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WS

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

WS/T 613-2018

**Annual limits on intake of radionuclides for members of the
public**

(English Translation)

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by the National Health Standards Committee Radiological Health Standards Committee.

This standard was drafted. Radiation Protection and Research Institute of Military Medical Sciences, Institute of Military Medical Sciences, China Center for Disease Control and Prevention Nuclear Safety Medical Institute, Suzhou University.

1 Scope

This standard specifies the annual radionuclide intake limits for members of different age groups.

This standard applies to the evaluation of internal radiation protection of members of the public.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document.

For undated references, the latest edition (including all amendments) applies to this document.

GB 18871 Basic standards for ionizing radiation protection and radiation source safety

3 Terms and definitions

The following terms and definitions apply to this document.

Member of the public any member of society other than a professionally licensed person and a medically licensed person. For verifying compliance with annual dose limits for public

exposure it is a representative individual in a key group of people.

Effective dose the sum of the equivalent dose of the organ or tissue to be accumulated and the corresponding tissue weighting factor. The formula is as follows.

$$E(\tau) = \sum_T w_T H_T(\tau) \quad (1)$$

In the formula.

$E(\tau)$ - the effective dose to be accumulated;

w_T - the organizational weighting factor of the organization T;

$H_T(\tau)$ --Integral to the tau time tissue T is the equivalent dose to be accumulated.

Note: When tau is not specified, 50 years for adults tau; for children up to 70 years.

Dose limit dose limit; DL Controlled practice is such that an effective dose or equivalent dose to an individual is not exceeded.

Intake

The amount of radionuclide that enters the body by inhalation, ingestion, or through the skin.

Annual intake limit

The amount of a given radionuclide that a reference person ingests, ingests, or ingests through the skin for a period of one year.

The dose is equal to the corresponding dose limit.

Activity median aerodynamic diameter activity median aerodynamic diameter ;AMAD Under the same aerodynamic conditions, the settling velocity of an aerosol particle in air is the same as that of a sphere with a density of 1 g/cm³.

The settling velocity is equal, and the diameter of the sphere is called the aerodynamic diameter of the aerosol particle. If in all aerosol particles, A particle having a diameter greater than or less than an aerodynamic diameter is equal, and the diameter is the activity median aerodynamic diameter.

4 Public members' annual intake limit and application of radionuclides

4.1

Appendix A gives the annual radionuclide intake limits for members of different age groups, including.

- Limits on the annual intake of radionuclides (Table A.1);

- Annual intake limit for inhaled radioactive aerosols (Table A.2);
- Annual intake limit for inhaled radioactive gases or vapours (Table A.3).

4.2

In the case of a single nuclide, a single intake route, and no external exposure, whether the intake exceeds ALI or not Limits for effective doses; when one or more of the following conditions exist.

- intake of a variety of radionuclides;
- multiple intake routes;
- Mixed radiation inside and outside.

The formula (2) can be used to determine whether the effective dose limit is met.

J_{ij}

ALI

ALI

Inh,

Inh,

Ing,

Ing,p

In the formula.

H_p - the individual dose equivalent of external exposure to radiation caused by members of the public during the year, in units of SV (Sv);

DL - Annual dose limit for effective doses of members of the public, in units of SV (Sv);

$I_{j,ing}$ - the intake of radionuclides j in the same period, in units of Becker (Bq);

ALI $_{j,ing}$ -- the annual intake limit for ingested radionuclide j in units of Becker (Bq);

$I_{j, inh}$ - the intake of radionuclide j inhaled during the same period, in units of Becker (Bq);

ALI $_{j, inh}$ - the annual intake limit for inhaled radionuclide j in units of Becker (Bq).

Note: In special cases, if the average dose of 5 consecutive years does not exceed 1mSv, the effective dose of a single year can be increased to 5mSv, the right side of formula (2) it can be taken as 5.

Appendix A

(normative appendix) Annual radionuclide intake limits for members of the public in different age groups A.1 The annual radionuclide intake limit for members of different age groups is

calculated according to formula (A.1).

$ALI = \dots(A.1)$

In the formula.

ALI - the annual intake limit for radionuclides in units of Becquerel (Bq);

DL - Annual dose limit for effective doses of members of the public, in units of Sievert (Sv);

$e(g)$ - The effective dose of the ingested and inhaled unit of radionuclide in the age group, in units of Sievert per gram (Sv /Bq). Members of the public are divided into 6 groups according to their age (≤ 1 , 1 to 2, 2 to 7, 7 to 12, 12 to 17).

>17 years old).

A.2 The annual intake limits of radionuclides of members of different age groups are shown in Tables A.1 to A.3. The annual intake limit listed in the table is the annual dose limit DL given in GB 18871 is equal to 1 mSv.

Table A.1 Annual intake limits of radionuclides in public members

The unit is Becquerel

Nuclide

ALI

Age	≤ 1 year old	1 year old~2 years old	2 years old~7 years old	7 years old~12 years old	12 years old~17 years old	>17 years old
H-3 (organic binding)	8.3x10 ⁶	8.3x10 ⁶	1.3x10 ⁷	1.7x10 ⁷	2.3x10 ⁷	2.3x10 ⁷
H-3 (deuterated water)	1.5x10 ⁷	2.0x10 ⁷	3.2x10 ⁷	4.3x10 ⁷	5.5x10 ⁷	5.5x10 ⁷
be-7	5.5x10 ⁶	7.6x10 ⁶	1.3x10 ⁷	1.8x10 ⁷	2.8x10 ⁷	3.5x10 ⁷
be-10	7.1x10 ⁴	1.2x10 ⁵	2.4x10 ⁵	4.1x10 ⁵	7.1x10 ⁵	9.0x10 ⁵
C-11	3.8x10 ⁶	6.6x10 ⁶	1.3x10 ⁷	2.3x10 ⁷	3.3x10 ⁷	4.1x10 ⁷
C-14	7.1x10 ⁵	6.2x10 ⁵	1.0x10 ⁶	1.2x10 ⁶	1.7x10 ⁶	1.7x10 ⁶
F-18	1.9x10 ⁶	3.3x10 ⁶	6.6x10 ⁶	1.1x10 ⁷	1.6x10 ⁷	2.0x10 ⁷
Na-22	4.7x10 ⁴	6.6x10 ⁴	1.1x10 ⁵	1.8x10 ⁵	2.7x10 ⁵	3.1x10 ⁵
Na-24	2.8x10 ⁵	4.3x10 ⁵	8.3x10 ⁵	1.3x10 ⁶	1.9x10 ⁶	2.3x10 ⁶
Mg-28	8.3x10 ⁴	7.1x10 ⁴	1.3x10 ⁵	2.2x10 ⁵	3.7x10 ⁵	4.5x10 ⁵
Al-26	2.9x10 ⁴	4.7x10 ⁴	9.0x10 ⁴	1.4x10 ⁵	2.3x10 ⁵	2.8x10 ⁵
Si-31	5.2x10 ⁵	1.0x10 ⁶	1.9x10 ⁶	3.3x10 ⁶	5.5x10 ⁶	6.2x10 ⁶
Si-32	1.3x10 ⁵	2.4x10 ⁵	5.0x10 ⁵	8.3x10 ⁵	1.4x10 ⁶	1.7x10 ⁶
P-32	3.2x10 ⁴	5.2x10 ⁴	1.0x10 ⁵	1.8x10 ⁵	3.2x10 ⁵	4.1x10 ⁵
P-33	3.7x10 ⁵	5.5x10 ⁵	1.1x10 ⁶	1.8x10 ⁶	3.2x10 ⁶	4.1x10 ⁶

Table A.1 (continued)

The unit is Becquerel

Nuclide

ALI

Age ≤ 1 year old 1 year old~2 years old 2 years old~7 years old 7 years old~12 years old