

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 31

PART VII

QUANTITIES AND UNITS OF ACOUSTICS

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 31, *Part VII – Quantities and Units of Acoustics*, was drawn up by Technical Committee ISO/TC 12, *Quantities, Units, Symbols, Conversion Factors and Conversion Tables*, the Secretariat of which is held by the Danish Standards Association, Dansk Standardiseringsråd (DS).

Work on this question by the Technical Committee began in 1956 and led, in 1960, to the adoption of a Draft ISO Recommendation.

It should be noted that the following international organizations have had these draft proposals sent to them and have taken part in the discussions at the meetings of Technical Committee ISO/TC 12:

International Committee on Weights and Measures,
International Electrotechnical Commission,
International Union of Pure and Applied Chemistry,
International Union of Pure and Applied Physics
and its Sub-Committee SUN,
International Commission on Illumination,
Comité International de métrologie légale,
World Meteorological Organization,
International Commission on Radiological Units and Measurements,
International Telegraph and Telephone Consultative Committee.

In June 1961, this Draft ISO Recommendation (No. 440) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to some modifications of an editorial nature, by the following Member Bodies:

Australia	Hungary	Poland
Austria	India	Portugal
Belgium	Ireland	Romania
Canada	Israel	Sweden
Chile	Italy	Switzerland
Czechoslovakia	Japan	U. A. R.
Denmark	Mexico	United Kingdom
France	Netherlands	U. S. A.
Germany	New Zealand	U. S. S. R.
Greece	Norway	Yugoslavia

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in November 1965, to accept it as an ISO RECOMMENDATION.

Introduction

General remarks

This document, containing a table of *Quantities and Units of Acoustics*, is part of a more comprehensive publication dealing with quantities and units in various fields of science and technology. Other part of this more comprehensive publication are at present

ISO Recommendations R 31,

Part I (2nd edition): *The International System of Units and Quantities and Units of Space and Time*¹⁾,

Part II: *Quantities and Units of Periodic and Related Phenomena*,

Part III: *Quantities and Units of Mechanics*,

Part IV: *Quantities and Units of Heat*,

Part V: *Quantities and Units of Electricity and Magnetism*,

Part XI: *Mathematical Signs and Symbols for Use in Physical Sciences and Technology*.

General information regarding the arrangement of the tables and the symbols and abbreviations used is to be found in the introduction to ISO/R 31/Part I, where the full definitions of fundamental units are given as an appendix.

The statements in the definition columns for quantities are given merely for identification, they are not intended to be complete definitions.

Special remarks

The explanations in the definition columns for quantities presuppose in general linear systems.

When it is necessary to use subscripts to avoid confusion between similar symbols in different domains, the subscript "a" is recommended for the acoustical case.

The preference given to the units of the International System of Units has been indicated by placing them first.

¹⁾ The title of the first edition of this document was: "Fundamental Quantities and Units of the MKSA System and Quantities and Units of Space and Time".

7. Acoustics

Item No.	Quantity	Symbol	Definition ¹⁾	Remarks
7-1.1	period, periodic time	T	Time of one cycle.	
7-2.1	frequency	f, ν	$f=1/T$	Concerning the standard tuning frequency (standard musical pitch), see ISO/R 16-1955.
7-3.1	frequency interval		The frequency interval between two frequencies is the logarithm to a specified base of the ratio between them.	
7-4.1	angular frequency, circular frequency	ω	$\omega=2\pi f$	
7-5.1	wavelength	λ		
7-6.1	circular wave number	k	$k = \frac{2\pi}{\lambda}$	
7-7.1	density (mass density)	ρ	Mass divided by volume.	
7-8.1	static pressure	p_s	Pressure that would exist with no sound waves present.	The root mean square value of the quantities 7-8.2, 7-9.1, 7-10.1, 7-11.1 and 7-12.1 are often called "effective" values, and the same symbols are often used without modification to denote the effective values.
7-8.2	(instantaneous) sound pressure	p	The difference between the instantaneous pressure and the static pressure.	
7-9.1	(instantaneous) sound particle displacement	$\xi, (x)$	Instantaneous displacement of particle of the medium from its mean position.	
7-10.1	(instantaneous) sound particle velocity	u, v	$u = \frac{\partial \xi}{\partial t}$	
7-11.1	(instantaneous) sound particle acceleration	a	$a = \frac{\partial u}{\partial t}$	
7-12.1	(instantaneous) volume velocity	q, U	Instantaneous rate of volume flow due to sound wave across an area.	
7-13.1	velocity of sound	c	Velocity of propagation of sound wave.	
7-14.1	sound energy density	E	Mean sound energy in a given volume divided by that volume.	If the energy density is varying with time, the mean must be taken over an interval during which the sound may be considered statistically stationary.
7-15.1	sound energy flux, sound power	$P, (N, W)$	Sound energy transferred in a certain time interval, divided by the duration of that interval.	
7-16.1	sound intensity	I, J	For unidirectional sound energy flux, sound energy flux through an area normal to the direction of propagation divided by that area.	

¹⁾ The statements in this column are given merely for identification and they are not intended to be complete definitions.