SVENSK STANDARD
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Storheter och enheter –
Del 12: Kondenserade materiens fysik (ISO/DIS 80000-12:2019)

Quantities and units –
Part 12: Condensed matter physics (ISO 80000-12:2019)

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Europastandarden EN ISO 80000-12:2019 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 80000-12:2019.

Denna standard ersätter SS-EN ISO 80000-12:2013, utgåva 1

The European Standard EN ISO 80000-12:2019 has the status of a Swedish Standard. This document contains the official version of EN ISO 80000-12:2019.

This standard supersedes the SS-EN ISO 80000-12:2013, edition 1

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för SIS/SEK Storheter och enheter, SIS/TK 002.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 80000-12

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Supersedes EN ISO 80000-12:2013

English Version

Quantities and units - Part 12: Condensed matter physics (ISO 80000-12:2019)

Grandeurs et unités - Partie 12: Physique de la matière condensée (ISO 80000-12:2019)

Größen und Einheiten - Teil 12: Physik der kondensierten Materie (ISO 80000-12:2019)

This European Standard was approved by CEN on 5 May 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN ISO 80000-12:2019) has been prepared by Technical Committee ISO/TC 12 "Quantities and units" in collaboration with Technical Committee CEN/SS F02 “Units and symbols” the secretariat of which is held by CCMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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Endorsement notice

The text of ISO 80000-12:2019 has been approved by CEN as EN ISO 80000-12:2019 without any modification.

Quantities and units —

Part 12: Condensed matter physics

1 Scope

This document gives names, symbols, definitions and units for quantities of condensed matter physics. Where appropriate, conversion factors are also given.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

Names, symbols, definitions and units for quantities used in condensed matter physics are given in Table 1.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

Table 1 — Quantities and units used in condensed matter physics

Item No.	Quantity			Unit	Remarks
	Name	Symbol	Definition		
12-1.1	lattice vector	$\boldsymbol{R}$	translation vector that maps the crystal lattice on itself	m	The non-SI unit ångström (Å) is widely used by x-ray crystallographers and structural chemists.
12-1.2	fundamental lattice vectors	$\boldsymbol{a}_1, \boldsymbol{a}_2, \boldsymbol{a}_3$ $\boldsymbol{a}, \boldsymbol{b}, \boldsymbol{c}$	fundamental translation vectors for the crystal lattice	m	The lattice vector (item 12-1.1) can be given as $\boldsymbol{R} = n_1\boldsymbol{a}_1 + n_2\boldsymbol{a}_2 + n_3\boldsymbol{a}_3$ where n_1, n_2 and n_3 are integers.
12-2.1	angular reciprocal lattice vector	$\boldsymbol{G}$	vector whose scalar products with all fundamental lattice vectors are integral multiples of 2π	m^{-1}	In crystallography, however, the quantity $\frac{\boldsymbol{G}}{2\pi}$ is sometimes used.
12-2.2	fundamental reciprocal lattice vectors	$\boldsymbol{b}_1, \boldsymbol{b}_2, \boldsymbol{b}_3$	fundamental translation vectors for the reciprocal lattice	m^{-1}	$\boldsymbol{a}_i \cdot \boldsymbol{b}_i = 2\pi\delta_{ij}$ In crystallography, however, the quantities $\frac{\boldsymbol{b}_j}{2\pi}$ are also often used.
12-3	lattice plane spacing	d	distance (ISO 80000-3) between successive lattice planes	m	The non-SI unit ångström (Å) is widely used by x-ray crystallographers and structural chemists.
12-4	Bragg angle	ϑ	angle between the scattered ray and the lattice plane	1 °	Bragg angle ϑ is given by $2d \sin\vartheta = n\lambda$ where d is the lattice plane spacing (item 12-3), λ is the wavelength (ISO 80000-7) of the radiation, and n is the order of reflexion which is an integer.
12-5.1	short-range order parameter	r, σ	fraction of nearest-neighbour atom pairs in an Ising ferromagnet having magnetic moments in one direction, minus the fraction having magnetic moments in the opposite direction	1	Similar definitions apply to other order-disorder phenomena. Other symbols are frequently used.
12-5.2	long-range order parameter	R, s	fraction of atoms in an Ising ferromagnet having magnetic moments in one direction, minus the fraction having magnetic moments in the opposite direction	1	Similar definitions apply to other order-disorder phenomena. Other symbols are frequently used.

Table 1 *(continued)*

Item No.	Quantity			Unit	Remarks
	Name	Symbol	Definition		
12-5.3	atomic scattering factor	f	quotient of radiation amplitude scattered by the atom and radiation amplitude scattered by a single electron	1	The atomic scattering factor can be expressed by: $f=\frac{E_\mathrm{a}}{E_\mathrm{e}}$ where E_a is the radiation amplitude scattered by the atom and E_e is the radiation amplitude scattered by a single electron.
12-5.4	structure factor	$F(h,k,l)$	quantity given by: $F(h,k,l)=\sum_{n=1}^{N} f_n \exp\left[2\pi\mathrm{i}\left(hx_n+ky_n+lz_n\right)\right]$ where f_n is the atomic scattering factor (item 12-5.3) for atom n, x_n, y_n, z_n are fractional coordinates of its position, N is the total number of atoms in the unit cell and h, k, l are the Miller indices	1	For the Miller indices h, k, l, see Annex A.
12-6	Burgers vector	$\boldsymbol{b}$	closing vector in a sequence of vectors encircling a dislocation	m	
12-7.1	particle position vector	$\boldsymbol{r}$, $\boldsymbol{R}$	position vector (ISO 80000-3) of a particle	m	Often, $\boldsymbol{r}$ is used for electrons and $\boldsymbol{R}$ is used for atoms and other heavier particles.
12-7.2	equilibrium position vector <condensed matter physics>	$\boldsymbol{R}_0$	position vector (ISO 80000-3) of an ion or atom in equilibrium	m	
12-7.3	displacement vector <condensed matter physics>	$\boldsymbol{u}$	difference between the position vector (ISO 80000-3) of an ion or atom and its position vector in equilibrium	m	The displacement vector can be expressed by: $\boldsymbol{u} = \boldsymbol{R} - \boldsymbol{R}_0$ where $\boldsymbol{R}$ is particle position vector (item 12-7.1) and $\boldsymbol{R}_0$ is position vector of an ion or atom in equilibrium (item 12-7.2).
12-8	Debye-Waller factor	D, B	factor by which the intensity of a diffraction line is reduced because of the lattice vibrations	1	D is sometimes expressed as $D = \exp(-2W)$; in Mössbauer spectroscopy, it is also called the f factor and denoted by f.