



ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 31 PART IV

QUANTITIES AND UNITS OF HEAT

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 31, Part IV, *Quantities and Units of Heat*, 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).

The ISO/TC 12 Secretariat drew up two drafts in succession, the second of which was studied by the Technical Committee during its fourth meeting, held in Copenhagen in November 1957. The Secretariat then prepared a third draft proposal, which was submitted by correspondence to the Members of the Technical Committee and was approved as 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 Commission on Illumination
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
Organisation Internationale de Métrologie Légale

On 31 March 1959, the Draft ISO Recommendation (No. 277) was distributed to all the ISO Member Bodies and was approved, subject to small modifications, by the following Member Bodies:

Australia	Greece	Pakistan
Austria	Hungary	Poland
Belgium	India	Portugal
Brazil	Ireland	Romania
Burma	Israel	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Netherlands	United Kingdom
France	New Zealand	U. S. A.
Germany	Norway	U. S. S. R.

One Member Body opposed the approval of the draft: Italy.

The Draft ISO Recommendation was submitted by correspondence to the ISO Council, which decided, in December 1960, to accept it as an ISO RECOMMENDATION.

Introduction

General remarks

This document, containing a table of *Quantities and Units of Heat*, is part of a more comprehensive publication dealing with quantities and units in various fields of science and technology.

Parts of this more comprehensive publication are the ISO Recommendation R 31/Part I (2nd edition):

*The International System of Units and
Quantities and Units of Space and Time*¹⁾,

the ISO Recommendation R 31/Part II:

Quantities and Units of Periodic and Related Phenomena

and the ISO Recommendation R 31/Part III:

Quantities and Units of Mechanics.

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 basic units are given as an appendix.

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

Special remarks

Attention is drawn to the remarks 4-4.a and 4-5.a. Quantities involving heat in the present document can be expressed in units based on the various units of energy, given in Part III “Mechanics” item 3-22.

For simplicity, the present document includes only a selection of units.

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”.

Quantities
4-1.1 ... 4-6.1

4. Heat

Item No.	Quantity	Symbol	Definition ¹⁾	Remarks
4-1.1	thermodynamic temperature, absolute temperature	T, Θ	The thermodynamic temperature is defined according to the principles of thermodynamics.	
4-2.1	customary temperature	t, θ, ϑ	$t = T - T_0$ where t and T are the customary and absolute (thermodynamic) temperatures, of the same system, and T_0 is fixed by convention.	
4-3.1	linear expansion coefficient	α, λ	$\alpha = \frac{1}{l} \frac{dl}{dT}$	These quantities are not completely defined unless the type of change is specified.
4-3.2	cubic expansion coefficient	α, β, γ	$\gamma = \frac{1}{V} \frac{dV}{dT}$	
4-3.3	pressure coefficient	β	$\beta = \frac{1}{p} \frac{dp}{dT}$	The quantity, pressure coefficient, as here defined is used only for gases.
4-4.1	heat, quantity of heat	Q		
4-5.1	heat flow rate	$\Phi, (q)$	Heat crossing a surface divided by time.	
4-6.1	density of heat flow rate	$q, (\varphi)$	Heat flow rate divided by area.	

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