex 1 of **JIS A 1418-2**

It is expressed in decibels (dB).

3.3 reduction of impact sound pressure level; improvement of impact sound insulation ΔL_H

value obtained by subtracting the average impact sound pressure level of the standard concrete floor with the installed floor covering ($L_{i,Fmax,f}$) from the average impact sound pressure level of the standard concrete floor of the plain surface ($L_{i,Fmax,s}$), obtained by formula (1)

It is expressed in decibels (dB).

$$\Delta L_H = L_{i,Fmax,s} - L_{i,Fmax,f} \dots\dots\dots (1)$$

NOTE : The acoustic conditions (e.g. installing positions of sound absorbing materials or diffusers) shall be the same for testing under the state in which the specimen is not yet installed (hereafter referred to as “bare-surface state”) and under the state in which the test covering is installed (hereafter referred to as “specimen-installed state”).

4 Measuring equipment

The measuring equipment shall have sufficient precision to perform the test in clause 7 and shall be as follows.

- a) For impact source, the standard heavy impact source meeting the impact force characteristics (1) or impact force characteristics (2) specified in Annex 1 of **JIS A 1418-2** shall be used.
- b) For sound level measurement, a sound level meter of an accuracy equivalent or superior to the requirements of accuracy Class 1 defined in **JIS C 1509-1** shall be used.

For sound level meters calibrated for measurements in sound fields of progressive plane waves corrections for the diffuse sound field shall be applied.

- c) The complete measuring system including the microphone shall be adjusted before each measurement using a sound calibrator specified in **JIS C 1515**.
- d) For the frequency measurement, one-third-octave band filters or octave band filters specified in **JIS C 1514** shall be used.

NOTE : The real-time frequency analyzer which complies with the requirements specified in **JIS C 1509-1** and **JIS C 1514** may be used.

5 Test arrangement

5.1 General arrangement

Two vertically adjacent rooms are used [the upper one being designated the “source room” and the lower one the “receiving room”], which are separated by the standard concrete floor.

In addition, it is necessary to make the airborne sound insulation performance between source room and receiving room sufficiently high so that the sound pressure level measured in the receiving room is not determined by the acoustic energy transmitted from source room to receiving room as airborne sound generated in the source room in each measurement frequency band specified in 7.6.

NOTE : The difference of sound pressure level between source room and receiving room should be measured in accordance with **JIS A 1417** beforehand, and then the sound pressure level in the source room should be measured at the time of measurement of the impact sound pressure level under bare surface state and specimen-installed state, so that the sound pressure level of airborne sound in the receiving room is predicted and is verified to be smaller than the impact sound pressure level measure in the receiving room by 15 dB or more.