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**Determination of asbestos in building
material products — Part 2: Sampling and
qualitative analysis for judgement
of existence of containing asbestos**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS A 1481-2:2014** is replaced with this Standard.

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JIS A 1481 series consists of the following 4 parts:

JIS A 1481-1 *Air quality — Bulk materials — Part 1: Sampling and qualitative determination of asbestos in commercial bulk materials*

JIS A 1481-2 *Determination of asbestos in building material products — Part 2: Sampling and qualitative analysis for judgement of existence of containing asbestos*

JIS A 1481-3 *Determination of asbestos in building material products — Part 3: Quantitative analysis of containing asbestos by X-ray diffraction method*

JIS A 1481-4 *Air quality — Bulk materials — Part 4: Quantitative determination of asbestos by gravimetric and microscopical methods*

Determination of asbestos in building material products — Part 2 : Sampling and qualitative analysis for judgement of existence of containing asbestos

Introduction

This Japanese Industrial Standard was established in 2014. The revision at this time has been made for the purpose of maintaining its consistency with other standards in **JIS A 1481** series. The comparison table between previous and current editions of this Standard on technically significant revisions is given in Annex D.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies matters concerning determination of the presence of asbestos in samples taken from building products; namely, the analytical sample preparation (primary and secondary analytical samples), the qualitative analysis method using an X-ray diffractometer and a dispersion staining phase-contrast microscope, and the method for determination of the presence of asbestos.

This Standard is applicable to qualitative analysis of: fire proofing spraying materials and the like, spraying materials made of vermiculite, interior finishing materials (moulded boards), floor tiles, exterior finishing materials (moulded boards, mortar), roofing materials, chimney materials, heat insulating materials, textile goods (cloths), sealing compounds and expansion joints.

This Standard is not applicable to natural minerals which can contain asbestos or any products made of such natural minerals (excluding spraying material made of vermiculite).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS K 3850-1 *Determination of airborne fibrous particles — Part 1 : Optical microscopy method and scanning electron microscopy method*

JIS K 8121 *Potassium chloride (Reagent)*

JIS K 8264 *Formic acid (Reagent)*

JIS R 3503 *Glass apparatus for chemical analysis*

JIS R 3702 *Cover glasses for microscopes*

*JIS R 3703 Slide glasses for microscope***3 Terms and definitions**

For the purpose of this Standard, the following terms and definitions apply.

3.1 asbestos

fibrous silicate minerals belonging to serpentine group (chrysotile) and those belonging to amphibole group (amosite, crocidolite, tremolite, actinolite, and anthophyllite) among the minerals which constitute rock

3.2 vermiculite

a swelling clay mineral resembling mica

It has a hydrated magnesium layer in its structural layer, and it typically includes, between its structural layers, hydrobiotite which contains a comparatively large amount of potassium.

The term is also used as a generic name for all mineral products of vermiculite.

3.3 fibrous particles

particles that are three or more in aspect ratio (length/width)

3.4 sample

a portion extracted from building material products for analysis purpose

3.5 primary analytical sample

sample prepared by pulverizing or heat-treating the sample defined above and passing it through a sieve meeting the specified conditions

3.6 secondary analytical sample

sample prepared by treating the primary sample with formic acid

3.7 immersion liquid

liquid in which the sample to be used for microscopic qualitative analysis is immersed

3.8 dust-free water

water prepared by filtering purified water or distilled water through a membrane filter of 0.45 µm aperture

3.9 standard sample

vermiculite sample containing 0.5 % of tremolite and that containing 0.8 % of chrysotile, to be used for the analysis of spraying material made of vermiculite

4 Qualitative analytical method and principle**4.1 Summary of qualitative analytical method**

Presence of asbestos in building material products is determined by the qualitative analytical method using X-ray diffraction and that using microscope. Presence of as-

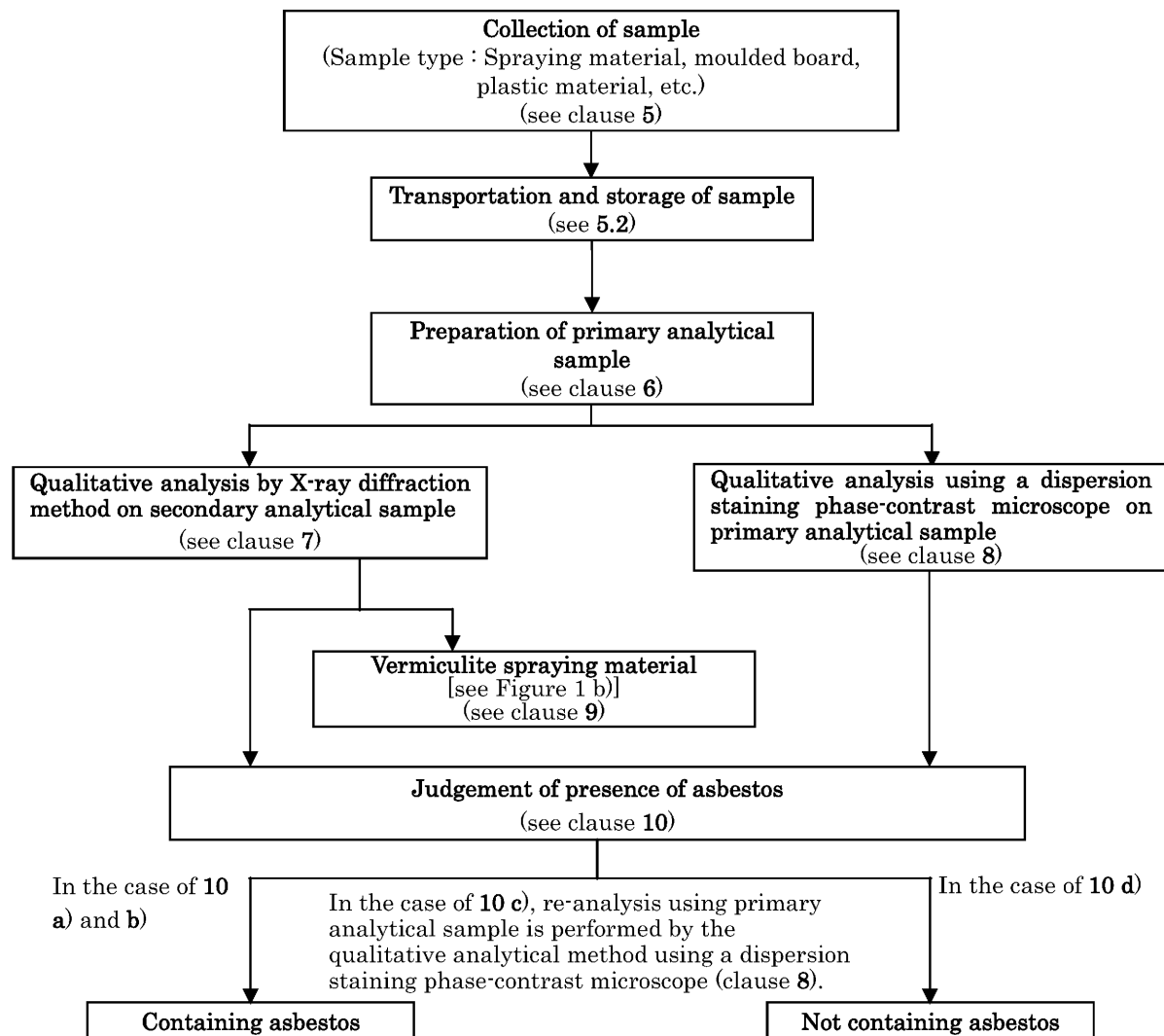
bestos in vermiculite spraying material is determined by comparing the diffraction intensity of the sample tested with that of the standard sample. The analysis for determining the presence of asbestos consists of the following main steps (see Figure 1).

- a) An amount of sample adequate for analysis is taken from the building material manufactured in factory, building material applied in buildings or imported building material.
- b) Analytical sample is prepared by pulverizing or heat-treating the above sample according to the matrix of the building material.
- c) The primary analytical sample is qualitatively analysed by the dispersion staining method using a phase-contrast microscope for presence of asbestos, and the secondary analytical sample, by the X-ray diffraction method. When the primary analytical sample is a spraying material in which vermiculite is found by X-ray diffraction analysis, the analysis for presence of asbestos is carried out according to the qualitative analytical method for vermiculite spraying material [see Figure 1 b)].

4.2 Principle of qualitative analytical method

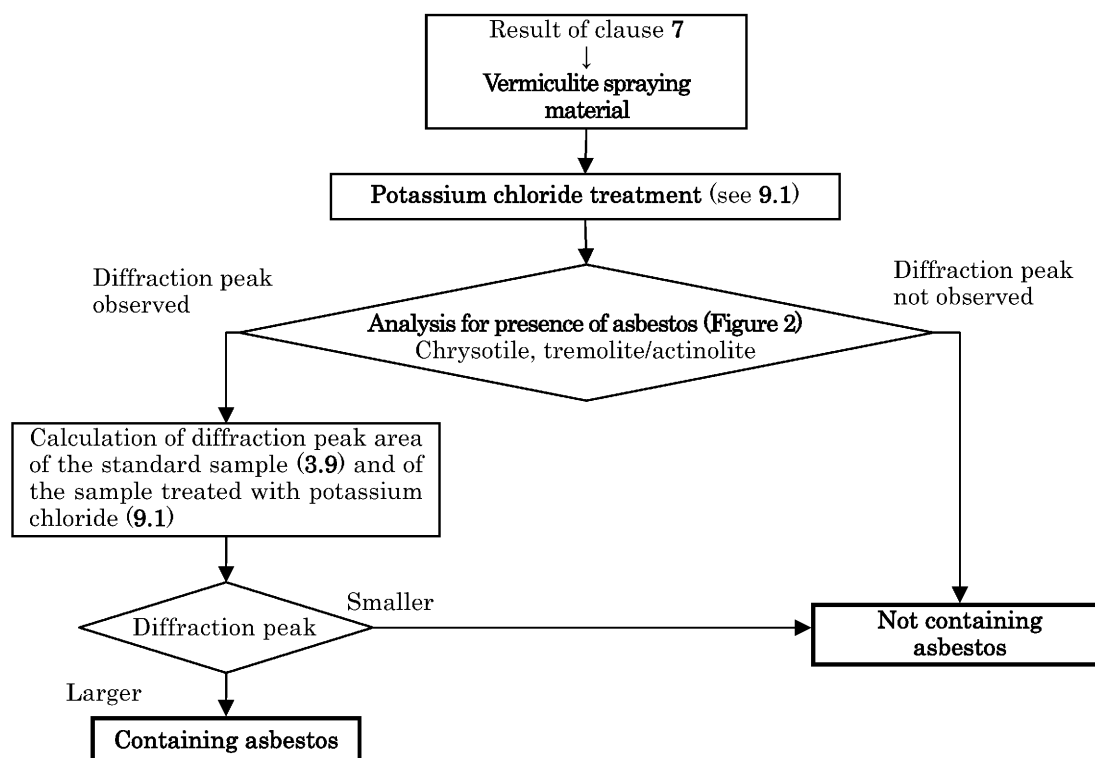
The principle of qualitative analytical method is as follows.

- a) In the X-ray diffraction method, the sample is exposed to X-ray radiation and asbestos presence in that sample is determined based on the indicated diffraction peak angles that are characteristic of particular types of asbestos.
- b) In the dispersion staining method using a phase-contrast microscope, the asbestos presence is determined based on the shape of the sample and specific colour change by the refractive index of fibrous particles in the sample.



a) Flowchart for qualitative analysis and judgement of asbestos presence in building material products

Figure 1 Summary of qualitative analysis and judgement of asbestos presence



b) Flowchart for qualitative analysis and judgement of asbestos presence for vermiculite spraying material

Figure 1 (concluded)

5 Sampling

5.1 Method of sampling

The samples shall be taken from the building material manufactured in factory, the building material applied in building and the like or the imported building material, while taking care of the following matters. Appropriate measures shall be taken so that the persons involved in sampling do not inhale asbestos dust (hereafter referred to as “dust”) at the time of sampling.

- In the case of sampling at job site, care shall be taken so that the present condition is not disturbed and dust is not scattered. Sampling shall be carried out by using a sharp knife and the like.
- In the case of taking from the building material manufactured or imported, the sample representing the lot shall be taken.
- The size of sample shall be sufficiently large so that it represents the building material under test. In the case of soft materials such as spraying material or heat insulating material, three samples, each about 10 cm³ in volume, taken at three different positions in the material shall be put in separate sealed containers, all of which shall then be put together in a larger sealed container to be supplied as a sample representing the position of sampling. In the case of a board shaped and

comparatively rigid material, three samples, each about 100 cm² in area, taken at three different positions in the material shall be put in separate sealed containers, all of which shall then be put together in a larger sealed container to be supplied as a sample representing the position of sampling.

- d) The building material product under test, depending on the period of construction, may consist of both asbestos-containing parts and non-containing parts. Further, some asbestos-containing building material products may have been replaced with other non-containing products during repair work. With these cases taken into account, sampling positions shall be selected referring to construction records such as the design document.
- e) Samples from products with small and widely varying asbestos contents such as spraying materials shall be taken so as to contain the entire depth down to the substrate, instead of being taken from only near-surface layers. This also applies to thermal insulating materials which have been used under continuous exposure to high-temperature atmosphere for a long period of time, and the asbestos contained in which may have been partially deteriorated.
- f) Building material products that are a paste or fluid used for joining or repairing of joints are likely to contain asbestos, and the sample shall be taken only from the part containing the asbestos, which is generally a joint.

5.2 Transportation and storage of sample

The collected sample shall be stored in a sealed container in order to avoid scattering of the dust when it is transferred from the sampling place to the place of analysis.

5.3 Sampling record

Necessary information required for identification of the collected sample, as listed in the following, shall be recorded.

- a) Name of building material
- b) Name and use of building, piping installation, machinery and the like
- c) Year of construction and date on which the building material (in addition to other materials, in some cases) was installed in the building.
- d) Position and location of sampling in the building or the like
- e) General sample identification (type or material : board; spraying material; plastics, etc., size of sample : approximate amount of sample), sampling method and date of sampling
- f) Person who conducted the sampling

6 Preparation of primary analytical sample

6.1 Preparation of primary analytical sample from inorganic component sample

Primary analytical sample shall be prepared from inorganic component sample as follows.

- a) Take out three inorganic component samples, having been taken from three positions and put together in one sealed container, take a required and equal amount from each of the three samples, and put them all in the same pulverizer. The sample to be pulverized and the pulverizer shall be as follows.
 - 1) When the sample is rigid, scrape the side surface with a cutter knife, board sander nozzle, etc. before putting it in a pulverizer.
 - 2) For the pulverizer, use a mortar (porcelain mortar, agate mortar, alumina mortar, or the like), Wiley mill, an ultracentrifugal cutter, a vibrating mill, a ball mill or the like, either by itself or in combination.
- b) Pulverize them by means of a draft chamber or the like taking care not to scatter the dust so that there is no contamination by asbestos.
- c) Sift out the pulverized sample using a sieve of 425 μm to 500 μm mesh. Repeat the operation of pulverization and sifting until all the sample has come under the sieve. From this sifted sample, the entire volume of which is taken as the primary analytical sample, take three samples for X-ray diffraction analysis and one sample for dispersion staining phase-contrast microscopic analysis.

The degree and time of pulverization influence the fibrous form of asbestos. Care shall be taken, therefore, that pulverization is performed in as short a time as possible, and sifting, as many times as possible, so as to avoid excess pulverization.

6.2 Preparation of primary analytical sample from organic component sample

The preparation of primary analytical sample from organic component sample shall be as follows.

- a) Take out three samples containing organic components, having been taken from three positions and put together in one sealed container, take a required and equal amount from each of the three samples, and put them all in the same porcelain crucible. Weigh the whole mass, m_a , of the crucible. Prior to this procedure, weigh the mass, m_c , of the crucible.
- b) Place the crucible containing the sample in an electric furnace set at $450\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ and heat for 1 h or longer.

NOTE : Care should be taken when crocidolite is heated at $450\text{ }^{\circ}\text{C}$, since the X-ray diffraction peak can shift toward the higher angle side or refractive index can change.

- c) After heating leave the sample to cool under clean condition until it reaches room temperature and weigh the total mass, m_b , of respective crucibles. Then, prepare the primary analytical sample in accordance with 6.1. In this case, calculate the weight loss ratio, r , according to Formula (1), and round the result to one decimal place. The obtained weight loss ratio shall be used for calculation of asbestos content in JIS A 1481-3.

$$r = \frac{m_b - m_c}{m_a - m_c} = \frac{m}{m_0} \dots\dots\dots (1)$$