SLOVENSKI STANDARD
SIST-TS CEN/TS 18020:2024

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Gradbeni proizvodi - Ocenjevanje sproščanja nevarnih snovi - Vzorčenje in kvantitativno določanje azbesta v gradbenih proizvodih

Construction products - Assessment of release of dangerous substances - Sampling and quantitative determination of asbestos in construction products

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Probenahme und qualitative Bestimmung von Asbest in Bauprodukten

Produits de construction - Evaluation de l'émission de substances dangereuses - Échantillonnage et dosage qualitatif de lamiante dans les produits de construction

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Construction products: Assessment of release of dangerous substances - Sampling and quantitative determination of asbestos in construction products

Produits de construction: Evaluation de l'émission de substances dangereuses - Échantillonnage et dosage qualitatif de l'amiante dans les produits de construction

Bauprodukte: Bewertung der Freisetzung von gefährlichen Stoffen - Probenahme und qualitative Bestimmung von Asbest in Bauprodukten

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

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European foreword

This document (CEN/TS 18020:2024) has been prepared by Technical Committee CEN/TC 351 “Construction products: Assessment of release of dangerous substances”, the secretariat of which is held by NEN.

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This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

Under regulation (EC) No 1272/2008 (the CLP regulation) of the European Union, asbestos is classified as a carcinogen of group 1A [EC 1272/2008]. The REACH Regulation (EC) No. 1907/2006 prohibits the placing on the market and use of asbestos fibres and of articles containing these fibres added intentionally [EC 1907/2006]. Asbestos was banned in the 1990s at the international level in several European countries and, since 2005, it has been completely banned within the European Union. Asbestos was used in very large quantities for decades and was incorporated into many construction products which were used in the construction of buildings and structures, as well as in industrial applications. Depending on the country, buildings and structures constructed before 2005 may contain a variety of asbestos-containing materials that still may pose a risk to building occupants and persons involved in construction and demolition work [1999/77/EC].

Asbestos is a generic term encompassing six hydrated silicates with fibrous morphology comprising chrysotile, amosite, crocidolite, anthophyllite, tremolite and actinolite, which are regulated by the European Union through the REACH Regulation [EC 1907/2006]. Chrysotile, amosite, crocidolite or anthophyllite were the asbestos types which were intentionally added in the past to construction products. Chrysotile accounted for approximately 95 % of commercial asbestos consumption, and amosite and crocidolite accounted for almost all of the remaining asbestos use. Tremolite asbestos and actinolite asbestos were not extensively used commercially, however can appear as natural contaminants in construction products (see ISO 22262-1).

Although the EU has now prohibited all asbestos use, there are several situations, however, which require special attention to avoid “new construction products” which may contain asbestos being distributed in the EU market. Several non-EU countries (primarily the Russian Federation, Kazakhstan, and China) still mine and export asbestos and asbestos-containing products. Consequently, asbestos-containing products manufactured in those countries and other countries where the importation of asbestos has not been prohibited may enter the European market illegally. Naturally occurring asbestos (NOAs), which are not technically enriched and processed, may be present as impurities in mineral raw materials, which are used to manufacture new construction products. Even though European countries implement strict quality control systems to prevent materials containing asbestos from re-entering new construction products in the course of waste recycling [Cinderela, 2021], asbestos contamination may be found in some cases. If a comprehensive asbestos survey and the consequent removal of all asbestos is not conducted prior to demolition of a building or structure from the critical construction period (depending on the country up to 2005), asbestos-containing materials (ACMs) may be present in the resulting construction and demolition waste (C&D waste). Recycling of this waste may lead to contaminated secondary raw materials (SRM) with ACMs and free asbestos fibres/bundles.

Therefore, in certain circumstances, manufacturers of products that may contain asbestos or traces of asbestos need to declare the asbestos content of those products to meet all the legal requirements for CE marking [EU 305/2011]. In most cases, the asbestos content in contaminated construction products (excluding materials intentionally containing asbestos) is expected to be low. The need to quantify asbestos in these materials depends on the maximum mass fraction that has been adopted by the jurisdiction to define an ACM for the purpose of regulation. The method for sampling and quantitative determination of asbestos in construction products can differ significantly. Quantitative determination of asbestos in secondary raw materials derived from contaminated C&D waste requires a detailed knowledge of the asbestos-containing manufactured products that were used in the past.

This document summarizes the procedures for the collection of samples, sample preparation and qualitative analysis of construction products for the presence of commercially added and naturally occurring asbestos. This document specifies procedures for the quantitative determination of the asbestos mass fraction in natural, manufactured or recycled large mineral aggregates and construction products of fine mineral particle size material. The methods used in this document to identify asbestos are polarized light microscopy (PLM), scanning electron microscopy (SEM) and transmission electron microscopy (TEM).

The method in this document will in future be validated for its robustness and its repeatability and reproducibility, according to CEN Guide 13. The aim is to have a fully validated EN standard for the assessment of asbestos in construction products in the end, with which producers of construction products can declare the absence or the content of asbestos fibres in their products. More information on CEN/TC 351 and its way of working in general is available from www.centc351.org.

1 Scope

This document summarizes methods for sampling, sample preparation and identification of asbestos in construction products. This document specifies appropriate sample preparation procedures for the quantitative analysis of the asbestos mass fraction in natural, manufactured or recycled large mineral aggregates and construction products of fine mineral particle size materials. This document describes the identification of asbestos by polarized light microscopy (PLM) and dispersion staining, scanning electron microscopy (SEM) with energy dispersive X-ray analysis or transmission electron microscopy (TEM) with energy dispersive X-ray and electron diffraction analysis.

NOTE This document is intended for microscopists familiar with polarized light, transmission electron- and scanning electron microscopy methods and the other analytical techniques specified (see ISO 10312, ISO 13794, ISO 14966, [McCrone et al., 1984], [Su et al., 1995]). It is not the intention of this document to provide instructions on basic analytical techniques.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
aspect ratio
ratio of length to width of a particle

[SOURCE: ISO 22262-2:2014, 3.8]

3.2
alpha refractive index
α
lowest refractive index exhibited by a fibre

[SOURCE: ISO 22262-1:2012, 2.3]

3.3
amphibole
group of rock-forming ferromagnesium silicate minerals, closely related in crystal form and composition, and having the nominal Formula (1)

$$A_{0\text{-}1}B_2C_5T_8O_{22}(OH,F,Cl)_2 \quad (1)$$

where

A is K, Na;

B is Fe^{2+}, Mn, Mg, Ca, Na;

C is Al, Cr, Ti, Fe^{3+}, Mg, Fe^{2+};

T is Si, Al, Cr, Fe^{3+}, Ti.

Note 1 to entry In some varieties of amphibole, these elements can be partially substituted by Li, Pb, or Zn. Amphibole is characterised by a cross-linked double chain of Si-O tetrahedra with a silicon:oxygen ratio of 4:11, by columnar or fibrous prismatic crystals and by good prismatic cleavage in two directions parallel to the crystal faces and intersecting at angles of about 56° and 124°.

[SOURCE: ISO 22262-1:2012, 2.4]

3.4
amphibole asbestos
amphibole in an asbestiform habit

[SOURCE: ISO 22262-1:2012, 2.5]

3.5
asbestiform
specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength and flexibility

[SOURCE: ISO 22262-1:2012, 2.8]

3.6
asbestos
group of silicate minerals belonging to the serpentine and amphibole groups which have crystallised in the asbestiform habit, causing them to be easily separated into long, thin, flexible, strong fibres when crushed or processed

Note 1 to entry: The Chemical Abstracts Service (CAS) registry numbers of the *most common* asbestos varieties are: chrysotile (12001-29-5), crocidolite (12001-28-4), grunerite asbestos (amosite) (12172-73-5), anthophyllite asbestos (77536-67-5), tremolite asbestos (77536-68-6) and actinolite asbestos (77536-66-4).

[SOURCE: ISO 22262-1:2012, 2.9]

3.7
asbestos containing material
ACM
any material containing any asbestos above trace amounts

[SOURCE: HSG 248:2021, 4.20]

3.8
birefringence
quantitative expression of the maximum difference in refractive index due to double refraction

[SOURCE: ISO 22262-1:2012, 2.12]

3.9
chrysotile
fibrous mineral of the serpentine group which has the nominal composition as in Formula (2)

$$Mg_3Si_2O_5(OH)_4 \quad (2)$$

Note 1 to entry: Most natural chrysotile deviates little from this nominal composition. In some varieties of chrysotile, minor substitution of silicon by Al^{3+} may occur. Minor substitution of magnesium by Al^{3+}, Fe^{2+}, Fe^{3+}, Ni^{2+}, Mn^{2+} and Co^{2+} may also be present. Chrysotile is the most prevalent type of asbestos.

[SOURCE: ISO 22262-1:2012, 2.14]

3.10
cleavage
breaking of a mineral along one of its crystallographic directions

[SOURCE: ISO 22262-1:2012, 2.15]

3.11
cleavage fragment
fragment of a crystal that is bounded by cleavage faces

Note 1 to entry: Crushing of non-asbestiform amphibole generally yields elongated fragments that conform to the definition of a fibre, but rarely have aspect ratios exceeding 10:1.

[SOURCE: ISO 22262-1:2012, 2.16]

3.12
construction and demolition waste
C&D waste
waste which arises from construction, renovation or demolition activities

[SOURCE: ISO 24161:2022, 3.1.2.4]

3.13
dispersion staining
effect produced when a transparent object is immersed in a surrounding medium, the refractive index of which is equal to that of the object at a wavelength in the visible range, but which has a significantly higher optical dispersion than the object

Note 1 to entry: Only the light refracted at the edges of the object is imaged, and this gives rise to colours at the interface between the object and the surrounding medium. The particular colour is a measure of the wavelength at which the refractive index of the object and that of the medium are equal.

[SOURCE: ISO 22262-1:2012, 2.20]

3.14
electron diffraction
technique in electron microscopy by which the crystal structure of a specimen is examined

[SOURCE: ISO 22262-1:2012, 2.21]

3.15
energy dispersive X-ray analysis
EDXA
measurement of the energies and intensities of X-rays by use of a solid-state detector and multichannel analyser system

[SOURCE: ISO 22262-1:2012, 2.23]

3.16
extinction
condition in which an optically anisotropic object appears dark when observed between crossed polars

[SOURCE: ISO 22262-1:2012, 2.25]

3.17
fibre
elongated particle which has parallel or stepped sides

Note 1 to entry: For the purposes of this part of ISO 22262, a fibre is defined to have an aspect ratio greater than or equal to 3:1.

[SOURCE: ISO 22262-1:2012, 2.28]

3.18
fibre bundle
structure composed of parallel, smaller diameter fibres attached along their lengths

Note 1 to entry: A fibre bundle may exhibit diverging fibres at one or both ends.

[SOURCE: ISO 22262-1:2012, 2.29]

3.19
fibril
single fibre of asbestos which cannot be further separated longitudinally into smaller components without losing its fibrous properties or appearances

[SOURCE: ISO 22262-1:2012, 2.27]

3.20
gamma refractive index
γ
highest refractive index exhibited by a fibre

[SOURCE: ISO 22262-1:2012, 2.30]

3.21
habit
characteristic crystal growth form, or combination of these forms, of a mineral, including characteristic irregularities

[SOURCE: ISO 22262-1:2012, 2.31]

3.22
laboratory sample
sample or subsample(s) sent to or received by the laboratory

Note 1 to entry: When the laboratory sample is further prepared by subdividing, cutting, sawing, coring, mixing, drying, grinding, and curing or by combinations of these operations, the result is the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample. A test portion is removed from the test sample for the performance of the test/ analysis or for the preparation of a test specimen.

Note 2 to entry: The laboratory sample is the final sample from the point of view of sample collection but it is the initial sample from the point of view of the laboratory.

[SOURCE: EN 16687:2023, 3.2.2.1]

3.23
limit of quantification
LOQ
lowest amount of asbestos that can be determined with an acceptable level of accuracy and precision, generally determined as three times the method detection limit

[SOURCE: EN 16687:2023, 3.1.1.14, modified – 'an analyte (determinand)' replaced by 'asbestos']

3.24
matrix
main composition of the product dictating the manner of sample preparation

[SOURCE: EN 16687:2023, 3.1.1.2, modified – 'product' deleted, reference to type of digestion or extraction removed]

3.25
method detection limit
MDL
lowest amount that can be detected with a specified analytical method including sample preparation with a defined statistical probability

[SOURCE: EN 16687:2023, 3.1.1.12, modified – 'analyte concentration' replaced by 'amount'; Note 1 to entry removed]

3.26
overall population
entire volume of material about which information is required

Note 1 to entry: For example, the overall population might be the output of a construction product over the whole lifetime of the plant.

Note 2 to entry: See 'population'.

[SOURCE: CEN/TR 15310-1:2006, 2.12, modified – 'waste' replaced by 'construction product']