

# Guidance for the safe management of asbestos at work – preliminary discussion paper

Draft (Version 1.0)

**PRELIMINARY DRAFT (V1.0) FOR STAKEHOLDER CONSULTATION  
NOT TO BE PUBLISHED OR USED AS GUIDANCE!**

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# Guidance for the safe management of asbestos at work – preliminary discussion paper

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# 1 Introduction

## 1.1 Why should I read the guide?

### 1.1.1 Why is controlling exposure important?

Asbestos was widely used for decades across Europe in a wide range of applications, including in the construction sector and can be still found in large quantities in buildings and infrastructure. It has long been recognised as a key occupational carcinogen. Airborne fibres are very resistant when inhaled and can lead to, amongst others, mesothelioma, cancers of the lung, larynx, and ovary, and other diseases.

At EU level, asbestos use was banned via various Council Directives and then all asbestos was banned under REACH Annex XVII entry 6 from 2006.<sup>1</sup> This entry states that the manufacturing and use of asbestos fibres as well as mixtures and articles (in which asbestos fibres have been added intentionally) are prohibited in the EU, with a view to ensure the complete phase out of asbestos products in Member States by 1 July 2025<sup>2</sup>. Asbestos can still be found from natural sources or in existing products and infrastructure due to historical use of asbestos. Large numbers of workers involved in construction, refurbishment, and demolition activities, including waste management, together with other workers in mining, quarrying, civil engineering, maintaining ships, trains, aircraft, vehicles and machinery, and emergency services continue to come into contact with asbestos during their work; see for example the estimated numbers of workers by exposure situation in Table 1-1.

**Table 1-1: Estimated total workforce exposed to asbestos by exposure situation**

No.	Exposure situation	Estimated number of exposed workers
1	Building and construction	3,800,000 - 6,000,000
2	Building and construction - passive exposure in buildings	200,000 - 1,000,000 Potentially millions
3	Exposure to asbestos in ships, trains, aircraft, vehicles, and other machinery	5,000 - 25,000
4	Waste management	50,000 - 200,000
5	Mining and quarrying - naturally occurring asbestos	5,000-20,000
6	Tunnel excavation	500-5,000
7	Road construction and maintenance	10,000 - 50,000
8	Sampling and analysis	10,000 - 25,000
	<b>Total (rounded)</b>	<b>4,100,000 - 7,300,000</b>

Source: Lassen, C, Christensen, F, Vencovska, J, Vencovsky, D, Garrett, S, Schneider, K and Dilger M (2021) Study on collecting information on substances with the view to analyse health, socio-economic and environmental impacts in connection with possible amendments of Directive 98/24/EC (Chemical Agents) and Directive 2009/148/EC (Asbestos). <https://op.europa.eu/en/publication-detail/-/publication/45581742-5e23-11ec-9c6c-01aa75ed71a1/language-en>

<sup>1</sup> Regulation (EC) No 1907/2006 - Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) <https://eur-lex.europa.eu/eli/reg/2006/1907>

<sup>2</sup> Lassen, C, Christensen, F, Vencovska, J, Vencovsky, D, Garrett, S, Schneider, K and Dilger M (2021) Study on collecting information on substances with the view to analyse health, socio-economic and environmental impacts in connection with possible amendments of Directive 98/24/EC (Chemical Agents) and Directive 2009/148/EC (Asbestos). <https://op.europa.eu/en/publication-detail/-/publication/45581742-5e23-11ec-9c6c-01aa75ed71a1/language-en>

18 **1.1.2 What is the purpose of this guide?**

19 This guide aims to:

- 20 • update and further develop existing EU guidance, taking into account recent technical, legal,  
21 and scientific developments, including the 2023 revision<sup>3</sup> of the Asbestos at Work Directive,  
22 (AWD)<sup>4</sup>;
- 23 • increase awareness about the risks of asbestos amongst employers and workers;
- 24 • increase the uptake of good practice by providing an overview of good practices for the  
25 management of asbestos in the workplace; and
- 26 • reduce inequalities by providing additional information on good practice to stakeholders  
27 across the EU, including in Member States where comparatively less guidance is available.

28 This guide is a non-binding overview of good practice approaches to the management of asbestos at  
29 the workplace. It is not a legally binding document. However, the guide builds on existing EU legislation  
30 listed in Section 3.

31 The information in this guide must be read in conjunction with national occupational safety and health  
32 legislation, it is not a substitute for a check of compliance with national and EU legislation. In addition,  
33 legislation other than that taken into account in this guide may apply at the European, national and  
34 local level.

35 **1.2 Scope of the guide**

36 **1.2.1 Types of asbestos**

37 Under the AWD, asbestos is defined as one of the six following fibrous silicates and chemicals abstracts  
38 service (CAS) numbers:

- 39 • asbestos, actinolite, CAS No 77536-66-4;
- 40 • asbestos, amosite (grunerite)<sup>5</sup>, CAS No 12172-73-5;
- 41 • asbestos, anthophyllite<sup>6</sup>, CAS No 77536-67-5;
- 42 • asbestos, chrysotile<sup>7</sup>, CAS No 12001-29-5;
- 43 • asbestos, crocidolite<sup>8</sup>, CAS No 12001-28-4;
- 44 • asbestos, tremolite<sup>9</sup>, CAS No 77536-68-6.

45 The structural composition of the six fibrous silicates within the scope of the AWD is summarised  
46 below.

Table 1-2: Structural composition of the six fibrous silicates within the scope of the AWD		
Fibrous silicate	CAS number	Molecular formula
<b>Serpentine group</b>		
Asbestos, chrysotile	12001-29-5	Mg <sub>3</sub> (Si <sub>2</sub> O <sub>5</sub> )(OH) <sub>4</sub>

<sup>3</sup> Directive (EU) 2023/2668, <https://eur-lex.europa.eu/eli/dir/2023/2668/oj>

<sup>4</sup> Directive 2009/148/EC, Article 2

<sup>5</sup> Also known as brown asbestos.

<sup>6</sup> Also known as azbolen asbestos

<sup>7</sup> Also known as white asbestos

<sup>8</sup> Also known as blue asbestos

<sup>9</sup> Also known as amphibole asbestos.



Table 1-2: Structural composition of the six fibrous silicates within the scope of the AWD		
Fibrous silicate	CAS number	Molecular formula
<b>Amphibole group</b>		
Asbestos, actinolite	77536-66-4	$\text{Ca}_2(\text{Fe}^{2+}\text{Mg})_5(\text{Si}_8\text{O}_{22})(\text{OH})_2$
Asbestos, amosite (grunerite)	12172-73-5	$(\text{Fe}^{2+}\text{Mg})_7(\text{Si}_8\text{O}_{22})(\text{OH})_2$
Asbestos, anthophyllite	77536-67-5	$(\text{Mg}, \text{Fe}^{2+})_7(\text{Si}_8\text{O}_{22})(\text{OH})_2$
Asbestos, crocidolite	12001-28-4	$\text{Na}_2\text{Fe}_3^{2+}\text{Fe}_2^{3+}(\text{Si}_8\text{O}_{22})(\text{OH})_2$
Asbestos, tremolite	77536-68-6	$\text{Ca}_2\text{Mg}_5(\text{Si}_8\text{O}_{22})(\text{OH})_2$

47 It is important to note that occupational risks other than the six asbestos fibres listed in Article 2 of  
 48 Directive 2009/148/EC may be relevant to the activities considered in this guide; specifically,  
 49 requirements are established in EU legislation for carcinogens, mutagens or reprotoxic substances<sup>10</sup>,  
 50 other hazardous chemical agents<sup>11</sup>, and other occupational risks<sup>12</sup>. In this regard, it is of note that  
 51 other types of asbestos in addition to the six asbestos fibres in Article 2 of Directive 2009/148/EC,  
 52 including but not limited to erionite<sup>13</sup>, riebeckite, winchite, richterite or fluoro-edenite, may meet the  
 53 criteria for classification as hazardous, for example carcinogenic<sup>14</sup> even if they do not fall under the  
 54 scope of Directive 2009/148/EC.

### 55 1.2.2 Where can asbestos be found?

56 Asbestos fibres are naturally occurring silicate minerals made of long fibrous crystals that can be found  
 57 in rock or soil formations. Asbestos and materials containing asbestos (MCAs) were widely used for  
 58 their heat resistance, insulation, and reinforcing properties, with significant applications in  
 59 construction across Europe and the rest of the world. MCAs were also commonly used in electrical,  
 60 ventilation, and security applications. For a detailed, but non-exhaustive, list of MCAs, see Annex 3.

### 61 1.2.3 Exposure situations

62 This guide considers a wide range of exposure situations including in:

- 63 • Buildings and construction;
- 64 • Ships, trains, aircraft, vehicles, and machines;
- 65 • Mining and quarrying;
- 66 • Civil engineering; and
- 67 • Emergency services.

### 68 1.2.4 Exposure situation category

69 The exposure to asbestos situations covered in this guide are:

- 70 • Direct exposure;
- 71 • Passive exposure; and
- 72 • Secondary exposure.

<sup>10</sup> Directive 2004/37/EC, Article 14

<sup>11</sup> Directive 98/24/EC, Article 10

<sup>12</sup> Directive 89/391/EEC, Article 14

<sup>13</sup> See <https://echa.europa.eu/substance-information/-/substanceinfo/100.149.232> and  
<https://echa.europa.eu/substance-information/-/substanceinfo/100.171.103>

<sup>14</sup> <https://ntp.niehs.nih.gov/sites/default/files/ntp/roc/content/profiles/erionite.pdf>;

<https://publications.iarc.fr/552>; <https://nap.nationalacademies.org/catalog/11665/asbestos-selected-cancers>.

### 73 **1.2.5 Exposure concentrations – fibres/cm<sup>3</sup> v fibres/m<sup>3</sup>**

74 Throughout this guide, the concentrations of asbestos are given in fibres/cm<sup>3</sup>. Some people use  
75 concentrations of fibres/m<sup>3</sup> and there is a 1:1,000,000 conversion rate. This means that, for example:

- 76 • 1 fibre/cm<sup>3</sup> = 1,000,000 fibres/m<sup>3</sup>
- 77 • 0.1 fibre/cm<sup>3</sup> = 100,000 fibres/m<sup>3</sup>
- 78 • 0.05 fibre/cm<sup>3</sup> = 50,000 fibres/m<sup>3</sup>
- 79 • 0.01 fibre/cm<sup>3</sup> = 10,000 fibres/m<sup>3</sup>
- 80 • 0.002 fibre/cm<sup>3</sup> = 2,000 fibres/m<sup>3</sup>
- 81 • 0.001 fibre/cm<sup>3</sup> = 1,000 fibres/m<sup>3</sup>

### 82 **1.2.6 How to use this guide**

83 The guide is divided into sections on general and specific topics, see below. The first twelve sections  
84 are general and apply to all exposure situations. Sections 13 to 17 cover each exposure situation where  
85 asbestos can be found. There are several annexes providing the glossary and additional information.

86 Throughout the guide, the use of “must” means that the references are covered by EU legislation and  
87 there is a footnote linking to the relevant legal provision, or the references relate to the need to follow  
88 national legislation. However, it should be noted that only following the statements that use “must”  
89 may not be sufficient for ensuring compliance with all applicable legislation, as these statements may  
90 not be sufficient to achieve all the results required by EU legislation, nor do they necessarily cover all  
91 applicable legislation. Moreover, it should be noted that EU occupational safety and health (OSH)  
92 legislation sets minimum requirements, in relation to which Member States are allowed to maintain  
93 or adopt more stringent protective measures. Accordingly, even fulfilling all EU OSH legislation  
94 requirements, does not guarantee the fulfilment of all relevant national requirements.

95 Please note that this guide is:

- 96 • General in nature and is not intended to address the specific circumstances of any particular  
97 individual or entity;
- 98 • Not necessarily comprehensive, complete, accurate or up to date; and
- 99 • Not legal or professional advice and does not provide a comprehensive overview of all the  
100 applicable legal requirements; readers are thus advised to familiarise themselves with all the  
101 relevant legal requirements in their Member State.

102 The guide is structured as follows:

- 103 • Section 1 Introduction
- 104 • Section 2 Health hazards associated with asbestos exposure
- 105 • Section 3 Legal framework
- 106 • Section 4 Safe working environment
- 107 • Section 5 Risk assessment and risk management
- 108 • Section 6 Identifying asbestos
- 109 • Section 7 Air exposure measurement
- 110 • Section 8 Passive exposure and secondary exposure
- 111 • Section 9 Control measures
- 112 • Section 10 Education and training

- 113 • Section 11 Health surveillance
- 114 • Section 12 Waste management
- 115 • Section 13 Buildings
- 116 • Section 14 Ships, trains, aircraft, vehicles and machines
- 117 • Section 15 Mining and quarrying
- 118 • Section 16 Civil engineering
- 119 • Section 17 Emergency services
- 120 • Annexes:
- 121 • Annex 1 Glossary
- 122 • Annex 2 List of guides identified in EU Member States and selected third countries
- 123 • Annex 3 Examples of MCAs
- 124 • Annex 4 Further information on the management of waste containing asbestos

125 **1.2.7 Are there any other important points about this guide?**

126 This guide aims to provide an overview of the good practices available and give practical ways to  
 127 reduce workers' exposure to asbestos. These good practices mentioned in this guide are examples  
 128 and should not be treated as the only possible ways to implement EU OSH legislation. It is designed  
 129 for all types of organisations regardless of size, whether public or private.

130 It is a non-binding guide. The advice provided in this guide is without prejudice to any applicable  
 131 European or national provisions.

132 In this guide, all references to standards are meant as references to the relevant standards as  
 133 amended, supplemented, replaced or otherwise modified from time to time.

134 **1.3 Who should read this guide?**

135 The guide provides relevant advice for both employers and workers. It is modular in design and the  
 136 sections that are relevant to each role are shown below. The sections that should be read for each  
 137 role group in Table 1-3 are shown in Table 1-4, which is coded as follows:

- 138 • Green means all of this section is relevant to this role
- 139 • Yellow means this section is relevant to roles for which they are responsible
- 140 • Blue means this section is relevant to the managers and supervisors of this role and all workers  
 141 should be aware of this section
- 142 • Pink means some of this section may be relevant to this role
- 143 • Clear/white means this section is not applicable to this role

Table 1-3: Roles typically coming into contact with asbestos	
Group	Role
A	Laboratory staff
B	Asbestos removal specialists
C	Other occupations that may come into contact with asbestos, including, but not limited to, electricians, plumbers, gas fitters, painters and decorators, joiners, shop fitters, plasterers, roofers, scaffolders, heating and ventilation engineers, telecommunication engineers, computer

**Table 1-3: Roles typically coming into contact with asbestos**

Group	Role
	and data installers, fire and burglar alarm installers, architects, building surveyors and other professionals.
D	Workers on renovation or demolition sites, or maintaining buildings that contain asbestos
E	Workers maintaining, renovating or dismantling ships, trains, aircraft, vehicles or machinery that could contain asbestos
F	Workers on mining or quarrying sites
H	Workers on civil engineering sites
I	Emergency services workers
J	Waste handlers
K	Waste transporters
L	Workers in buildings that contain asbestos (office workers, teachers etc)
M	Employers, supervisors, and managers of workers in any other role

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**Table 1-4: Sections relevant to each role group**

	A	B	C	D	E	F	H	I	J	K	L	M
Introduction	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Health hazards associated with asbestos exposure	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Legal framework	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Safe working environment	Blue	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	White	Green
Risk assessment	Blue	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	White	Green
Identifying asbestos	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Green	Green
Air exposure measurement	Green	Green	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	White	Green
Passive exposure and secondary exposure	Pink	Green	Blue	Blue	Blue	Blue	Blue	Pink	Pink	Pink	Pink	Green
Health surveillance	Blue	Green	Blue	Blue	Blue	Pink	Pink	Blue	Blue	Blue	White	Green
Education and training	Blue	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	White	Green
Control measures	Blue	Green	Blue	Blue	Blue	Pink	Pink	Blue	Blue	Blue	White	Green
Waste management	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Green	Green	White	Yellow
Building and construction	White	Pink	Green	Green	Pink	White	White	White	White	White	White	Yellow
Ships, trains, aircraft, vehicles, and machines	White	Pink	White	White	Green	White	White	White	White	White	White	Yellow
Mining and quarrying	White	Pink	White	White	White	Green	White	White	White	White	White	Yellow
Civil engineering	White	Pink	White	White	White	White	Green	White	White	White	White	Yellow
Emergency services	White	Pink	White	White	White	White	White	Green	White	White	White	Yellow

**Green** means some or all of this section is relevant to this role; **Yellow** means this section is relevant to roles for which they are responsible; **Blue** means this section is relevant to the managers and supervisors of this role and all workers should be aware of this section; **Pink** means some of this section may be relevant to this role; Clear/white means this section is not applicable to this role

## 146 **1.4 Why and how was this guide developed?**

147 Principle 10 of the European Pillar of Social Rights recognises every worker’s entitlement to a safe,  
148 healthy, and appropriately adapted work environment. The European Commission’s new EU Strategic  
149 Framework on Health and Safety at Work 2021-2027<sup>15</sup> highlights the ongoing need to safeguard  
150 workers from hazardous chemicals, including asbestos, in response to evolving occupational risks.

151 As part of the Commission’s responsibility, the effectiveness and suitability of the EU occupational  
152 safety and health (OSH) regulations remains essential. This is anchored by the Occupational Safety and  
153 Health Framework Directive along with 23 related (OSH) directives. In line with Europe’s Beating  
154 Cancer Plan<sup>16</sup>, there is an emphasis on protecting workers from carcinogens, including asbestos.  
155 Enhanced safety measures for workers exposed to asbestos also play a crucial role in the green  
156 transition, including in the European Green Deal’s renovation wave<sup>17</sup>.

157 This guide was developed with extensive involvement of stakeholders. The consultation included:

- 158 • Ten online workshops
- 159 • A call for comments on the first draft of the guide which resulted in stakeholders providing  
160 comments
- 161 • Pilot discussions with stakeholders from a range of asbestos exposure situations and  
162 undertaking a range of exposure activities.

163 The process of development of this guide was followed by a Steering Group set up by Directorate  
164 General for Employment, Social Affairs and Inclusion, with representatives from the European  
165 Commission, governments, employers, and workers.

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<sup>15</sup> COM/2021/323 final Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions EU strategic framework on health and safety at work 2021-2027 Occupational safety and health in a changing world of work, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0323>

<sup>16</sup> Europe’s Beating Cancer Plan [https://health.ec.europa.eu/system/files/2022-02/eu\\_cancer\\_plan\\_en\\_0.pdf](https://health.ec.europa.eu/system/files/2022-02/eu_cancer_plan_en_0.pdf)

<sup>17</sup> European Green Deal’s renovation wave [https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave\\_en](https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en)

## 2 Health hazards associated with asbestos exposure

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167 Asbestos fibres in the sense of Directive 2009/148/EC (chrysotile, crocidolite, amosite, tremolite,  
168 actinolite and anthophyllite) are classified as carcinogens Category 1A according to the Regulation No  
169 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP Regulation)<sup>18</sup>.

170 The main cancer effects associated with asbestos exposure are mesothelioma (tumours of the  
171 membrane linings of the lungs and abdominal cavities) and cancer of the lung, larynx, and ovary.<sup>19</sup> In  
172 addition, some studies have linked asbestos exposure with the cancer of the pharynx, stomach, and  
173 colorectum.<sup>20</sup> Moreover, asbestosis (a form of pulmonary fibrosis) is the main non-cancerous disease  
174 associated with exposure to asbestos.<sup>21</sup> Asbestos also causes pleural plaques<sup>22</sup>.

175 Asbestos is a non-threshold carcinogen and it is thus not possible to identify a level below which  
176 exposure would not lead to adverse health effects.<sup>23</sup> Thinner fibres (<0.2 µm) are also carcinogenic<sup>24</sup>.

177 Inhalation is the most relevant exposure pathway for asbestos fibres at the workplace. In addition, it  
178 cannot be ruled out that there could be risks when asbestos is swallowed<sup>25</sup>.

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<sup>18</sup> Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.  
<https://eur-lex.europa.eu/eli/reg/2008/1272>

<sup>19</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202) and Recital 7, Directive (EU) 2023/2668

<sup>20</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202) and Recital 7, Directive (EU) 2023/2668

<sup>21</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202)

<sup>22</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
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<sup>23</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
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<sup>24</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
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<sup>25</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
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179 When deposited in the lungs, clearance half-times<sup>26</sup> of months to many years are reported, depending  
180 on fibre types, geometry and other factors.<sup>27</sup> Asbestos fibres are not readily eliminated by physical  
181 alteration (breakage, splitting) or chemical modification and are thus considered bio-persistent<sup>28 29</sup>.

182 Long latency periods of at least ten years (but up to 20 – 40 years or more) were described for  
183 respiratory tract tumours and mesothelioma to develop.<sup>30</sup>

184 Tobacco smoking is an important co-factor. Co-exposure of asbestos and tobacco smoke is believed  
185 to have a multiplicative effect on lung cancer induction.<sup>31 32</sup>

186 Asbestosis, fibrotic changes of the lung as a consequence of prolonged exposure to asbestos fibres, is  
187 characterised by symptoms such as dyspnoea (shortness of breath), rales (clicking, bubbling, or  
188 rattling sounds in the lungs), coughs and reduced lung function, which, in severe cases might be lethal.

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[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202)

<sup>26</sup> Time required for asbestos fibre concentration in the lungs to fall to 50%. See, for example, Churg A, Wright JL. Persistence of natural mineral fibers in human lungs: an overview. *Environ Health Perspect.* 1994 Oct;102 (Suppl 5):229-33. <https://pubmed.ncbi.nlm.nih.gov/articles/instance/1567279/pdf/envhper00401-0211.pdf>

<sup>27</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
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<sup>28</sup> Health Council of the Netherland (HCN) 2010 Asbestos. Risks of Environmental and Occupational Exposure. No. 2010/10E. <https://www.healthcouncil.nl/documents/advisory-reports/2010/06/03/asbestos-risks-of-environmental-and-occupational-exposure>

<sup>29</sup> International Agency for Research on Cancer, WHO, World Health Organization (IARC) 2012 - IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol. 100C. A Review of Human Carcinogens. Arsenic, Metals, Fibres, and Dusts., Lyon, France. <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Arsenic-Metals-Fibres-And-Dusts-2012>

<sup>30</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
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<sup>31</sup> COM/2021/323 final Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions EU strategic framework on health and safety at work 2021-2027 Occupational safety and health in a changing world of work, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0323>

<sup>32</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202)



### 190 3 Legal framework

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191 The EU directives and regulations underpinning this guide include:

192 Occupational safety and health legislation:

- 193 • Directive 2009/148/EC: **AWD** (Asbestos at Work Directive<sup>33</sup>) lays down minimum  
194 requirements, including limit values for the exposure to asbestos at work, in order to protect  
195 workers against risks to their health, including the prevention of such risks, arising or likely to  
196 arise from this exposure. Revised by Directive (EU) 2023/2668)
- 197 • Directive 2004/37/EC: **CMRD** (Carcinogens, Mutagens and Reprotoxic Substances Directive<sup>34</sup>)  
198 lays down minimum requirements for protecting workers against risks to their health and  
199 safety arising, or likely to arise, from exposure to carcinogens, mutagens and reprotoxic  
200 substances at work. As regards asbestos, the provisions of the CMRD apply whenever they are  
201 more favourable to health and safety at work.<sup>35</sup> In addition, the provisions of the CMRD will  
202 apply in full to asbestos fibres not falling under the scope of the AWD but falling under the  
203 scope of the CMRD.
- 204 • Directive 98/24/EC: **CAD** (Chemical Agents Directive<sup>36</sup>) lays down minimum requirements for  
205 protecting workers from risks to their safety and health arising, or likely to arise, from the  
206 effects of chemical agents present at the workplace or as a result of any work activity involving  
207 those agents.
- 208 • Directive 89/391/EEC: **OSH FD** (Occupational Safety and Health Framework Directive<sup>37</sup>) lays  
209 down measures to encourage improvements in the health and safety of workers at work.  
210 Amongst others, it sets out obligations for both employers and workers to reduce accidents  
211 and occupational disease in the workplace. The OSH FD applies to all sectors of activity, both  
212 public and private, without prejudice to existing or future national and EU provisions which  
213 are more favourable to protection of the safety and health of workers at work.<sup>38</sup>
- 214 • Directive 89/656/EEC: **PPE** (Personal Protective Equipment Directive<sup>39</sup>) lays down minimum  
215 requirements for PPE used by workers at work.
- 216 • Directive 92/85/EEC: **PWD** (Pregnant Workers' Directive<sup>40</sup>) lays down measures to encourage  
217 improvements in the safety and health at work of pregnant workers and workers who have  
218 recently given birth or are breastfeeding.
- 219 • Directive 94/33/EC: **YWD** (Young Workers' Directive<sup>41</sup>) lays down minimum measures for the  
220 protection of young people at work, including prohibiting work involving harmful exposure to  
221 agents which are toxic, carcinogenic, cause heritable genetic damage, or harm to the unborn  
222 child or which in any other way chronically affect human health.

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<sup>33</sup> Directive 2009/148/EC – Asbestos at Work <https://eur-lex.europa.eu/eli/dir/2009/148>

<sup>34</sup> Directive 2004/37/EC - Carcinogens, Mutagens or Reprotoxic Substances at Work <https://eur-lex.europa.eu/eli/dir/2004/37>

<sup>35</sup> Directive 2004/37/EC, Article 1(4)

<sup>36</sup> Directive 98/24/EC - Chemical Agents at Work <https://eur-lex.europa.eu/eli/dir/1998/24>

<sup>37</sup> Directive 89/391/EEC - OSH Framework <https://eur-lex.europa.eu/eli/dir/1989/391>

<sup>38</sup> Directive 89/391/EEC, Articles 2(1), 1(3); see also Directive 2004/37/EC, Article 1(3)

<sup>39</sup> Directive 89/656/EEC - Personal Protective Equipment, <https://eur-lex.europa.eu/eli/dir/1989/656>

<sup>40</sup> Directive 92/85/EEC - Pregnant Workers' <https://eur-lex.europa.eu/eli/dir/1992/85>

<sup>41</sup> Directive 94/33/EC - Young Workers' <https://eur-lex.europa.eu/eli/dir/1994/33>

- 223 • Directive 92/58/EEC: **SIGN** (Health and Safety Signs at Work Directive<sup>42</sup>) lays down minimum  
224 requirements for the provision of safety and/or health signs at work.
- 225 • Directive 92/104/EEC: **SUMI** (Surface and Underground Mineral-extracting Industries  
226 Directive<sup>43</sup>) lays down minimum requirements for the safety and health protection of workers  
227 in surface and underground mineral-extracting industries.
- 228 • Directive 92/91/EEC: **MITD** (Mineral- extracting Industries Through Drilling Directive<sup>44</sup>) lays  
229 down minimum requirements for the safety and health protection of workers in the mineral-  
230 extracting industries through drilling; and
- 231 • Directive 92/57/EEC: **TMC** (Temporary or Mobile Construction Sites Directive<sup>45</sup>) lays down  
232 minimum safety and health requirements for temporary or mobile construction sites.

233 Other relevant legislation and agreements:

- 234 • Regulation (EU) 2016/425: **PPER** (Personal Protective Equipment Regulation<sup>46</sup>) lays down  
235 requirements for the design and manufacture of PPE which is to be made available on the  
236 market, in order to ensure protection of the health and safety of users and establish rules on  
237 the free movement of PPE in the Union.
- 238 • Regulation (EC) No 1272/2008: **CLP** (Classification, Labelling and Packaging Regulation<sup>47</sup>) lays  
239 down uniform requirements for the classification, labelling and packaging (CLP) of chemical  
240 substances and mixtures according to the United Nations' Globally Harmonised System (GHS).  
241 It requires companies to classify, label and package hazardous chemicals appropriately before  
242 placing them on the market.
- 243 • Regulation (EC) No 1907/2006: **REACH** (Registration, Evaluation, Authorisation and Restriction  
244 of Chemicals Regulation<sup>48</sup>) establishes, for example, the requirement to provide safety data  
245 sheets for hazardous chemicals.
- 246 • Directive 2006/21/EC: **MWD** (Mining Waste Directive<sup>49</sup>) provides for measures, procedures  
247 and guidance to prevent or reduce as far as possible any adverse effects on the environment  
248 and any resultant risks to human health, brought about as a result of the management of  
249 waste from the extractive industries. It sets requirements for waste management plans,  
250 monitoring, and closure of waste facilities, emphasising environmental safety and accident  
251 prevention.
- 252 • Regulation 2024/1252: **CRMA** (Critical Raw Materials Act<sup>50</sup>) aims to improve the functioning  
253 of the internal market by establishing a framework to ensure the Union's access to a secure,  
254 resilient and sustainable supply of critical raw materials, including by fostering efficiency and  
255 circularity throughout the value chain.

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<sup>42</sup> Directive 92/58/EEC – Health and Safety Signs at Work <https://eur-lex.europa.eu/eli/dir/1992/58>

<sup>43</sup> Directive 92/104/EEC - Mineral-Extracting Industries <https://eur-lex.europa.eu/eli/dir/1992/104>

<sup>44</sup> Directive 92/91/EEC - Mineral-Extracting Industries <https://eur-lex.europa.eu/eli/dir/1992/91>

<sup>45</sup> Directive 1992/57/EEC - Temporary or Mobile Construction Sites <https://eur-lex.europa.eu/eli/dir/1992/57>

<sup>46</sup> Regulation 2016/425 - Personal Protective Equipment

<sup>47</sup> Regulation No 1272/2008 - Classification, Labelling and Packaging of Substances and Mixtures (CLP)  
<https://eur-lex.europa.eu/eli/reg/2008/1272>

<sup>48</sup> Regulation (EC) No 1907/2006 - Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)  
<https://eur-lex.europa.eu/eli/reg/2006/1907>

<sup>49</sup> Directive 2006/21/EC – Mining Waste <https://eur-lex.europa.eu/eli/dir/2006/21>

<sup>50</sup> Regulation 2024/1252 – Critical Raw Materials Act <https://eur-lex.europa.eu/eli/reg/2024/1252>

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- Directive 2008/68/EC: **Inland TDG** (Inland Transport Of Dangerous Goods Directive<sup>51</sup>) lays down rules for the safe and secure transport of dangerous goods within and between EU countries by road, rail or inland waterway.
  - Agreement concerning the International Carriage of Dangerous Goods by Road: **ADR**<sup>52</sup> ensures that any dangerous goods transported by road can cross international borders freely if the goods, vehicles and drivers comply with its rules. ADR is applied in the EU
  - Directive 2008/98/EC: **WFD** (Waste Framework Directive<sup>53</sup>) lays down measures to protect the environment and human health by preventing or reducing the generation of waste, the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use.

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<sup>51</sup> Directive 2008/68/EEC - Inland Transport of Dangerous Goods <https://eur-lex.europa.eu/eli/dir/2008/68>

<sup>52</sup> UNECE: Agreement concerning the International Carriage of Dangerous Goods by Road 2021 <https://unece.org/transport/publications/agreement-concerning-international-carriage-dangerous-goods-road-adr-2021>

<sup>53</sup> Directive 2008/98/EC Waste Framework <https://eur-lex.europa.eu/eli/dir/2008/98>

## 4 Safe working environment

### 4.1 Introduction

268 It is the employer's duty to ensure the safety and health of workers in every aspect related to the  
269 work.<sup>54</sup> This includes taking the necessary measures for the safety and health protection of workers,  
270 including the assessment and prevention of occupational risks and provision of information and  
271 training, as well as the provision of the necessary organisation and means.<sup>55</sup>

272 The employer is responsible for the safety and health in the company, even where some of the tasks  
273 are outsourced to external service providers.<sup>56</sup> The employer must designate one or more workers to  
274 carry out relevant OSH activities.<sup>57</sup>

275 Where several undertakings share a place  
276 of work, employers must cooperate in  
277 implementing asbestos-OSH, coordinate  
278 their actions in matters of the protection  
279 and prevention of occupational risks, and  
280 inform one another and their respective  
281 workers and/ or workers' representatives  
282 of these risks<sup>58</sup>. For example, in a building  
283 under renovation where multiple  
284 contractors, such as builders, electricians,  
285 and plumbers work simultaneously. If  
286 MCAs are present, the primary contractor  
287 must collaborate with each  
288 subcontractor to ensure that all parties  
289 are aware of the location and condition of  
290 asbestos hazards to ensure that all staff  
291 potentially exposed at the relevant place  
292 of work are protected.<sup>59</sup>

293 The remainder of this section provides an  
294 example of the division of tasks related to  
295 the prevention and reduction of exposure  
296 to asbestos among workers where  
297 asbestos is, or is likely to be, present,  
298 such as a building under renovation, a  
299 ship under planned maintenance, a mine  
300 or quarry, or a civil engineering site such  
301 as tunnel or road construction. This

#### Box 4.1: Co-operation between employers

Article 6(4) of Directive 89/391/EEC (OSH FD):

Without prejudice to the other provisions of this Directive, where several undertakings share a work place, the employers shall cooperate in implementing the safety, health and occupational hygiene provisions and, taking into account the nature of the activities, shall coordinate their actions in matters of the protection and prevention of occupational risks, and shall inform one another and their respective workers and/ or workers' representatives of these risks.

Art 12 of Directive 92/57/EEC (TMC)

Consultation and participation of workers and/ or of their representatives shall take place in accordance with Article 11 of Directive 89/391/EEC on matters covered by Articles 6, 8 and 9 of this Directive, ensuring whenever necessary proper coordination between workers and/ or workers' representatives in undertakings carrying out their activities at the workplace, having regard to the degree of risk and the size of the work site.

Art 6(d) of Directive 92/57/EEC (TMC)

The coordinator(s) for safety and health matters during the project execution stage appointed in accordance with Article 3 (1) shall organize cooperation between employers, including successive employers on the same site, coordination of their activities with a view to protecting workers and preventing accidents and occupational health hazards and reciprocal information as provided for in Article 6 (4) of Directive 89/391/EEC, ensuring that self-employed persons are brought into this process where necessary

<sup>54</sup> Directive 89/391/EEC, Article 5(1)

<sup>55</sup> Directive 89/391/EEC, Article 6(1); see also Directive 89/391/EEC, Article 6(3)(a); Directive 2004/37/EC, Article 3; Directive 98/24/EC, Article 4

<sup>56</sup> Directive 89/391/EEC, Article 5(2)

<sup>57</sup> Directive 89/391/EEC, Article 7; according to Directive 89/391/EEC, Article 7(7), Member States may define, in the light of the nature of the activities and size of the undertakings, the categories of undertakings in which the employer, provided he is competent, may himself take responsibility for the relevant measures.

<sup>58</sup> Directive 89/391/EEC, Article 6(4)

<sup>59</sup> Directive 89/391/EEC, Article 6(4)

302 example is provided for illustrative purposes but takes into account the fact that (subject to risk  
303 evaluation as necessary) the preventive measures and the working methods implemented by the  
304 employer must be integrated into all the activities of the undertaking and/or establishment and at all  
305 hierarchical levels.<sup>60</sup>

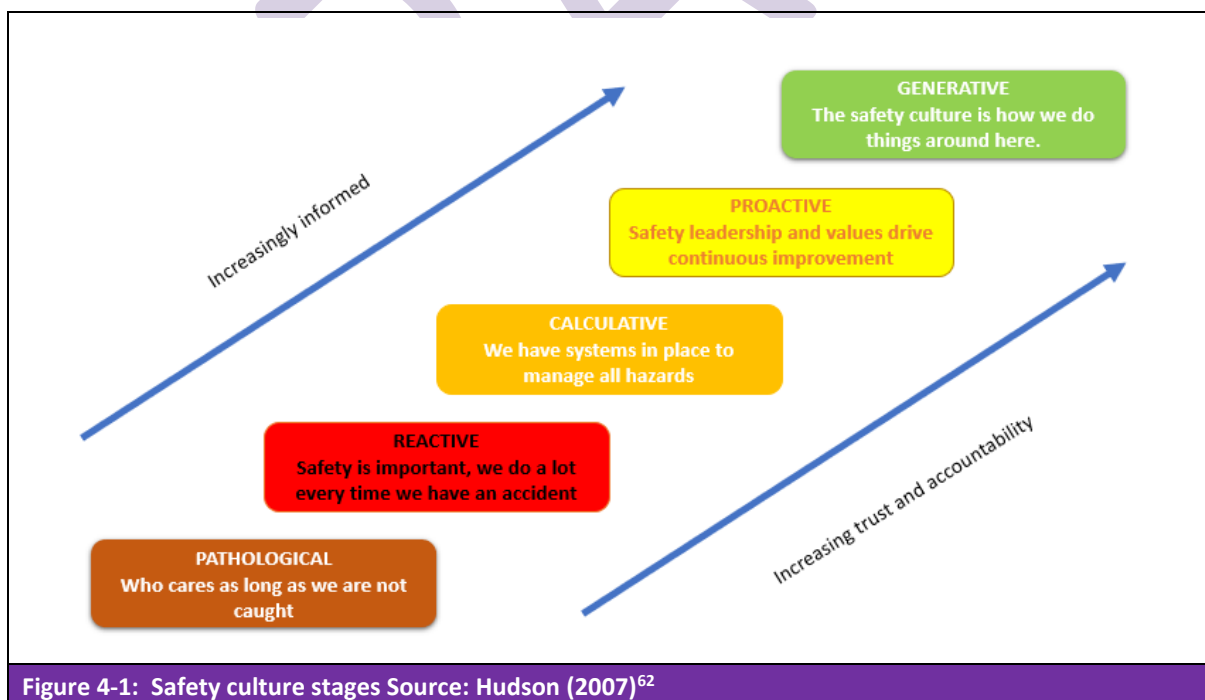
## 306 4.2 Safety culture

307 Commitment, involvement, and leadership at all levels of the management are an important  
308 prerequisite for attaining a high level of safety culture. An overview of the different safety culture  
309 stages is provided below.

310 It is important for the management to create a high level of safety culture that is not only reactive but  
311 looks ahead and proactively anticipates problems, aiming to achieve one of the following stages<sup>61</sup>:

- 312 • Proactive safety culture: Safety leadership and values drive continuous improvement across  
313 the organisation. Criticism is encouraged
- 314 • Generative safety culture: The safety culture is how we do things around here. Business  
315 culture = safety culture

316 To achieve a high level of safety culture, managers may find it useful to ensure that workers are  
317 comfortable raising concerns and reporting incidents without fear of repercussions and that there is  
318 a nominated person for receiving such reports.



<sup>60</sup> Directive 89/391/EEC, Article 6(3)(a)

<sup>61</sup> Directors' Safety Alliance: Safety Leadership

<https://www.iosh.co.uk/~media/Documents/Networks/Branch/East%20Anglia/DSA%20IOSH%20We%20st%20AngliaConstruction%20Leadership.pptx?la=en>

<sup>62</sup> Hudson (2007), Implementing safety culture in a major multinational, In: Safety science 45:6, <https://www.sciencedirect.com/science/article/abs/pii/S0925753507000227>

### 319 4.3 Examples of management practices with regard to asbestos

320 Examples of principles with regard to asbestos-OSH could include:

- 321 • **Allocate sufficient resources for asbestos-OSH (time, money, people):** Specifying that the  
322 allocation of sufficient resources for asbestos management is a key operating principle in the  
323 organisation's operating procedures can be useful.
- 324 • Set specific **targets** and define the specific **monitoring indicators** (for example, results of  
325 exposure assessments, results of health surveillance, behavioural change in staff, numbers of  
326 accidents, availability of PPE (with CE marking), results of staff surveys, and results of  
327 audits/reviews).
- 328 • Highlight the **importance of worker involvement** in the establishment, operation, evaluation  
329 and improvement of asbestos-OSH policy to create a high level of buy-in and awareness of the  
330 risks, across all levels of management and amongst workers.
- 331 • Undertake **audits and reviews** at least once in between risk assessments, see section 5,  
332 including worker surveys and interviews to capture their views. The characteristics of the  
333 surveys could include:
  - 334 ○ Sufficient numbers of questions to capture a range of views and experiences
  - 335 ○ Preferably anonymous or in a non-threatening manner
  - 336 ○ Questions about workers' trust in senior managers' approach to health & safety,  
337 which increases accountability
  - 338 ○ Questions about the availability of engineering controls and CE certified PPE
  - 339 ○ Questions about the availability of advice
  - 340 ○ Test accuracy of workers' perception of risk
- 341 • **Nominate a specific contact person** (or people) for asbestos related queries. Ideally, the  
342 nominated people are available to be consulted at all times.
- 343 • Encourage **workers to report concerns** (such as hazards, incidents, non-availability of CE  
344 certified personal protective equipment (PPE)) and create a safe, non-punitive, system for  
345 reporting ideas and concerns.
- 346 • **Remove barriers to participation**, for example, such as those caused by language, and hold  
347 enough meetings to ensure that all workers, contractors and subcontractors concerned can  
348 participate, including e.g. workers working different shifts, agency workers, etc.

### 349 4.4 Communication (including information for and consultation of 350 workers)

351 In accordance with Directive 2009/148/EC, Article 17, the information that must be provided to  
352 workers and their representatives include:

- 353 • The potential risks associated with to the exposure to dust arising from asbestos or MCAs
- 354 • The existence of statutory limit values and the need for the atmosphere to be monitored
- 355 • Hygiene requirements, including the need to refrain from smoking
- 356 • The precautions to be taken as regards the wearing and use of protective equipment and  
357 clothing
- 358 • Special precautions designed to minimise exposure to asbestos.



359

360 Other relevant information which must be available to workers and/or their representatives according  
361 to the EU legal framework on the protection of the OSH of workers include:

- 362 • Information on the documentation which is subject to notification<sup>63</sup>; for details see Section  
363 5.2.1 of this document.
- 364 • Access to results of asbestos-in-air concentration measurements including explanations of the  
365 significance of those results<sup>64</sup>
- 366 • Information and advice regarding any assessment of their health which they may undergo  
367 following the end of exposure.<sup>65</sup>
- 368 • Information on the nature and duration of exposure to which they have been personally  
369 subjected<sup>66</sup>
- 370 • Risk assessment and risk management plan, see Section 5<sup>67</sup>
- 371 • Details about exceedance of the OEL, see Section 13.5.5<sup>68</sup>

372 Employers must also ensure that employers of workers from any external companies working on their  
373 premises receive adequate information concerning the above points, which is to be provided to the  
374 workers in question.<sup>69</sup>

375 The employer must ensure that workers and workers' representatives are consulted, allowed to  
376 participate in discussions, and make proposals about any issue relating to workers' exposure to  
377 asbestos.<sup>70</sup> In the case of certain activities such as demolition, asbestos removal work, repairing and  
378 maintenance, in respect of which it is foreseeable that the relevant limit value will be exceeded despite  
379 the use of all possible technical preventive measures for limiting asbestos in air concentrations, Article  
380 12 of Directive 2009/148/EC requires that measures intended to protect workers to be subject to  
381 consultation with workers and/or their representatives. These measures include in particular:

- 382 • The use of protective equipment with particular emphasis on respiratory protection.
- 383 • The display of warning signs to indicate that legal exposure limits are at risk of being exceeded.
- 384 • Preventive measures to prevent the spread of asbestos dust outside the premises. This  
385 includes ensuring that enclosures are airtight and equipped with mechanical extraction  
386 ventilation.

387 Other requirements that must be subject to consultation include:

- 388 • Risk assessment in case there is the risk of exposure to dust arising from asbestos or MCAs<sup>71</sup>
- 389 • When sampling of asbestos is to be carried out<sup>72</sup>
- 390 • Where applicable, the duration of work requiring individual respiratory protective equipment  
391 and the scheduling of regular breaks, taking into account physical and climatological  
392 conditions<sup>73</sup>

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<sup>63</sup> Directive 2009/148/EC, Article 4(4)

<sup>64</sup> Directive 2009/148/EC, Article 17(2)(a)

<sup>65</sup> Directive 2009/148/EC, Article 18(4)

<sup>66</sup> Directive 2009/148/EC, Article 19(2)

<sup>67</sup> Directive 2009/148/EC, Article 3(5)

<sup>68</sup> Directive 2009/148/EC, Article 17(2)

<sup>69</sup> Directive 89/391/EEC, Article 10(2).

<sup>70</sup> Directive 89/391/EEC, Articles 10, 11; see also Directive 2004/37/EC, Article 13

<sup>71</sup> Directive 2009/148/EC, Article 3(5)

<sup>72</sup> Directive 2009/148/EC, Article 7(3)

<sup>73</sup> Directive 2009/148/EC, Article 10(3)

- 393 • The measures to be taken by the employer in case the limits of exposure permitted by the  
394 current legal framework are exceeded<sup>74</sup>

395 During the awareness raising or consultation processes, many different messages relating to asbestos  
396 exposure should be clearly communicated to workers covering issues such as:

- 397 • Risk assessment and risk management plans, see Section 5;  
398 • Identifying asbestos, see Section 6  
399 • Air exposure measurement, see Section 7;  
400 • Passive exposure and secondary exposure to asbestos, see Section 8;  
401 • Control measures, see Section 9;  
402 • Education and training, see Section 10 **Error! Reference source not found.**;  
403 • Health surveillance, see Section 11; and  
404 • Information about handling waste that might contain asbestos, see Section 12.

405 The central element of the communication is the message. The message could be:

- 406 • Specific event such as a training course, new risk management plan or a series of workplace  
407 measuring events  
408 • Part of an awareness campaign to ensure that workers know about wider topics such as health  
409 surveillance or waste management

410 All communication should be easily understood by the workers receiving it. If any workers might not  
411 be proficient in the language of the communication or might have low levels of literacy, the  
412 communication should be carefully constructed to ensure that every targeted worker receives and  
413 understands it.

414 The recipients targeted for a communication depend upon the specific message. The workers with  
415 roles listed in Section 1.2.4 might handle asbestos and are the starting point for recipients for any  
416 communication relating to asbestos exposure. Most communications are likely to be sent to a small  
417 subset of this list.

418 The communication should be sent through the medium most appropriate to the roles of the workers  
419 that need to receive it. Some communications can use more than one medium. Different media  
420 include, for example:

- 421 • Email  
422 • Notices – printed and placed on noticeboards or walls  
423 • Leaflets or printed documents  
424 • Webpages or other online forums  
425 • Internal newsletters – printed and online  
426 • Letters  
427 • Face to face – one-to-one, meetings or committees

428 The timing of the communications may vary, for example:

- 429 • Ad-hoc communication such as for new staff.

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<sup>74</sup> Directive 2009/148/EC, Article 17(2)(b)



- 430
- 431
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- 435
- 436
- Regular communication and events such as refresher training, see Section 10.2.3, which should be held at regular intervals, for example annually. Other regular communications could be scheduled monthly or quarterly or at any suitable interval.
  - Awareness campaigns for example to ensure awareness of asbestos exposure: these could be a series of related communications over a period of a month, quarter, year or other suitable timeframe.
  - The format and frequency of communication must conform to national legal requirements.

DRAFT

## 5 Risk assessment and risk management

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### 5.1 Asbestos risk assessment

#### 5.1.1 Introduction

440 An asbestos risk assessment involves the  
441 identification of the presence or likely  
442 presence of asbestos and materials  
443 containing asbestos (MCAs) at the  
444 workplace (for example in a building,  
445 means of transport, equipment or  
446 environment) and the assessment of the  
447 resulting risk for workers, including the  
448 nature and degree of workers' exposure  
449 and the potential risk it poses to their  
450 health. An asbestos risk assessment must  
451 prioritise the removal of asbestos or  
452 materials containing asbestos over other  
453 forms of asbestos handling.<sup>75</sup>

454 A risk assessment must be elaborated for  
455 all activities in which workers are or may  
456 be exposed in the course of their work to  
457 dust arising from asbestos or MCAs.<sup>76</sup> In case of any activity likely to involve a risk of exposure to dust  
458 arising from asbestos or materials containing asbestos, that risk shall be assessed in such a way as to  
459 determine the nature and degree of the workers' exposure to dust arising from asbestos or materials  
460 containing asbestos and to prioritise removal of asbestos or materials containing asbestos over other  
461 forms of asbestos handling.<sup>77</sup>

462 In the case of a new activity involving asbestos or MCAs (e.g. maintenance, repair, demolition or  
463 refurbishment work), work can only commence after an assessment of the risk of that activity has  
464 been made and any preventive measures identified have been implemented.

465 A risk assessment is the cornerstone of the overall approach to preventing, mitigating and managing  
466 risk associated with asbestos and MCAs. The illustrative role of asbestos risk assessment within the  
467 overall approach to risk management is shown in Figure 5-1.

#### Box 5.1: Asbestos and MCA identification

Article 3(2) of Directive 2009/148/EC (AWD):

In the case of any activity likely to involve a risk of exposure to dust arising from asbestos or materials containing asbestos, that risk shall be assessed in such a way as to determine the nature and degree of the workers' exposure to dust arising from asbestos or materials containing asbestos and to prioritise removal of asbestos or materials containing asbestos over other forms of asbestos handling.

Article 3(2) of Directive 2004/37/EC (CMRD):

In the case of any activity likely to involve a risk of exposure to carcinogens, mutagens or reprotoxic substances, the nature, degree and duration of workers' exposure shall be determined in order to make it possible to assess any risk to the workers' health or safety and to lay down the measures to be taken.

<sup>75</sup> Directive 2009/148/EC, Article 3(2); see also Directive 2009/148/EC, Article 11

<sup>76</sup> Directive 2009/148/EC, Article 3(2)

<sup>77</sup> Directive 2009/148/EC, Article 3(2)

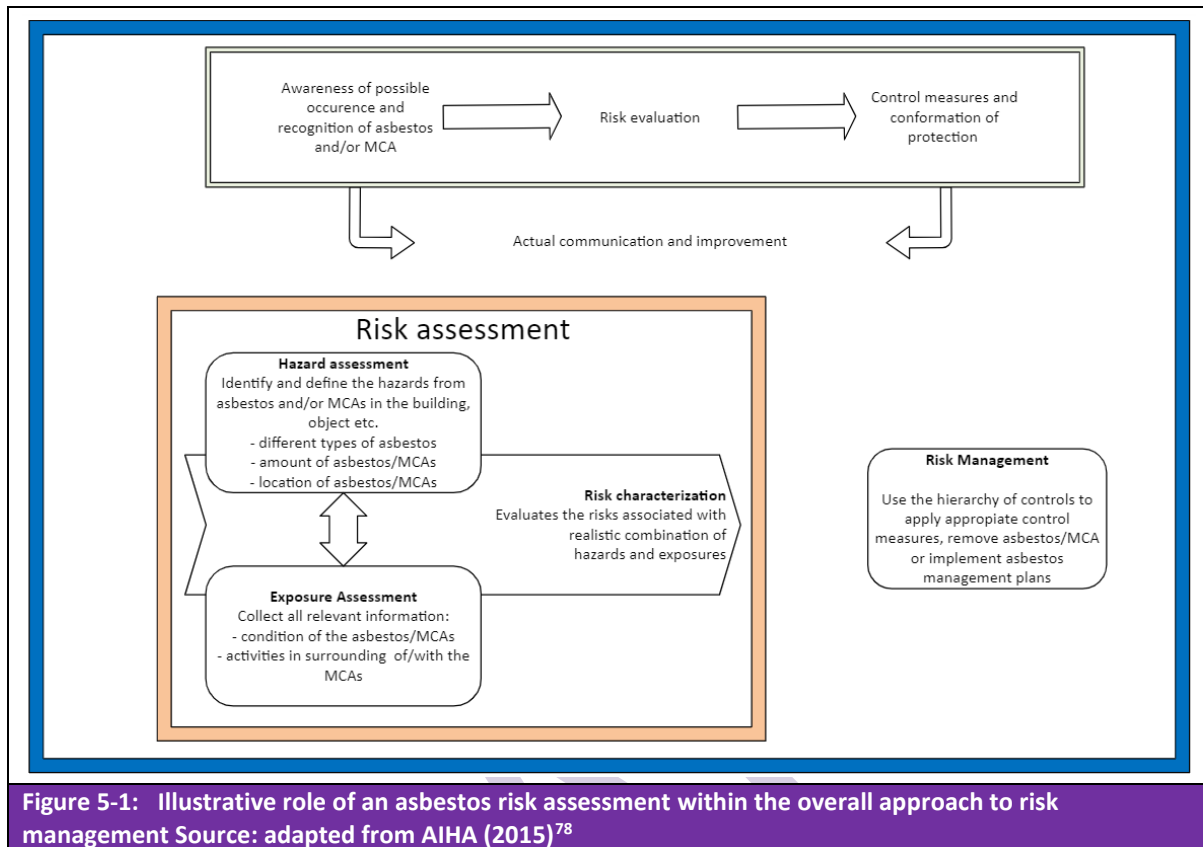


Figure 5-1: Illustrative role of an asbestos risk assessment within the overall approach to risk management Source: adapted from AIHA (2015)<sup>78</sup>

468 The purpose of an asbestos risk assessment is to enable decisions to be made about the appropriate  
 469 risk management (including prevention and control) measures, training, health surveillance, etc. The  
 470 two key terms are hazard and risk, which are defined as:

- 471
- Hazard - something that could cause harm, in this context the presence of asbestos or MCAs.
  - Risk - the likelihood that the hazard will cause harm and how serious that harm might be, in  
 472 this context, the exposure of workers to asbestos fibres and the associated negative health  
 473 effects.  
 474

475 The key elements of an asbestos risk assessment are:

- Providing detailed understanding of the current state of asbestos risks, by identifying where  
 476 the asbestos or MCAs are, the probability of the release of the fibres and the level of exposure  
 477 of workers.
- Identifying the steps to be taken to reduce the exposure of workers to dust arising from  
 478 asbestos or materials containing asbestos at the place of work to a minimum and in any case  
 479 to as low a level as is technically possible.<sup>79</sup>  
 480  
 481

482 Working with or removing MCAs may involve other risks to the health and safety of workers than the  
 483 potential risk of exposure to asbestos dust (for example, working at height, working in confined spaces  
 484 or machine safety). When working with asbestos or materials containing asbestos, all the risks should

<sup>78</sup> AIHA- American Industrial Hygiene Association (2015): A strategy for assessing and managing occupational exposures. 4th ed.

<sup>79</sup> Directive 2009/148/EC, Article 6

485 be assessed, and the necessary control measures need to be implemented. A risk assessment thus  
486 must consider all occupational risks other than the six asbestos fibres listed in Article 2 of Directive  
487 2009/148/EC. A risk assessment is required both under the generally applicable EU OSH Framework  
488 Directive<sup>80</sup> and under specific EU OSH directives, such as the CMRD<sup>81</sup> and the CAD.<sup>82</sup>

489 A risk assessment should be complete, reliable and represent the actual situation. The risk assessment  
490 must be evaluated regularly or when any change occurs in the conditions which may affect workers'  
491 exposure<sup>83</sup> to see if it still complete, reliable and covers the actual situation. It could be checked by  
492 another, independent Occupational Health and Safety (OSH) expert.

493 An employer must consult the workers and/or their representatives on asbestos risk assessment. An  
494 asbestos risk assessment must be revised where there is reason to believe that it is incorrect or there  
495 is a material change in the work.<sup>84</sup>

### 496 5.1.2 Responsibility

497 The responsibility for risk assessment of  
498 asbestos or MCAs lies with the employer.

499 If they are not in the possession of all the  
500 required expertise, the employer should  
501 enlist the assistance of competent  
502 professionals to perform the asbestos  
503 risk assessment.

504 Persons that carry out the asbestos risk  
505 assessment should typically have the following competencies (whilst complying with any applicable  
506 national rules):

- 507 • Adequate knowledge, training and expertise to evaluate risks from asbestos and MCAs.
- 508 • Understanding of exposure related to asbestos and MCAs in the workplace, tasks undertaken,  
509 how and when exposure can happen, and health and safety regulations.
- 510 • Ability to deal with the complexity of the process and authorities involved.

511 Certification schemes for asbestos professionals are often regulated by national bodies in each  
512 Member State.

### 513 5.1.3 Conducting an asbestos risk assessment

514 An initial asbestos risk assessment should comprise the following key elements:

<p><b>Box 5.2: Responsibility for risk assessment</b></p> <p>Article 6(3) of Directive 89/391/EEC (OSH FD): [...] the employer shall [...]: (a) evaluate the risks to the safety and health of workers</p> <p>Article 9(1) of Directive 89/391/EEC (OSH FD): The employer shall be in possession of an assessment of the risks to safety and health at work, including those facing groups of workers exposed to particular risks.</p>
--

<sup>80</sup> Directive 89/391/EEC, Articles 6(3), 9(1)

<sup>81</sup> Directive 2004/37/EC, Article 3

<sup>82</sup> Directive 98/24/EC, Article 4

<sup>83</sup> Directive 2004/37/EC, Article 3(2)

<sup>84</sup> Directive 2009/148/EC, Article 3(5)

- 515 • Element 1: Materials assessment (also sometimes referred to as an asbestos survey) -
- 516 Evaluation of the presence and condition of asbestos or MCAs.
- 517 • Element 2: Description of type of activity, work and/or work environment.
- 518 • Element 3: Description of nature and degree of exposure.
- 519 • Element 4: Exposure assessment.
- 520 • Element 5: Regular review of risk assessment and revision; including effectiveness of control
- 521 measures.

### 522 **5.1.3.1 Materials assessment - evaluation of the presence and condition of asbestos or MCAs**

523 A materials assessment identifies and evaluates the presence and the condition of the identified MCAs  
524 and evaluates the likelihood of them releasing harmful fibres if disturbed.

525 A materials assessment should include:

- 526 • Description of the minerals (NOA) or MCAs which are examined.
- 527 • Identification of the type of asbestos present.
- 528 • The concentration of asbestos in the materials.
- 529 • Identification of the condition of asbestos or MCAs (the likelihood of release of asbestos
- 530 fibres) - the physical condition of MCAs and their ability to release fibres should be assessed.
- 531 Materials that are damaged, friable, or deteriorating pose a higher risk.
- 532 • The amount of the asbestos or MCAs which is present.

### 533 **5.1.3.2 Description of type of activity, work and/or work environment**

534 This element should include a description of:

- 535 • Type of activity/work (e.g. repair, removal, encapsulation of MCAs or maintenance and testing
- 536 of plant and equipment contaminated with MCAs).
- 537 • Working methods used.
- 538 • The working environment and conditions.

539 A comprehensive list of examples of exposure situations both within the renovation and demolition  
540 sector and beyond is provided in INRS (2012): Work situations involving exposure to asbestos.<sup>85</sup>

541 It is important that the risk assessment considers all the features and activities at a particular site and  
542 includes a sufficient basis for the definition of operational phases to be considered as part of the  
543 exposure assessment. The European Standard EN689:2018+AC provides advice on how to assess  
544 exposure to asbestos<sup>86</sup>.

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<sup>85</sup> <https://www.inrs.fr/dam/jcr:3b3440b2-0be8-4012-be79-d634ec42f801/ed6005.pdf>

<sup>86</sup> EN 689:2018+AC, Workplace exposure - Measurement of exposure by inhalation to chemical agents - Strategy for testing compliance with occupational exposure limit values. <https://www.arbeidshygiene.nl/uploads/files/insite/sessie-t-fransman.pdf>

545 **5.1.3.3 Description of nature and degree of exposure**

546 In addition to the materials assessment and the type of activity, work methods and/or work  
547 environment, the asbestos risk assessment should include a characterisation of exposure which may  
548 occur during the work activities:

- 549 • Number of people involved and potentially exposed<sup>87</sup>, including particularly sensitive risk  
550 groups / workers at particular risk.<sup>88</sup>
- 551 • Nature and degree of exposure - a description of the scale of the work and expected frequency  
552 and duration of the work.

553 **5.1.3.4 Exposure assessment**

554 An asbestos risk assessment should include an assessment of the possibility of degradation of the  
555 MCAs over time and the degree of exposure which may occur during the work activities. It should  
556 consider the following:

- 557 • Relevant air monitoring data of the actual situation and/or of similar previous activities;
- 558 • Exposure assessment - to determine compliance with exposure limit values; and
- 559 • Evaluate the effectiveness of existing control measures; and
- 560 • Potential exposure of people not directly exposed (passive and secondary exposure).

561 Depending on the results of the initial risk assessment, and in order to ensure compliance with the  
562 relevant limit value, the measurement of asbestos fibres in the air at the place of work must be carried  
563 out at regular intervals during specific operational phases.<sup>89</sup> An example of a tool that can be useful  
564 for a first indication of the potential asbestos dust levels as a part of the initial risk assessment is the  
565 Scol@miante tool used in France.<sup>90</sup> For details of air measurement and compliance with the OEL, see  
566 Section 7.

567 **5.1.3.5 Sources of information**

568 The following tools and sources may be useful for data collection on the presence of asbestos or  
569 MCAs, type of activity, work environment and nature of exposure:

- 570 • Information from the owners of premises and other employers.
- 571 • Documentation about the object or building.
- 572 • Incident reports.
- 573 • Information from inspection and monitoring tools.
- 574 • Emergency response plans.

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<sup>87</sup> See Directive 89/391/EEC, Articles 9(1)(a), 15, Directive 2004/37/EC, Article 3(4); see also Directive 2009/148/EC, Article 18

<sup>88</sup> Examples: Potentially exposed are employees working in demolition and removal companies, people working in mines and quarries where asbestos can be present in mineral layers, employees with passive exposure working in environments where materials containing asbestos are present. Sensitive risk groups could be identified in health surveillance or woman (ovarian cancer).

<sup>89</sup> Directive 2009/148/EC, Article 7(1)

<sup>90</sup> <https://scolamiante.inrs.fr/Scolamiante/>

- 575 • Relevant registers and inventories<sup>91</sup>, for example in the asbestos management plan (see  
576 5.2.3).

## 577 **5.1.4 Recording the results and reporting**

### 578 **5.1.4.1 Risk assessment report**

579 The findings of the risk assessment should be recorded in written form. A comprehensive asbestos  
580 risk assessment report may include the following sections:

- 581 • Title, owner of document, version control.
- 582 • Executive summary.
- 583 • Introduction.
- 584 • Description of (part of) the object or building which is assessed.
- 585 • Any studies/reports previously carried out (including from other agencies).
- 586 • Methodology: risk assessment methods and sampling process.
- 587 • Asbestos register: inventory of asbestos and MCAs present.
- 588 • Detailed information on type of asbestos, condition of the MCA, activity, work environment,  
589 nature of exposure and control measures in place
- 590 • The places that have not been able to be investigate - information on what was not included  
591 in the risk assessment.<sup>92</sup>
- 592 • Air monitoring results: fibre concentration data (if applicable).
- 593 • Exposure assessment and evaluation.
- 594 • Evaluation of risks and exposure potential.
- 595 • Conclusion.
- 596 • Annexes: Supporting documentation, including analysis certificates and photos.

### 597 **5.1.4.2 Site-specific asbestos inventory**

598 The presence of asbestos and MCAs could be recorded in a site-specific asbestos inventory. It can be  
599 mandatory to have such an inventory under national legislation. If applicable in a Member State, the  
600 presence of MCAs should be recorded in a national asbestos registries.

601 A site-specific asbestos register lists all identified (or assumed) asbestos present in a workplace. The  
602 inventory is intended to ensure workers and others in the workplace to not accidentally disturb  
603 asbestos. It should be accessible for all workers.

604 An asbestos inventory may include:

- 605 • Exact location of the asbestos/MCAs (room/area, building element).
- 606 • Type of material.
- 607 • Accessibility.

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<sup>91</sup> In this guide, the term 'inventory' is used to describe a site-specific document, e.g. an inventory of asbestos/MCAs in a building. The term register is used to describe a collection of inventories or their results, e.g. a national register of buildings that contain asbestos/MCAs.

<sup>92</sup> This procedure is very common in non-destructive risk-assessment. F.i. if a pipe made of asbestos-cement crosses a stone wall into a shaft and is inaccessible. The pipe cannot be inspected otherwise than to make an inspection opening. Because of the risks that can be introduced by doing that, the competent investigator makes an annotation of this fact and assumes that the pipe will continue as a pipe made of asbestos cement. By doing so the risk assessment is not incomplete ; some parts are based on expert judgment and/or common sense. EN 2991:2015



- 608 • Encapsulation/sealant.
- 609 • Quantity (in m<sup>2</sup>).
- 610 • Number of samples.
- 611 • Analysis result.
- 612 • Date the asbestos was identified.
- 613 • Type of asbestos.
- 614 • Condition of asbestos, such as friable or non-friable, intact or damaged.
- 615 • Exposed population.
- 616 • Action required.
- 617 • Comments/recommendation.

## 618 5.1.5 Review and revision of asbestos risk assessment

### 619 5.1.5.1 Periodical review of asbestos risk assessment

620 The asbestos risk assessment must be  
621 reviewed regularly<sup>93</sup> to ensure that it  
622 remains up to date and that control  
623 measures are effective.

624 In the review of previous asbestos risk  
625 assessments, the effectiveness of the  
626 control measures should be evaluated.  
627 Information from workers, incident  
628 reports and/or health surveillance must  
629 be part of this evaluation.

630 The frequency of the review of the risk  
631 assessment should be agreed, for  
632 instance every year. The frequency of the  
633 review may be dictated by national  
634 regulations or industry best practices and  
635 should be documented in the asbestos  
636 management plan, see Section 5.2.3.

### 637 5.1.5.2 Revision of asbestos risk 638 assessment

639 A revision of the asbestos risk assessment  
640 must take place where there is reason to  
641 believe that it is incorrect or there is a  
642 material change in the work.<sup>94</sup> Such situations typically include:

- 643 • If MCAs are disturbed, degraded or damaged.
- 644 • If methods used to control fibre release change.
- 645 • If there is doubt about the efficiency of control measures.
- 646 • If there is a significant change in the use of the object/building, the type of work or method of  
647 work, work environment, workforce or occupancy levels, and/or amount of asbestos found.
- 648 • If further asbestos is or MCAs are identified at the workplace.

#### Box 5.3: Review of risk assessment

Article 3(5) of Directive 2009/148/EC (AWD):

The assessment referred to in paragraph 2 shall be the subject of consultation with the workers and/or their representatives within the undertaking or establishment and shall be revised where there is reason to believe that it is incorrect or there is a material change in the work.

Article 3(2) of Directive 2004/37/EC (CMRD):

The assessment shall be renewed regularly and in any event when any change occurs in the conditions which may affect workers' exposure to carcinogens, mutagens or reprotoxic substances.

Article 6(1) of Directive 89/391/EEC (EU OSH FD)

Within the context of his responsibilities, the employer shall take the measures necessary for the safety and health protection of workers, including prevention of occupational risks and provision of information and training, as well as provision of the necessary organization and means.

The employer shall be alert to the need to adjust these measures to take account of changing circumstances and aim to improve existing situations.

<sup>93</sup> Directive 2009/148/EC, Article 3(5), Directive 2004/37/EC, Article 3(2), Directive 89/391/EEC, Article 6

<sup>94</sup> Directive 2009/148/EC, Article 3(5)



- 649 • If results of air monitoring indicate the exposure levels to be higher than previously assessed.
- 650 • After an incident has occurred.
- 651 • If health monitoring of workers indicates possible asbestos-related health effects or exposure.
- 652 • Introduction of new legal or regulatory requirements.

## 653 5.2 Structured management of asbestos

### 654 5.2.1 Notification

655 Employers must notify their relevant  
656 national authority before commencing  
657 any activity in which workers are or may  
658 be exposed in the course of their work to  
659 dust arising from asbestos or MCAs<sup>95</sup>,  
660 unless their Member State has derogated  
661 certain activities from the notification  
662 requirement.

663  
664 This notification system ensures that  
665 authorities are informed about asbestos-  
666 related activities, enabling them to  
667 monitor compliance with safety  
668 regulations and safeguard workers'  
669 health.

670 A notification<sup>96</sup> must include at least a  
671 brief description of:

- 672 • the location of the worksite and,  
673 where relevant, the specific  
674 areas where the work will take  
675 place;
- 676 • the type and quantity of asbestos  
677 used or handled - detailed information on the forms of asbestos present and their amounts;
- 678 • the activities and processes involved, including with regard to the protection and  
679 decontamination of workers, waste disposal and, where relevant, air exchange when working  
680 under confinement;
- 681 • the number of workers involved - a list of the workers likely to be assigned to the site  
682 concerned, the workers' individual training certificates and the date of the latest assessment  
683 of the workers' health<sup>97</sup>;
- 684 • the starting date and duration of the work; and
- 685 • measures taken, including an overview of the equipment used, to limit the exposure of  
686 workers to asbestos.

#### Box 5.4: Notification requirement and derogation

Article 4 (2 and 4) of Directive 2009/148/EC (AWD):

2. The activities referred to in Article 3(1) must be covered by a notification system administered by the responsible authority of the Member State.

3. The notification referred to in paragraph 2 shall be submitted by the employer to the responsible authority of the Member State, before the work commences, in accordance with national laws, regulations and administrative provisions.

Article 3(3) of Directive 2009/148/EC (AWD):

Provided that worker exposure is sporadic and of low intensity, and if it is clear from the results of the risk assessment referred to in paragraph 2 of this Article that the relevant limit value as laid down in Article 8 will not be exceeded in the air of the working area, Member States may derogate from Article 4 where the work involves:

- (a) short, non-continuous maintenance activities in which only non-friable materials are handled;
- (b) removal without deterioration of non-degraded materials in which the asbestos fibres are firmly linked in a matrix;
- (c) encapsulation or sealing of MCAs which are in good condition;
- (d) air monitoring and control, and the collection of samples to ascertain whether a specific material contains asbestos.

<sup>95</sup> Directive 2009/148/EC, Article 4

<sup>96</sup> Directive 2009/148/EC, Article 4(3)

<sup>97</sup> Directive 2009/148/EC, Article 18

687 A new notification must be submitted each time a change in working conditions is likely to result in a  
688 significant increase in exposure to dust from asbestos or MCAs.<sup>98</sup>

689 The specific requirements for the notification, for instance when and to whom the notification should  
690 be made, are determined nationally.

691 Workers and/or their representatives must also have access to notifications.<sup>99</sup>

## 692 **5.2.2 Plan of work**

693 A plan of work must be drawn up before demolition work or work on removing asbestos and/or  
694 asbestos-containing products from buildings, structures, plant or installations or from ships is  
695 started<sup>100</sup> and prescribe the measures necessary to ensure the safety and health of workers at the  
696 place of work, including that:<sup>101</sup>

- 697 • asbestos and/or asbestos-containing products must be removed before demolition, except  
698 where this would cause a greater risk to workers than if the asbestos and/or asbestos-  
699 containing products are left in place;
- 700 • PPE<sup>102</sup> must be provided, where necessary;
- 701 • following the completion of the demolition or asbestos removal work, the absence of risks of  
702 exposure to asbestos must be verified before other activities resume.

703 At the request of the competent  
704 authorities, the plan must include  
705 information on the following:<sup>103</sup>

- 706 • the nature and probable duration  
707 of the work;
- 708 • the place where the work is  
709 carried out;
- 710 • the methods applied where the work involves the handling of asbestos or of materials  
711 containing asbestos;
- 712 • the characteristics of the equipment used for:  
713 (i) protection and decontamination of those carrying out the work;  
714 (ii) protection of other persons present on or near the worksite

### **Box 5.5: Example of an interesting approach**

French Labour Code (Article R4412-433 updated in February 2023) allows employers to draft a demolition, removal, or encapsulation plan using an online teleservice. This service, accessible via a user account, is implemented by the Minister for Labour and is known as the DEMAT@MIANTE platform.

715 There may be additional Member State specific requirements for the plan of work, including a  
716 potential requirement to notify the plan of work before the start of work.

## 717 **5.2.3 Asbestos Management Plan (AMP)**

718 In some Member States, the information required for elaborating the notification, plan of work, for  
719 compliance with additional national legal requirements and practical handling of asbestos and MCA is

<sup>98</sup> Directive 2009/148/EC, Article 4(5)

<sup>99</sup> Directive 2004/37/EC Article 4(4)

<sup>100</sup> Directive 2009/148/EC, Article 13 (1)

<sup>101</sup> Directive 2009/148/EC, Article 13 (2)

<sup>102</sup> With regard to PPE, Directive 2009/148/EC, Article 13 (2) refers to Article 12(1)(a): workers shall be issued with suitable personal protective equipment to be worn, which shall be appropriately handled and, in particular with regard to respiratory equipment, which shall be individually adjusted, including through fitting checks, in accordance with Council Directive 89/656/EEC.

<sup>103</sup> Directive 2009/148/EC, Article 13 (2)

720 collated in an Asbestos Management Plan (AMP). An AMP sets out how asbestos or MCAs that are  
721 identified will be managed and/or what kind of control measures will be in place to control the  
722 exposure until the MCA's are removed or the building, structure or object is demolished.

723 An AMP is a comprehensive framework integral for safeguarding health and safety, ensuring  
724 compliance with legal obligations, and enabling the effective long-term management of asbestos risks.  
725 By proactively managing asbestos, organizations may avoid exposure incidents, reduce liabilities, and  
726 maintain a safe environment for all workers.

727 An AMP should include the steps to be taken to control exposure to the lowest level technically  
728 achievable. This may include:

- 729 • Measures to prevent the spread of asbestos to the surrounding environment.
- 730 • Provision, use and maintenance (including cleaning) of RPE & other PPE.
- 731 • Procedures for personal decontamination.
- 732 • Procedures for dealing with incidents and emergencies.
- 733 • Procedures for removal and disposal of waste.
- 734 • Other hazards.

#### 735 **5.2.3.1 Content of an asbestos management plan (AMP)**

736 An asbestos management plan (AMP) may include:

- 737 • Purpose and objectives.
- 738 • Asbestos risk assessment findings.
- 739 • Roles and responsibilities.
- 740 • A system of usage restrictions
- 741 • Removal techniques.
- 742 • Control measures, such as encapsulation of materials containing asbestos.
- 743 • Monitoring and inspection schedule.
- 744 • Incident procedure.
- 745 • Emergency procedures.
- 746 • Risk communication.
- 747 • Training.
- 748 • Plan of action (including prioritisation).
- 749 • Review and revision.
- 750 • Record keeping.

#### 751 **5.2.3.2 Review and revision of AMP**

752 The frequency of the review of the AMP should be agreed, for instance every year or every two years.  
753 The frequency of the review may be dictated by national regulations or industry best practices and  
754 should be documented in the AMP.

755 The AMP should be revised:

- 756 • Whenever a new notification has to be submitted.<sup>104</sup>
- 757 • Whenever a new plan of work is drawn up.
- 758 • If a new MCA is discovered.
- 759 • After structural changes (also in responsibilities).

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<sup>104</sup> Directive 2009/148/EC, Article 4(5)

- 760 • If asbestos is removed from or disturbed, sealed or enclosed at the workplace.
- 761 • If the plan is no longer adequate for managing asbestos or MCAs at the workplace.
- 762 • If a competent health and safety representative requests a review.

### 763 5.3 Record keeping

764 The employer should store the key risk assessment and management documents (risk assessments,  
765 AMPs, notifications, plans of work, registers of exposed workers, results of health surveillance, etc.)  
766 in a dedicated place and should be made accessible to the extent needed and/or required for health  
767 and safety of workers whilst complying with the relevant data protection requirements.

768 A register of workers that are or may be exposed in the course of their work to dust arising from  
769 asbestos or MCAs, which must indicate the nature and duration of the activity and the exposure to  
770 which they have been subjected must be kept for at least 40 years following the end of exposure (and  
771 made available to the national authority where the employer ceases trading).<sup>105</sup>

772 Workers must be given access to the information in the register that relates to them personally.  
773 Workers and/or their representatives must be given access to anonymous, collective, information in  
774 the register.<sup>106</sup>

775 Record keeping must comply with any applicable national legislation or guidance, which can vary  
776 considerably.

### 777 5.4 Sharing information

778 The results of the risk assessment and  
779 control measures must be communicated  
780 with relevant parties or employers (see  
781 also section 1) in cooperation to prevent  
782 health risks to their workers and other  
783 persons.

784 The employer must supply the authorities  
785 responsible at their request with the  
786 information used for making the asbestos  
787 risk assessment.<sup>107</sup>

Box 5.6: Sharing information
<p>Article 6(4) of Directive 89/391/EEC (OSH FD):</p> <p>Without prejudice to the other provisions of this Directive, where several undertakings share a work place, the employers shall cooperate in implementing the safety, health and occupational hygiene provisions and, taking into account the nature of the activities, shall coordinate their actions in matters of the protection and prevention of occupational risks, and shall inform one another and their respective workers and/ or workers' representatives of these risks.</p>

### 788 5.5 Consultation with workers and/or their representatives

789 The asbestos risk assessment, including its results, must be subject to consultation with workers  
790 and/or their representatives.<sup>108</sup> The AMP and plan of work should also be subject to consultation with  
791 workers and/or their representatives.

<sup>105</sup> Directive 2009/148/EC, Article 19

<sup>106</sup> Directive 2009/148/EC, Article 19(2)

<sup>107</sup> Directive 2004/37/EC Article 3(2)

<sup>108</sup> Directive 2009/148/EC, Article 3(5), Directive 89/391/EEC, Article 11(1)

## 792 6 Identifying asbestos

### 793 6.1 Introduction

794 Identification of all asbestos and  
795 materials containing asbestos (MCAs) in  
796 the workplace is the cornerstone of the  
797 risk assessment (see Section 5). The  
798 objective is to ensure that all asbestos  
799 and MCAs are correctly identified, thus  
800 underpinning an effective approach to  
801 risk assessment and management. In  
802 many instances, a reliable identification  
803 of asbestos and MCAs requires extensive  
804 research and communication with other  
805 stakeholders, such as building owners.

806 Asbestos identification is relevant to both  
807 asbestos exposure in buildings and also  
808 to all other sectors where exposure to  
809 asbestos or MCAs occurs. An effective  
810 risk assessment requires a  
811 comprehensive and reliable identification  
812 of the presence of asbestos or MCAs in  
813 the workplace.

814 In accordance with the precautionary principle, where asbestos identification is not possible or there  
815 is doubt about the presence of asbestos or MCAs, the requirements of Directive 2009/148/EC must  
816 be observed<sup>109</sup> and other approaches set out in this guide should be observed.

### 817 6.2 Materials and products containing asbestos

#### 818 6.2.1 Asbestos ban in the EU Member States

819 Before beginning demolition, maintenance or renovation work on premises built before the entry into  
820 force of the Member State's asbestos ban, employers must identify presumed materials containing  
821 asbestos in employers shall take all necessary steps to identify presumed materials containing  
822 asbestos.<sup>110</sup> In the EU, manufacture, import and use of all six types of asbestos has been prohibited  
823 since 2005. This includes non-EU members Norway, United Kingdom, Gibraltar, Liechtenstein, and  
824 Monaco. In some EU Member States this was implemented earlier than 2005.

825 Table 6-1 details the year when manufacture, import and use of all six asbestos types was prohibited  
826 in each country. Although, it is reasonable to expect that in some cases a transition period will have  
827 followed the implementation of this ban. Therefore, these dates should be used with due caution.

#### Box 6.1: Asbestos and MCA identification

Article 11 of Directive 2009/148/EC:

Before beginning demolition, maintenance or renovation work on premises built before the entry into force of the Member State's asbestos ban, employers shall take all necessary steps to identify presumed materials containing asbestos, in particular by obtaining information from the owners of premises, from other employers and from other sources, including relevant registers. If such information is not available, the employer shall ensure an examination, by a qualified operator in accordance with national law and practice, of the occurrence of materials containing asbestos and shall obtain the result of such examination before the start of the work. The employer shall make available to another employer, upon request and solely for the purpose of complying with the obligation laid down in this paragraph, any information obtained within the framework of such an examination.

If there is any doubt about the presence of asbestos in a material or construction, the applicable provisions of this Directive shall be observed.

<sup>109</sup> Directive 2009/148/EC, Article 11

<sup>110</sup> Directive 2009/148/EC, Article 13 (2)

Table 6-1: Year when manufacture, import and use of all six types of asbestos was prohibited.	
Country	Ban year
Norway	1984 <sup>111</sup>
Denmark, Sweden	1986 <sup>112,109</sup>
Austria, Liechtenstein*	1990 <sup>109,110</sup>
Italy	1992 <sup>109</sup>
Germany	1993 <sup>110</sup>
Finland, Netherlands	1994 <sup>113,110</sup>
Slovenia	1996 <sup>114</sup>
France, Poland	1997 <sup>115,109</sup>
Ireland, United Kingdom*	1999 <sup>116,110</sup>
Belgium, Latvia	2001 <sup>117,109</sup>
Luxembourg, Spain	2002 <sup>110</sup>
Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Lithuania, Malta, Portugal, Romania, Slovakia	2005 <sup>109</sup>
Croatia	2006 <sup>109</sup>
Gibraltar*	2007 <sup>118</sup>
Monaco*	2016 <sup>109</sup>
* Non-EU countries. Footnotes provide references for these dates.	

828 Countries outside of the EU adopted bans on all six asbestos types later than this, including Ukraine  
829 (2017), Serbia (2011), Turkey (2010). Some countries are yet to enforce an absolute ban on asbestos  
830 including China, Russia, India, Brazil and the United States.<sup>119</sup>

831 In deciding about the presence of asbestos or MCAs, employers should bear in mind the potential for  
832 asbestos to be present due to a) illegal imports<sup>120</sup> of materials or products containing asbestos after  
833 the year given in Table 6-1, b) incomplete removal performed in the past (e.g. from buildings or means  
834 of transport), and c) potential for asbestos to be present in recycled construction materials.

## 835 6.2.2 Materials containing asbestos (MCAs)

836 MCAs were widely used across various applications due to their heat-resistant, insulating, and  
837 reinforcing properties. The usage periods for these materials started from the early 1920s and it varied  
838 significantly between Western and Eastern European countries, with generally more extensive use in

<sup>111</sup> [http://ibasecretariat.org/asbestos\\_ban\\_list.php](http://ibasecretariat.org/asbestos_ban_list.php)

<sup>112</sup> COWI & RPA (2021): Impact assessment of revision of AWD.

<sup>113</sup> <https://tyosuojelu.fi/en/working-conditions/construction-industry/asbestos>

<sup>114</sup> Asbestos cement only, source: [http://ibasecretariat.org/asbestos\\_ban\\_list.php](http://ibasecretariat.org/asbestos_ban_list.php)

<sup>115</sup> <https://www.anses.fr/en/content/asbestos-still-very-topical-problem>

<sup>116</sup>

[https://www.hsa.ie/eng/your\\_industry/chemicals/legislation\\_enforcement/asbestos/legislation\\_and\\_guidance/restrictions\\_and\\_exemptions/](https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/asbestos/legislation_and_guidance/restrictions_and_exemptions/)

<sup>117</sup>

[https://www.ejustice.just.fgov.be/cgi\\_loi/change\\_lg.pl?language=fr&la=F&table\\_name=loi&cn=2001102332](https://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=fr&la=F&table_name=loi&cn=2001102332)

<sup>118</sup> <https://www.gibraltarlaws.gov.gi/legislations/control-of-asbestos-regulations-2007-1811/download>

<sup>119</sup> <https://www.asbestosnation.org/facts/asbestos-bans-around-the-world/>

<sup>120</sup> In some cases, the presence of asbestos in imported products may not be labelled if below a certain content threshold.



839 the West during the 1950s-1970s, and in general a more significant utilisation of asbestos in buildings,  
840 and higher consumption in Eastern Europe during the 1990s-2000s (where its utilisation has been  
841 mostly related to asbestos cement).

842 MCAs were made by a variety of manufacturers and offered on the market under various names. The  
843 same products can therefore be encountered under different designations.

844 Common product groups of MCAs include:

- 845 • Technical and electrical installations
- 846 • Ventilation components
- 847 • Interior surface materials
- 848 • Roof products
- 849 • Façade elements
- 850 • Insulation and fire protection materials
- 851 • Panels and boards
- 852 • Special components and equipment

853 Table A3-1 in Annex 3 contains a more detailed, however non-exhaustive, list of MCAs used in the  
854 construction sector in the EU in the past. It is crucial to stress that the list contained in Annex 3 is non-  
855 exhaustive, as asbestos can be found in many unexpected locations. A list of suppliers, types of  
856 asbestos, and uses is also available in the INRS (2014) ED 1475.<sup>121</sup>

857 Asbestos was also used in application other than buildings, including in different modes of transport  
858 such as ships, trains, vehicles and in different products, such as safes and security devices, heaters,  
859 ovens and fire blankets. These asbestos-containing products can still be found in many public,  
860 government, and commercial properties and can pose a potential risk during maintenance, repair,  
861 relocation activities or in case of emergencies, e.g. through destructive cutting or even non-  
862 destructive “precision drill opening” of a safe<sup>122</sup>.

863 When identifying MCAs, it is essential to consider both visible and non-visible materials that could be  
864 disturbed during renovation or maintenance activities. It is important to note that visual identification  
865 alone is not reliable for determining the presence of asbestos. Materials that look identical may or  
866 may not contain asbestos. Therefore, it is always mandatory to consult with qualified professionals  
867 when there is any doubt about the presence of asbestos<sup>123</sup>.

868 The potential for asbestos in unexpected locations underscores the need for a thorough and  
869 systematic approach to asbestos identification and management. This approach should encompass all  
870 areas of a building, site or facility, including those that might not immediately be associated with  
871 asbestos use, or those that are not routinely accessed, such as crawl spaces and attics.

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<sup>121</sup> Institut national de recherche et de sécurité (INRS) (2014). Asbestos products and suppliers. pour la  
prévention des accidents du travail et des maladies professionnelles (INRS) 2014. INRS ED 1475 edition - 4e  
edition - November 2014

<sup>122</sup>

[https://www.hsa.ie/eng/your\\_industry/chemicals/legislation\\_enforcement/asbestos/asbestos\\_introduction/asbestos\\_risks\\_in\\_safes\\_and\\_fire\\_resistant\\_cabinets/](https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/asbestos/asbestos_introduction/asbestos_risks_in_safes_and_fire_resistant_cabinets/)

<sup>123</sup> Directive 2009/148/EC, Article 11

872 To ensure comprehensive identification, it is recommended to maintain regularly updated inventories  
873 and registers for each building or workplace. These should include detailed information about the  
874 location, type, and condition of MCAs throughout a building or site.

### 875 **6.2.3 MCAs common in buildings**

876 In buildings, MCAs may be found in various locations, often hidden or not immediately apparent. The  
877 prevalence of these materials can vary significantly depending on the country and the year of  
878 construction and/or renovation. Asbestos use in residential settings was most common from the  
879 1950s to the 1980s, but can be found in buildings constructed or renovated up until national bans  
880 were implemented. Common areas where MCAs are found include:

- 881 • Roofing materials:
  - 882 ○ Asbestos cement tiles or sheets
  - 883 ○ Roofing felt and underlayment
  - 884 ○ Soffits and fascias
  - 885 ○ Gutters and downpipes
- 886 • Floor coverings:
  - 887 ○ Vinyl floor tiles (particularly those installed between 1950 and 1980)
  - 888 ○ Linoleum backing
  - 889 ○ Floor tile adhesives
  - 890 ○ Bitumen-based floor adhesives
- 891 • Wall and ceiling coverings:
  - 892 ○ Textured coatings (e.g., Artex)
  - 893 ○ Asbestos Insulating Board (AIB) used in partition walls or ceilings
  - 894 ○ Sprayed coatings on ceilings or walls for fire protection or insulation
  - 895 ○ Plaster and render
- 896 • Facade materials:
  - 897 ○ Asbestos cement cladding
  - 898 ○ Infill panels
  - 899 ○ Renders, pebbledash
  - 900 ○ Window elements:
    - 901 ○ Windowsills (particularly exterior)
    - 902 ○ Window putty and sealants
    - 903 ○ Asbestos cement window boxes
- 904 • Insulation materials:
  - 905 ○ Loose fill insulation in lofts or cavity walls
  - 906 ○ Fire protection around structural steelwork
  - 907 ○ Asbestos paper backing on fibreglass insulation
- 908 • Heating and ventilation equipment:
  - 909 ○ Flue pipes
  - 910 ○ Gaskets in pipe joints
  - 911 ○ Pipe lagging around heating systems, insulation around boilers
  - 912 ○ Insulation on old storage heaters
  - 913 ○ Seals in warm air heating systems
- 914 • Other areas:
  - 915 ○ Toilet cisterns (asbestos cement)
  - 916 ○ Panels/pads behind electrical distribution boards or other equipment
  - 917 ○ Panels lining airing cupboards (for hiding hot water tanks)
  - 918 ○ Fire blankets
  - 919 ○ Asbestos rope seals on boiler and oven doors



920 Important points to be aware of when dealing with MCAs in buildings include:

- 921 • Age of property: While asbestos use was most common in certain decades, it is important to  
922 note that buildings constructed before the introduction of asbestos in building materials may  
923 also contain MCAs, as these may have been added during subsequent renovations prior to the  
924 ban.
- 925 • Potential for fibre release: Some MCAs may have a lower likelihood of releasing fibres if left  
926 undisturbed. However, they can have a significant potential for fibre release if damaged,  
927 disturbed, or during maintenance and renovation activities. Even small-scale renovations or  
928 maintenance tasks, such as drilling into walls or replacing floor coverings, can potentially  
929 disturb MCAs and thus pose significant risks.
- 930 • Challenges in identifying asbestos: Asbestos can be present in areas not immediately visible  
931 or accessible, such as behind walls, under floorboards, or within cavity walls. Unless detailed  
932 information about asbestos presence is already available, materials assessment by a qualified  
933 professional must thus be performed before any maintenance, renovation or demolition  
934 work, see section 6.7. It should be kept in mind that visual identification alone is not reliable  
935 for determining the presence of asbestos, as materials that appear identical may or may not  
936 contain asbestos. Therefore, if there is any doubt about whether a material contains asbestos,  
937 this must be treated as if it does until proven otherwise by professional assessment and  
938 laboratory analysis.<sup>124</sup>

#### 939 **6.2.4 Highly friable MCAs**

940 Highly friable MCAs pose a significant risk due to their high potential for crumbling and thus fibre  
941 release when disturbed, thus requiring careful management by qualified professionals. The main  
942 categories include (but are not limited to):

- 943 • Loose asbestos insulation:
  - 944 ○ Primary use: Thermal insulation for pipes, boilers, and attics
  - 945 ○ Asbestos content: Ranges from 1% to 100%
  - 946 ○ Potential for fibre release: Extremely high, especially if disturbed or deteriorating
  - 947 ○ Common applications: Public buildings, schools, hospitals, and industrial facilities
- 948 • Asbestos fabrics:
  - 949 ○ Primary uses: Fire blankets, protective clothing, gaskets, and seals (used in gloves,  
950 aprons, fire curtains, and conveyor belts)
  - 951 ○ Asbestos content: Can contain up to 100% asbestos
  - 952 ○ Potential for fibre release: High, particularly when cut, torn, or abraded
  - 953 ○ Common applications: Theatres, laboratories, foundries, and industrial settings
- 954 • Asbestos insulating boards (AIB):
  - 955 ○ Primary uses: Fireproof coverings, partition walls, and ceiling panels (e.g.  
956 “Asbestolux” and similar AIB)
  - 957 ○ Asbestos content: Typically 16% to 40%
  - 958 ○ Potential for fibre release: Moderate to high, depending on condition and disturbance
  - 959 ○ Common locations: fire protection and acoustic/thermal insulation in broad variety of  
960 buildings.
- 961 • Asbestos papers and cardboards:
  - 962 ○ Primary uses: Electrical insulation, floor covering underlays, and filter materials (used  
963 in gaskets for high-temperature and pressure environments, e.g. Compressed  
964 Asbestos Fibre (CAF) gaskets)
  - 965

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<sup>124</sup> Directive 2009/148/EC, Article 11

- 966 ○ Asbestos content: Can have very high content, sometimes approaching 90% to 100%
- 967 ○ Potential for fibre release: High, especially when damaged or deteriorating

968 It is crucial to stress that the above list is non-exhaustive, as there were country-specific variations in  
969 asbestos use in the past.

970  
971 In France, there is a position on not differentiating between friable and non-friable asbestos, aiming  
972 to prevent misunderstandings and incorrect risk assessments<sup>125</sup>.

## 973 **6.3 Examples of potential exposure other than demolition and** 974 **renovation workers**

### 975 **6.3.1 Maintenance staff, engineers, and tool manufacturers**

976 These employees come into contact with asbestos through direct handling of a range of ACMs  
977 including insulation, flocking, false ceilings, friction products (brakes, clutches), seals, and asbestos  
978 cement products like sheets and ducts. Their activities involve stripping, replacing, and cleaning  
979 machinery like engines, turbines, and thermal shields. Asbestos-contaminated or confined  
980 maintenance also leads to high exposure. For instance, the stripping of old asbestos braids may result  
981 in exposure levels of 6–27 fibres/cm<sup>3</sup> when dry and 0.2 fibres/cm<sup>3</sup> when damp. Friction materials used  
982 for cleaning or work are especially dangerous because they cause asbestos dust to be released during  
983 work or cleaning.

### 984 **6.3.2 Lift Operators**

985 Actively, lift operators will come across asbestos exposure when they work directly on ACMs;  
986 passively, they will find it in enclosed areas including flaking or degraded asbestos products. Flocking,  
987 asbestos cement sheets, and cable sheaths are usual ACMs. Their usual job entails cleaning asbestos  
988 contaminated equipment, replacing it, and dismantling it. Removing asbestos cement sheets by hand  
989 without suction, for example, produces asbestos fibres ranging from 1.27 to 2.07 fibres/cm<sup>3</sup>.  
990 Furthermore, vacuum cleaning enclosed elevator shafts can expose employees to 0.22 fibres/cm<sup>3</sup>  
991 fibres.

### 992 **6.3.3 Scaffolders**

993 Installing or taking down scaffolding in surroundings with ACMs like flocking, false ceilings, and  
994 asbestos cement cladding exposes scaffolders to asbestos often. They have to cut roofing, puncture  
995 walls, and deal with scaffolding decks covered with asbestos dust. Exposure levels for drilling  
996 deteriorated asbestos-containing walls can go up to 14.1 fibres/cm<sup>3</sup>. Handling gear that has gathered  
997 asbestos fibres or roaming about in asbestos-contaminated areas are examples of indirect exposure  
998 usually present at the workplace.

### 999 **6.3.4 Electricians**

1000 Working on electric systems including ACMs—like electrical resistors, cable sheaths, and insulation—  
1001 exposes electricians to asbestos. Common sources of exposure include projects such as taking down,  
1002 replacing, and cleaning electrical elements in flocked regions, as well as attaching or drilling wires into  
1003 walls containing ACMs. For example, removing asbestos-insulated wires could result in exposure levels

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<sup>125</sup> INRS, 2011. Campaign to measure exposure to asbestos fibres by analytical transmission electron microscopy (TEM).

1004 ranging from 0.14 to 0.91 fibres/cm<sup>3</sup>. Pulling wires across flocked cable trays also releases fibres, which  
1005 have an exposure of 0.07 fibres/cm<sup>3</sup>.

## 1006 **6.4 How to identify asbestos in buildings, products and materials**

### 1007 **6.4.1 How to identify asbestos products**

1008 Identifying asbestos products involves a systematic approach combining historical knowledge, visual  
1009 inspection, and scientific analysis. The general approach must always be conservative, i.e. assuming  
1010 the presence of MCAs if the material is unidentified<sup>126</sup>, especially in buildings/vessels/vehicles/other  
1011 equipment (in the following referred to as “premises”) constructed or renovated before the national  
1012 asbestos ban. If there is any doubt about the presence of asbestos in a material, product or  
1013 construction, the provisions of the AWD must be followed.<sup>127</sup> For premises constructed after the  
1014 national asbestos ban, the possible presence of MCAs could still be investigated, which could be due  
1015 to illegal import, or use of secondary construction products containing asbestos. The process of  
1016 identification of MCAs typically includes the following steps:

- 1017 • Gather information regarding the premises including construction year, refurbishment history  
1018 and material types, see Section 6.5.
- 1019 • Engage a competent person with appropriate training, qualifications, and experience in  
1020 asbestos identification (see Section 6.6) to conduct thorough visual inspection(s), examining  
1021 all areas, including hidden spaces where possible, and to perform sampling and analysis of  
1022 suspect materials by accredited laboratories, see Section 6.7 and 6.8.
- 1023 • Label identified MCAs and update relevant asbestos registers, e.g. site-specific inventories,  
1024 local or national registers, see Section 6.9.

1025 While the individual steps are described in more detail in the following sections, it is important to keep  
1026 the following points in mind:

- 1027 • Recognise that even trained professionals may need time to gain *practical* experience for  
1028 comprehensive asbestos inventories.
- 1029 • Never rely solely on visual identification, as MCAs can often look identical to non-asbestos  
1030 alternatives.
- 1031 • Always document areas that could not be accessed or verified, stating any limitations of the  
1032 inventory.
- 1033 • Treat relevant asbestos inventories or registers as living documents, updating them whenever  
1034 new information becomes available or conditions change.

### 1035 **6.4.2 Who and when is responsible for the identification of asbestos and MCAs prior to 1036 demolition, maintenance and renovation?**

1037 The typical activities undertaken by different stakeholders with regard to the identification of asbestos  
1038 and MCAs vary depending on the specific context and national regulations. However, in terms of  
1039 protecting workers from occupational risks arising from exposure to asbestos dust in the workplace,  
1040 including asbestos identification and risk assessment, the responsibility lies with the employer.<sup>128</sup>

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<sup>126</sup> Directive 2009/148/EC, Article 11

<sup>127</sup> Directive 2009/148/EC, Article 11

<sup>128</sup> Directive 2009/148/EC, Article 11

#### 1041 **6.4.2.1 Triggers for identification**

1042 Asbestos and MCA identification must occur before any work begins that might disturb MCAs, e.g.  
1043 demolition, maintenance and renovation projects on premises built before the entry into force of the  
1044 Member State's asbestos ban<sup>129</sup>. However, additional situations that may trigger a materials  
1045 assessment may be, for example, the change of ownership (when it is advisable, and in some countries  
1046 mandatory, to conduct a materials assessment to inform new owners of potential asbestos related  
1047 risks), or in relation to specific national regulatory requirements (which might enforce screenings of  
1048 specific building categories by specific dates or under certain conditions).

#### 1049 **6.4.2.2 Responsibilities of main actors**

- 1050 • Employers: Employers have a duty to ensure the safety and health of workers in every aspect  
1051 related to the work<sup>130</sup>. In this context, they have the responsibility to identify and assess all  
1052 risks, including risks related to exposure to asbestos or MCAs, that their workers face. In  
1053 particular, according to Article 11 of Directive 2009/148/EC, before beginning demolition,  
1054 maintenance or renovation work on premises built before the entry into force of the Member  
1055 State's asbestos ban, employers must take all necessary steps to identify presumed materials  
1056 containing asbestos, in particular by obtaining information from the owners of premises, from  
1057 other employers and from other sources, including relevant registers. If such information is  
1058 not available, the employer must ensure an examination, by a qualified operator in  
1059 accordance with national law and practice, of the occurrence of materials containing asbestos  
1060 and must obtain the result of such examination before the start of the work. The employer  
1061 must make available to another employer, upon request and solely for the purpose of  
1062 complying with this obligation, any information obtained within the framework of such an  
1063 examination.
- 1064 • Owner of the premises: In some countries (e.g. the Netherlands), owners have an obligation  
1065 to maintain an asbestos inventory. This inventory serves as a baseline for understanding the  
1066 presence and location of MCAs in the premises.
- 1067 • Project owner/sponsor: In some countries (e.g. France), the project owner bears the  
1068 responsibility for asbestos identification before renovation or demolition work commences.

1069 Thus, in some countries, there may be multiple sources of information. One notable aspect is that self-  
1070 employed individuals may face challenges due to limited access to (or limited resources/capability to  
1071 access) asbestos information.

### 1072 **6.5 Sources of information (including information sharing)**

1073 It is important to be aware that asbestos inventories may be available from other sources, such as:

- 1074 • Premises owners or duty-holders (e.g. site-specific asbestos inventories)
- 1075 • Previous employers who have conducted work in the premises;
- 1076 • Relevant asbestos registries (e.g. national or local databases of premises known to contain  
1077 asbestos.)

1078

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<sup>129</sup> Directive 2009/148/EC, Article 11

<sup>130</sup> Directive 89/391/EEC, Article 5(1)

1079 It should be noted that national or regional legislation may have different and more stringent  
1080 requirements for triggering the screening for asbestos in buildings. For example, the Flanders region  
1081 in Belgium requires mandatory screening by private owners of buildings whenever a building is sold  
1082 and all buildings must be screened by 2032, even where there is no change in ownership.

1083 Asbestos registries are known to exist, for example, in Flanders (Belgium), the Netherlands, Italy (with  
1084 data predominantly from two regions), and Poland.

1085 In this case, employers must actively seek out this information before beginning any work that could  
1086 potentially disturb MCAs.<sup>131</sup> When existing information is unavailable, outdated or inadequate, a  
1087 thorough examination should be conducted before any demolition, maintenance, or renovation work  
1088 begins, see section 6.7.

1089 Employers must clearly inform all workers who may come into contact with MCAs.<sup>132</sup>

1090 Furthermore, employers must also make asbestos-related information available to other employers  
1091 who may be affected by the work, to ensure workers' safety.<sup>133</sup> To ensure best practice in information  
1092 sharing, clear protocols should be established for the transfer of information between parties. Some  
1093 jurisdictions may require written proof of information exchange between employers.

## 1094 **6.6 Qualified personnel**

1095 Materials assessment for the identification of MCAs require the expertise of suitably qualified  
1096 personnel<sup>134</sup>, whose qualifications requirements vary by country and must comply with national  
1097 regulations. In some Member States, such as France and Netherlands, as well as in the Flanders region  
1098 in Belgium, specific certification systems for asbestos professionals have been established,  
1099 encompassing training, examinations, and ongoing assessment. To maintain competence in this field,  
1100 regular training and updates should be provided. It is also important to recognise that even qualified  
1101 professionals may require time to gain practical experience. The development of newly qualified  
1102 professionals could be supported by implementing mentoring systems, allowing the latter to gain  
1103 experience under supervision.

## 1104 **6.7 Materials assessments**

1105 Materials assessments for the identification of MCAs, as provided for by Article 11 of the AWD, must  
1106 be conducted by qualified professionals<sup>135</sup>, see Section 6.6, and should follow established protocols  
1107 and standards (e.g. ISO 16000-32:2014 or relevant national protocols, where available). Examples of  
1108 guidance on how to perform a materials assessment for the identification of MCAs are provided in VDI  
1109 6202 Part 3:2021 (DE), HSG264 (UK), UNE 171370-2:2021 Asbestos, Part 2, UNE-EN  
1110 12467:2013+A2:2018, UNE-EN 494:1995 (Spain), NF X46-020 for buildings, NF X46-101 for ships, NF  
1111 X46-100 for industries, NF X46-102 for roads, NF P 94-001 for rocks and soils NF F 01-020 for trains  
1112 and NF L 80-001 for aircrafts (France).<sup>136</sup> Materials assessments should be based on the gathered  
1113 information about age and construction/renovation history of the premises, see Section 6.5, and  
1114 should include on the one hand thorough visual inspections of all accessible areas, and on the other

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<sup>131</sup> Directive 2009/148/EC, Article 11

<sup>132</sup> Directive 2009/148/EC, Article 17

<sup>133</sup> Directive 2009/148/EC, Article 11

<sup>134</sup> Directive 2009/148/EC, Article 11

<sup>135</sup> Directive 2009/148/EC, Article 11

<sup>136</sup> <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

1115 hand sampling of suspect materials for laboratory analysis, see Section 6.8. It is worth noting that in  
1116 the context of demolition and renovation of buildings, the so-called pre-demolition or pre-  
1117 redevelopment audit (PDA and PRA) may cover some of the same aspects of a materials assessment  
1118 for the identification of MCAs. While PDAs and PRAs have a broader scope in terms of assessed  
1119 pollutants (covering e.g. metals and organic pollutants as well) and in terms of focus (not only  
1120 identification of hazardous substances, but also identification of resources to be recovered before or  
1121 under the demolition/renovation process), PDA/PRA have a narrower field of application, as they are  
1122 only implemented before demolitions or renovations, and they have a different overall goal, that is  
1123 environmental protection (including resource recovery, waste minimization and minimization of  
1124 environmental impacts) rather than occupational health and safety.

1125 The materials assessments should document all findings, including negative results and inaccessible  
1126 areas, clearly stating any limitations or assumptions. If it cannot be univocally determined whether a  
1127 material contains asbestos, e.g. because not accessible, it must be treated as if it does (i.e.  
1128 maintenance or other disturbance work should not be carried out in these areas) until proven  
1129 otherwise by professional assessment and laboratory analysis.<sup>137</sup>

1130 The examination should be tailored to its intended use, the specific premises as well as to the specific  
1131 work to be undertaken (e.g. management survey, maintenance, refurbishment, demolition, etc.),  
1132 considering the potential for disturbance of hidden materials.

## 1133 **6.7.1 Sampling protocols**

### 1134 **6.7.1.1 Types of sampling**

1135 Sampling to identify asbestos will be in the form of bulk or soil sampling. The purpose of sampling is  
1136 to collect representative samples of suspect asbestos materials and to confirm the presence or  
1137 absence of asbestos.

1138 A description of each sampling type is provided in the following sub-sections.

1139 Sampling must be conducted by qualified personnel only<sup>138</sup> and should follow well-described  
1140 procedures such as those outlined in ISO 22262-1, HSG 264, HSG 248 and NEN 5707. Adequate risk  
1141 assessment must be carried out before sampling<sup>139</sup> (see Section 5 for more information on Risk  
1142 Assessment). Sampling personnel should wear adequate PPE and RPE, which will be based on the  
1143 outcomes of the risk assessment process.

1144 Areas to be sampled should be unoccupied, as far as is reasonably practicable, and entry should be  
1145 restricted, e.g. a notice with wording such as 'Asbestos sampling in progress: Keep out' can be used  
1146 during the sampling period (see Section 9.4.1 for examples of signage).<sup>140</sup>

### 1147 **6.7.1.2 Bulk sampling**

1148 When sampling is carried out for the whole building, samples from each type of suspect MCA should  
1149 be collected and analysed (see Sections 6.2.2 and 6.2.3 for examples of MCAs). If the material sampled  
1150 is found to contain asbestos, other similar materials used in the same way in the building can be  
1151 strongly presumed to contain asbestos. Less homogeneous materials will require a greater number of

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<sup>137</sup> Directive 2009/148/EC, Article 11

<sup>138</sup> Directive 2009/148/EC, Article 11

<sup>139</sup> Directive 2009/148/EC, Article 3(1)

<sup>140</sup> HSG 248 - HSE 2021 - Asbestos: The Analysts' Guide <https://www.hse.gov.uk/pubns/priced/hsg248.pdf>



1152 samples. The number of samples collected should be sufficient to establish whether asbestos is  
1153 present or not in the particular material(s).<sup>141</sup>

1154 Materials should be inspected for apparent differences and variation in appearance.<sup>142</sup> Variability can  
1155 be due to differences in, for example, repaired/damaged areas, colour/shade, surface  
1156 texture/roughness, sound emitted on knocking, depth, temperature and coating. Samples of about 3–  
1157 5 cm<sup>2</sup> surface area and through the entire depth of the MCA (including any backing paper) should  
1158 normally be taken with the aim of collecting one or more samples which are representative of the  
1159 whole material. Samples that do not have asbestos distributed homogeneously (e.g. textured coatings  
1160 or sprayed fireproofing) will require collection of a larger sample (minimum 10 cm<sup>3</sup>) to ensure the  
1161 sample is representative.<sup>143</sup>

1162 Repaired and replaced materials should always be sampled in addition to the original items.<sup>144</sup>  
1163 Asbestos debris and other suspect visible contamination should also be sampled.<sup>145</sup>

1164 Care should be taken to minimise disturbance to MCAs and any dust or debris that might be present.  
1165 Surfaces onto which asbestos debris may fall should be protected with a sheet of impervious material  
1166 such as polythene<sup>146</sup> which can be easily cleaned by wet-wiping or using a suitable Class H vacuum  
1167 cleaner.<sup>147</sup>

1168 Sampling should not be carried out where there is an electrical hazard or if it will damage the critical  
1169 integrity of a roof, gutter, pipe etc.<sup>148</sup>

### 1170 6.7.1.3 Soil sampling

1171 Asbestos in soil and made ground is likely  
1172 to be variable and unpredictable.  
1173 Samples may consist of MCA debris and  
1174 asbestos fibres surrounded and encased  
1175 in soil and may be mixed in with  
1176 vegetation, stones, bricks, crushed  
1177 building rubble and other materials.  
1178 Therefore, obtaining a representative  
1179 sample can be very difficult. The number  
1180 of samples should reflect the  
1181 quantity/size and the extent of likely  
1182 variation within the material or

#### Box 6.2: Example of an approach to sampling<sup>149</sup>

- **Identify materials suspected of containing asbestos (MCAs)** before starting work.
- Ensure materials are **tightly bound** to prevent the release of fibers.
- Establish clear **processes to ensure traceability** of materials and actions.
- Determine **preventive actions** based on collected and analysed data.
- Install **windows around work areas** to allow external monitoring of the worksite.
- Implement systems for the **selection and management of respiratory protective devices**.

<sup>141</sup> ISO 22262-1:2012 Air quality — Bulk materials Part 1: Sampling and qualitative determination of asbestos in commercial bulk materials

<sup>142</sup> HSG 264 – HSE 2012 - Asbestos: The survey guide <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

<sup>143</sup> ISO 22262-1:2012 Air quality — Bulk materials Part 1: Sampling and qualitative determination of asbestos in commercial bulk materials

<sup>144</sup> HSG 264 – HSE 2012 - Asbestos: The survey guide <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

<sup>145</sup> HSG 264 – HSE 2012 - Asbestos: The survey guide <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

<sup>146</sup> HSG 248 - HSE 2021 - Asbestos: The Analysts' Guide <https://www.hse.gov.uk/pubns/priced/hsg248.pdf>

<sup>147</sup> ISO 22262-1:2012

<sup>148</sup> HSG 264 – HSE 2012 - Asbestos: The survey guide <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

<sup>149</sup> INRS (2011). Asbestos exposure measurement investigation using analytical transmission microscopy (ATEM).



1183 product.<sup>150</sup> Other materials (e.g. rubble) may need to be removed to see what is behind, before taking  
1184 samples.

1185 For depth materials assessments looking for visible asbestos, the material from a trench or hole can  
1186 be excavated and spread out on the surface (or a plastic sheet). The material removed can then be  
1187 inspected visually by digging and raking through the soil from sequential depths to look for suspected  
1188 MCAs. A depth profile of the asbestos content can be built up from the successive excavations.

1189 For smaller asbestos fragments it is usually possible to examine only a very small area (or volume) of  
1190 the site. To do this, representative soil samples have to be collected and sent for laboratory analysis.  
1191 In practice, it is normally practicable to collect representative soil samples from ~1 m<sup>2</sup> areas, and by  
1192 coning and quartering to collect at least a 1 litre representative sample for laboratory analysis. Usually  
1193 the top 1–2 cm of soil is sampled for a surface materials assessment. For a depth materials assessment,  
1194 successive soil profiles are sampled, which may be of 1–50 cm depth, depending on the method used.

### 1195 **6.7.1.3.1 Strategies for Soil Sampling**

1196 The strategy for sampling soil for analysis can encompass diverse phases such as:<sup>151</sup>

- 1197 **1. Preliminary Study (1st Phase):**
  - 1198 ○ Bibliographical analysis of data (e.g., lithology).
  - 1199 ○ Examination of the composition (mineralogy), structure, and coherence of materials  
1200 and soils present.
- 1201 **2. Defining Study Objectives (2nd Phase):**
  - 1202 ○ Establishing the objectives of the study and the expected levels of information.
  - 1203 ○ Determining the parameters to be analyzed.
- 1204 **3. Study Plan Development (3rd Phase):**
  - 1205 ○ Drawing up the study plan.
- 1206 **4. Field Sampling (4th Phase):**
  - 1207 ○ Implementing the sampling plan in the field.
- 1208 **5. Sample Handling (5th Phase):**
  - 1209 ○ Packaging and dispatching the samples to the laboratory.

## 1210 **6.7.2 Contextual information**

1211 All samples should be individually sealed in their own container or a sealable polythene bag which is  
1212 then sealed in a second container or polythene bag.<sup>152</sup> The outermost container should be labelled as  
1213 potentially containing asbestos. Whenever a sample is collected, it should be labelled with a unique  
1214 identifier that is also recorded in the materials assessment documentation, records and site plans so  
1215 that the sample origin can be traced back.<sup>153</sup> The sampling position at the site may also be labelled  
1216 with the same identifier.

1217 **Example of good practice showing labelling of samples and on-site.**

1218 Visual records such as marked-up plans and/or photographic records showing the location and extent  
1219 of the sample are also effective ways of recording the sampling position and the location of the MCAs.

<sup>150</sup> HSG 248 - HSE 2021 - Asbestos: The Analysts' Guide <https://www.hse.gov.uk/pubns/priced/hsg248.pdf>

<sup>151</sup> Lahondère D., Cagnard F., Wille G., Duron J., Hertout A. (2021) - L'amianté dans l'environnement naturel : Éléments de compréhension et d'aide à l'identification et à la caractérisation. Final report, BRGM/RP-70343-FR, 157 p., 31 figs, 33 pls, 6 tabs, 1 ann.

<sup>152</sup> HSG 248 - HSE 2021 - Asbestos: The Analysts' Guide <https://www.hse.gov.uk/pubns/priced/hsg248.pdf>

<sup>153</sup> HSG 264 – HSE 2012 - Asbestos: The survey guide <https://www.hse.gov.uk/pubns/priced/hsg264.pdf>

1220 For large-scale materials assessments, such as those involving soil sampling, maps can be used to plan  
1221 the materials assessment and to record the position, amount (e.g. number of MCA fragments and/or  
1222 surface area of the MCAs found per square metre) and a description of the forms of the MCAs found.

## 1223 **6.8 Sample analysis**

### 1224 **6.8.1 Accreditation**

1225 Some Member States (e.g. Greece, Ireland, Portugal, and Slovenia) recommend that surveyors and  
1226 laboratories used for collection and analysis of samples are accredited to ISO/IEC 17025. This  
1227 accreditation requires the surveyor or laboratory to demonstrate that they operate competently and  
1228 generate valid results, thereby promoting confidence in their results. The accreditation covers  
1229 organisation, quality systems, control of records, personnel, accommodation and environmental  
1230 conditions, test and calibration methods, method validation, equipment, handling of test and  
1231 calibration items, and reporting results.

1232  
1233 The responsibility to ensure analysis is conducted by suitably competent laboratories, such as  
1234 following ISO/IEC 17025 or other relevant standards, is placed on those who commission the work (i.e.  
1235 the employer).

### 1236 **6.8.2 Analysis**

1237 Asbestos is identified in bulk and soil samples described above by polarised light microscopy (PLM)  
1238 using methods outlined in documents such as ISO 22262-1, HSG248 and NEN 5896. With careful  
1239 application of this method, a single fibre may be found in a few milligrams of dispersed material.

1240 Briefly, after preparing a sub-sample, these are analysed under a stereo-microscope using tweezers  
1241 and probe to find and isolate fibres. Any fibres identified are extracted, mounted in matching  
1242 refractive index (RI) liquid, and analysed further by PLM. If no fibres are identified, a further random  
1243 sub-sample is taken to confirm no asbestos is present. To identify asbestos by PLM a number of optical  
1244 properties must be assessed as the optical properties viewed will depend on fibre type and particle  
1245 orientation.

1246 The PLM method is suitable for most MCAs and can distinguish between asbestos fibres and elongate  
1247 mineral fragments or other materials in almost all situations. However, difficulties may occur in:

- 1248 • identifying fibres below about 1 µm width;
- 1249 • distinguishing between tremolite and actinolite or between tremolite and anthophyllite.

1250 In such cases, electron microscopy (EM) with energy dispersive X-ray analysis (EDXA) and/or electron  
1251 diffraction techniques, X-ray diffraction or infra-red spectroscopy can be used to provide additional  
1252 information.

1253 In some Member States (e.g. France), due to the limitations of the PLM method to identify thin fibres,  
1254 EM methods are mandatory depending on the sample type.

1255 A potential approach may involve performing EM analysis on non-friable organically bound (NOB)  
1256 materials and some naturally containing asbestos materials (e.g. talc and vermiculite), where PLM  
1257 analysis has provided a negative result. This is because these materials often contain small, thin fibres  
1258 that may not be detected by PLM. Therefore, to increase the sensitivity and reliability of the result,  
1259 EM methods should be used.

1260 Example of good practice where EM methods are used as routine to supplement PCM analysis.

## 1261 **6.9 Documentation**

1262 While employers must identify MCAs via existing information or via an examination and must make  
1263 such information available to other employers<sup>154</sup>, detailed documentation of the presence, location,  
1264 type and condition of MCAs via e.g. a site-specific asbestos inventory should be maintained. This  
1265 inventory should incorporate all materials assessment findings, including sampling locations and  
1266 laboratory results, as well as records of risk assessments, asbestos management plans and any  
1267 remedial actions taken.

1268 The documentation should be clear, accessible to all relevant parties (including workers, contractors,  
1269 etc.), and regularly updated to reflect any changes in the building's condition or use. Where  
1270 appropriate, photographs and diagrams should be included to support identifying MCAs. These  
1271 records should be retained for the lifespan of the building or as required by national regulations.

1272 The use of digital documentation systems could facilitate easy updating and access to available  
1273 documentation.

1274 The documentation should include:

- 1275 1. A comprehensive inventory of all identified or presumed MCAs
- 1276 2. Detailed location information, including building plans where possible
- 1277 3. The condition of the MCAs and any risk assessment outcomes
- 1278 4. Results of air monitoring, where applicable
- 1279 5. Details of any encapsulation, removal, or remediation work carried out
- 1280 6. A schedule for regular re-inspections and updates

1281 The level of detail in the documentation should be proportionate to the size and complexity of the  
1282 building or site, but should always be sufficient to enable effective ongoing management of asbestos  
1283 risks.

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<sup>154</sup> Directive 2009/148/EC, Article 11

1284

## 7 Air exposure measurement

1285

### 7.1 Introduction

1286 Air exposure measurement serves  
1287 several important purposes within the  
1288 framework of preventing and controlling  
1289 occupational exposure to asbestos:

1290 • Supporting current and future  
1291 risk assessments.

1292

1293 • Ensuring compliance with the  
1294 occupational exposure limit  
1295 (OEL) for asbestos (see Box 7.1).  
1296

1297 • Validating that the exposure  
1298 minimisation requirement is  
1299 being complied with (see Box  
1300 7.1).  
1301

1302 • Designing and validating that the  
1303 control measures in place are  
1304 effective in controlling exposure  
1305 to asbestos. Verifying of the  
1306 correct selection of respiratory  
1307 protective equipment (RPE).  
1308

1309 • Identifying incidents and lapses  
1310 in control procedures, both with  
1311 regard to the exceedance of the  
1312 OEL (see Box 7.1) and incidents  
1313 leading to very high exposure.  
1314

1315 • Verifying the effectiveness of decontamination.  
1316

1317 • Identifying workers subject to passive and secondary exposure (see Section 8 on passive and  
1318 secondary exposure).

### 7.2 Respirable fibre definition

1320 The respirable fibre definition is as follows: fibres with a length of more than 5 micrometres, a breadth  
1321 of less than 3 micrometres and a length/breadth ratio greater than 3:1.<sup>155</sup>

1322 With respect to one of the two OEL options to be followed from 21<sup>st</sup> December 2029 (see Section 7.3),  
1323 fibres with a breadth of less than 0.2 micrometres must also be taken into consideration for one of

#### Box 7.1: Objectives of air exposure measurement

Article 6 of Directive 2009/148/EC:

[...] the exposure of workers to dust arising from asbestos or materials containing asbestos at the place of work shall be reduced to a minimum and in any case to as low a level as is technically possible below the relevant limit value as laid down in Article 8 [...]

Article 7(1) of Directive 2009/148/EC:

Depending on the results of the initial risk assessment, and in order to ensure compliance with the relevant limit value as laid down in Article 8, the measurement of asbestos fibres in the air at the place of work shall be carried out at regular intervals during specific operational phases.

Article 10 of Directive 2009/148/EC:

Where the relevant limit value as laid down in Article 8 is exceeded, or if there is reason to believe that materials containing asbestos which are not identified prior to the work have been disturbed so as to generate dust, work shall stop immediately.

Work shall not be continued in the affected area until adequate measures have been taken for the protection of the workers concerned.

Where the relevant limit value as laid down in Article 8 is exceeded, the reasons for the limit value being exceeded shall be identified and appropriate measures to remedy the situation shall be taken as soon as possible.

<sup>155</sup> Directive 2009/148/EC, Article 7(7)

1324 the two OEL option from 21 December 2029.<sup>156</sup> This extension to the respirable fibre definition is in  
1325 recognition that thin asbestos fibres are also harmful to health<sup>157</sup> and should hence be included in OEL  
1326 measurements.

1327 A lower limit for fibre breadth is not set in Directive 2009/148/EC. Some countries have a defined  
1328 breadth range of “thin asbestos fibres” e.g. France who describe thin fibres as those with diameter  
1329 between 0.01 and 0.2 µm.<sup>158</sup> In a study conducted by INRS, the impact of not including thin fibres in  
1330 the TEM analysis of air samples is well described.<sup>159</sup> Consideration of defined fibre breadth limits of  
1331 thin fibres should be taken into account based on available information in your member state.

### 1332 7.3 Exposure limits

1333 The exposure of workers to dust arising  
1334 from asbestos or materials containing  
1335 asbestos at the place of work must be  
1336 reduced to a minimum and in any case to  
1337 as low a level as is technically possible  
1338 below the limit values in Box 7.2.<sup>162</sup>

<b>Box 7.2: Objectives of air exposure measurement</b>
Article 8 of Directive 2009/148/EC:
<ul style="list-style-type: none"><li>• Until 20 December 2029, employers must ensure that no worker is exposed to an airborne concentration of asbestos in excess of 0.01 fibres per cm<sup>3</sup> as an 8-hour time-weighted average (TWA).<sup>160</sup></li><li>• From 21 December 2029, employers must ensure that no worker is exposed to an airborne concentration of asbestos in excess of:<sup>161</sup></li><li>• 0.01 fibres per cm<sup>3</sup> as an 8-hour TWA where measurement includes fibres with a breadth of less than 0.2 micrometres; or</li><li>• 0.002 fibres per cm<sup>3</sup> as an 8-hour TWA.</li></ul>

### 1339 7.4 Air sampling

#### 1340 7.4.1 Purpose of air sampling

1341 Air sampling involves the collection of  
1342 particulates from a measured volume of  
1343 air by drawing the air through a suitable  
1344 filter using a sampling head attached to a  
1345 pump. The filter is examined by microscopy over a known area and the number of airborne fibres  
1346 determined. The quantitative measurement of the fibres present is referred to as the airborne  
1347 respirable fibre concentration.

1348  
1349 Any activity likely to involve a risk of exposure to dust arising from asbestos or materials containing  
1350 asbestos must have the risk assessed in such a way as to determine the nature and degree of the  
1351 workers’ exposure to dust arising from asbestos or materials containing asbestos.<sup>163</sup> Further,  
1352 depending on the results of this initial risk assessment (see Section 5), and in order to ensure  
1353 compliance with the relevant OEL (see Section 7.3), the measurement of asbestos fibres in the air at

<sup>156</sup> Directive 2009/148/EC, Article 7(7)

<sup>157</sup> RAC (2021): Opinion on scientific evaluation of occupational exposure limits for Asbestos.  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Final\\_Opinion\\_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Final_Opinion_en.pdf/cc917e63-e0e6-e9cd-86d2-f75c81514277?t=1626256168788) and  
[https://echa.europa.eu/documents/10162/7937606/OEL\\_asbestos\\_Annex1\\_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202](https://echa.europa.eu/documents/10162/7937606/OEL_asbestos_Annex1_en.pdf/ea272703-e495-8846-ae8c-ec2e4fc85f9f?t=1626256203202)

<sup>158</sup> The French National Institute for Research and Safety (INRS) (2011). Asbestos exposure measurement investigation using analytical transmission electron microscopy (ATEM)

<sup>159</sup> The French National Institute for Research and Safety (INRS) (2011). Campaign to measure exposure to asbestos fibres by analytical transmission electron microscopy (TEM)

<sup>160</sup> Directive 2009/148/EC, Article 8(1)

<sup>161</sup> Directive 2009/148/EC, Article 8(2)

<sup>162</sup> Directive 2009/148/EC, Article 6

<sup>163</sup> Directive 2009/148/EC, Article 3(2)

1354 the place of work must be carried out at regular intervals during specific operational phases (see  
1355 Section 7.4.3 for further discussion).<sup>164</sup> An example of a tool that can be useful for a first indication of  
1356 the potential asbestos dust levels as a part of the initial risk assessment is the Scol@miante tool used  
1357 in France.<sup>165</sup>

#### 1358 **7.4.2 Who is responsible for exposure assessment?**

1359 Employers are responsible for exposure assessment. Employers must ensure that no worker is  
1360 exposed to an airborne concentration of asbestos in excess of the relevant OEL.<sup>166</sup> This may require  
1361 the employer to work together with the building owner to ensure they are aware of the presence and  
1362 condition of any asbestos in the building.

#### 1363 **7.4.3 When to carry out exposure assessment?**

1364 When to carry out air sampling may depend upon the intended purpose of air exposure measurement  
1365 (see Section 7.1). The measurement of asbestos fibres in the air must be carried out as required  
1366 depending on the results of the initial risk assessment.<sup>167</sup> If any significant changes are made to the  
1367 workplace factors an assessment should be made to determine if renewed air sampling is required.<sup>168</sup>

#### **Box 7-2: Example of less frequent air monitoring (case study)**

**Example:** Asbestos analysis laboratory. This workplace has constant conditions, i.e. the same activities are typically conducted, involving the same equipment, same place of work with the same level of ventilation and other control measures.

**Summary:** To ensure analysts are not exposed to asbestos fibres during their work, air monitoring of staff carrying out this work is monitored six-monthly by an appropriately trained member of staff. Results are reported to the individual and their manager, who then keeps a record of results. Any results showing evidence of exposure to asbestos fibres is reported to the company's Health & Safety Adviser and an investigation into the reason for the exposure is conducted. Following the completion of the investigation, suitable communication and refresher training is provided to all staff working in the laboratory.

1368

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<sup>164</sup> Directive 2009/148/EC, Article 7(2)

<sup>165</sup> <https://scolamiante.inrs.fr/Scolamiante/>

<sup>166</sup> Directive 2009/148/EC, Article 8

<sup>167</sup> Directive 2009/148/EC, Article 7(1)

<sup>168</sup> EN 689:2018



1369 **7.4.4 How to carry out exposure assessment and air sampling of environments suspect of**  
1370 **containing asbestos?**

1371 Air sampling must reflect the personal  
1372 exposure of the worker to dust arising from  
1373 asbestos or materials containing asbestos.<sup>169</sup> It  
1374 must also be carried out after consultation of  
1375 the workers and/or their representatives  
1376 within the undertaking or establishment.<sup>170</sup>

1377 Sampling must be carried out by suitably  
1378 qualified personnel<sup>171</sup> who are sufficiently  
1379 trained and experienced in occupational  
1380 hygiene principles. In some Member States  
1381 (e.g. Ireland) it is a requirement that this  
1382 person possesses specific qualifications. The  
1383 EN 689 standard describes a strategy for  
1384 testing compliance with occupational exposure  
1385 limit values, this is also applicable to inhalation  
1386 exposure of asbestos fibres. As outlined in this  
1387 standard, 3-5 valid measurements on workers belonging to a similar exposure group (SEG) are  
1388 required for the preliminary test to determine compliance with the OEL and  $\geq 6$  valid measurements  
1389 to provide statistical evaluation of the results.

1390 The duration of sampling must be such that representative exposure can be established for an 8-hour  
1391 reference period (one shift) by means of measurements or time-weighted calculations.<sup>172</sup> A time-  
1392 weighted calculation refers to the average air concentration over a continuous period (in this case 8-  
1393 hours). If the sampling time is less than 8-hours, an assumption is made on the likely exposure for the  
1394 remaining time to provide an 8-hour time-weighted average.<sup>173</sup> The time sampled may also have an  
1395 effect on the sensitivity that is possible for the subsequent filter analysis, as this is directly correlated  
1396 with the volume of air sampled (see Section 7.5.2 for more details on sensitivity).

1397 Alternative documents may be available in your Member State that address all required aspects of air  
1398 sampling on membrane filters to determine the concentration in number of fibres by microscopy  
1399 techniques, such as French Standard NF X 43-269.<sup>174</sup>

1400 Analysis of samples must be performed by suitably competent laboratories equipped for fibre  
1401 counting (see Section 7.8.1 for further discussion on laboratory requirements).<sup>175</sup>

1402

**Box 7.3: How to carry out air concentration measurement.**

Article 7 of Directive 2009/148/EC:

(2) Sampling shall reflect the personal exposure of the worker to dust arising from asbestos or materials containing asbestos.

(3) Sampling shall be carried out after consultation of the workers and/or their representatives within the undertaking or establishment.

(4) Sampling shall be carried out by suitably qualified personnel. The samples taken shall be subsequently analysed, in accordance with paragraph 6, in laboratories equipped for fibre counting.

(5) The duration of sampling shall be such that representative exposure can be established for an 8-hour reference period (one shift) by means of measurements or time-weighted calculations.

<sup>169</sup> Directive 2009/148/EC, Article 7(2)

<sup>170</sup> Directive 2009/148/EC, Article 7(3)

<sup>171</sup> Directive 2009/148/EC, Article 7(4)

<sup>172</sup> Directive 2009/148/EC, Article 7(5)

<sup>173</sup> HSG 248

<sup>174</sup> French Standardization Association (AFNOR) (2017). Air quality - Workplace air - Sampling on membrane filter to determine the concentration in number of fibres by microscopy techniques: MOCP, MEBA and META - Counting by MOCP

<sup>175</sup> Directive 2009/148/EC, Article 7(4)



#### Box 7-4: Example of how to define the level of dust in a process (case study)

The French National Institute for Research and Safety (INRS) provide guidance on how to define the level of dust in a process.<sup>176</sup>

##### Test Site

The test site is the initial location where dust suspected of containing asbestos is assessed. This assessment aims at sampling potential MCAs, evaluating treatment techniques, or implementing emission reduction measures at the source. The evaluation at the test site should be conducted when the process is first implemented to verify the preliminary estimation of asbestos concentration in the dust. This site serves as a means to validate the results from the initial estimation. Periodic testing of the test site is suggested, with at least three inspections conducted over a twelve-month period to ensure ongoing accuracy and effectiveness.

##### Validation

If the dust levels measured at the test site align with the estimated values, the employer should proceed with additional validation under the same conditions as those at the test site, except in specific cases, as outlined below:

**Scenario 1:** If the dust levels at the test site and the three validation sites are consistent, this finding is recorded in risk assessment documentation. The company must then conduct periodic monitoring to ensure a minimum of three results are collected over a 12-month period.

**Scenario 2:** If the dust level at any of the validation sites is lower than that of the test site, the process is still classified at the highest dust level recorded.

#### 1403 7.4.5 Equipment necessary for air sampling collection

1404 The following equipment is necessary for carrying out air monitoring. Once sampling is complete,  
1405 suitable decontamination procedures should be followed for all equipment (see Section 13.5.3).

##### 1406 7.4.5.1 Sampling head

1407 To comply with the analytical methodologies described in Section 7.5.1, an open-faced filter holder  
1408 fitted with an electrically conducting cylindrical cowl and exposing a circular area of filter at least 20  
1409 mm in diameter should be used for sampling. The cowl is pointed downwards during sampling.  
1410 Sampling is taken from the breathing zone of a worker, outside of any PPE/RPE. Flexible tubing is  
1411 required to connect the filter holder to the pump, and a cap or bung is needed for the cowl entrance  
1412 to protect the filter from contamination during transport. Different filter diameters and shorter cowls  
1413 can be used if they are shown to give comparable results but must be measured to determine the  
1414 effective filter area.

##### 1415 7.4.5.2 Filters

1416 Filter types depend on the subsequent analysis method:

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<sup>176</sup> The French National Institute for Research and Safety (INRS) (2020). Asbestos: defining the level of dust in a process "Subsection 3"

- 1417 • Phase contrast microscopy (PCM) - Membrane filters should be of mixed esters of cellulose or  
1418 cellulose nitrate, and pore size 0.8 to 1.2 µm (optically clear grade).<sup>177</sup> Preferably the filter  
1419 should be 25 mm in diameter (minimum 20 mm) with a printed grid.
- 1420 • Scanning electron microscopy (SEM) – Polycarbonate filters, maximum nominal pore size 0.8  
1421 µm. A gold coating is applied to the filter using either a vacuum evaporator or a sputter-  
1422 coating unit. The gold coating shall be approximately 30 nm thick applied to the shiny side of  
1423 the filter.<sup>178</sup>
- 1424 • Transmission electron microscopy (TEM) – Filters of size 25 – 50 mm diameter. Polycarbonate  
1425 filter with maximum nominal pore size 0.4 µm or Mixed Ester Cellulose (MEC) or cellulose  
1426 nitrate filter with a pore size of 0.45 µm.<sup>179</sup>

### 1427 **7.4.5.3 Pumps**

1428 The pump should be capable of:<sup>180</sup>

- 1429 • giving a smooth airflow;
- 1430 • having flow set to within ±10% for flow rates ≤2 litres.min<sup>-1</sup> and within ±5% for flow rates >2  
1431 litres.min<sup>-1</sup>;
- 1432 • maintaining this flow rate during the period of sampling.

1433 These values include any change of flow rate with pump orientation. If the flowrate varies by more  
1434 than ±10% during the period of sampling the sample should be marked as invalid.<sup>181</sup> For personal  
1435 sampling the pump should be light and portable, and capable of being fitted to a belt, harness or  
1436 carried in a pocket. Care should be taken to ensure the pump used is safe for use in the working  
1437 environment (e.g. in potentially explosive environments or when high temperatures are  
1438 encountered). The pump's battery should have sufficient power to operate within the specified flow  
1439 limits for the duration of the measurement. If pumps for static samples are operated by mains  
1440 electricity, regard should be given to appropriate safety precautions. Static sampling pumps should  
1441 have the facility to enable the sampling head to be positioned 1–2 m above ground level.<sup>182</sup> In some  
1442 Member States, it may also be common practice to use high volume non-portable pumps with a long  
1443 flexible tubing to connect the pump to the workers breathing zone, particularly when monitoring  
1444 short-term tasks as these pumps allow larger volumes of air to be sampled.<sup>183</sup> If following these  
1445 methods, care should be taken to ensure that tubing does not cause any further hazards (e.g. trip  
1446 hazard).

1447 Flow rate of the pump should be measured by a working flow meter, sufficiently sensitive to be  
1448 capable of measuring the appropriate flow rate to within the values specified above, and which has  
1449 been calibrated against a primary standard.<sup>184</sup>

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<sup>177</sup> HSE 2021 - HSG248

<sup>178</sup> ISO 14966:2019 Ambient air — Determination of numerical concentration of inorganic fibrous particles — Scanning electron microscopy method

<sup>179</sup> ISO 10312:2019

<sup>180</sup> HSE 2021 - HSG248

<sup>181</sup> ISO 14966:2019

<sup>182</sup> HSE 2021 - HSG248

<sup>183</sup>TNO 2021 - R12180 [https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos\\_TNO-R12180-Nov-2021.pdf](https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos_TNO-R12180-Nov-2021.pdf)

<sup>184</sup> HSE 2021 - HSG248

## 1450 7.5 Sample analysis

### 1451 7.5.1 Analytical methodologies for the assessment of asbestos in samples

1452 For the purpose of measuring asbestos fibres in the air, fibres that fall within the respirable fibre  
1453 definition (see Section 7.2) are taken into consideration.<sup>185</sup>

1454  
1455 Fibre counting must be carried out by electron microscopy or by any alternative method that provides  
1456 equivalent or more accurate results.<sup>186</sup>

1457  
1458 Currently, the methods used to determine airborne respirable fibre concentration include:

- 1459 • PCM e.g. following WHO 1997 method
- 1460 • SEM e.g. following ISO 14966
- 1461 • TEM e.g. following ISO 10312 (direct method) or ISO 13794 (indirect method)

1462  
1463 Advantages and disadvantages of each method are provided in Table 7-1.

1464  
1465 The minimum breadth of fibres that is possible to include in measurements will be defined by the  
1466 measurement technique chosen as each will have different technical limitations. This should be  
1467 considered when choosing a suitable measurement technique.

1468  
1469 If measuring to the requirements of the defined OEL options (see Section 7.3), the PCM method will  
1470 no longer be suitable from 21 December 2029. However, it is reasonable that the PCM method can  
1471 still be used for measurements on building/demolition sites to check asbestos levels more frequently  
1472 or to obtain faster warnings of situations where there is an unexpected significant increase in  
1473 concentrations, as long as EM methods (or other methods capable of providing equivalent or more  
1474 accurate results) are used to demonstrate compliance with the OEL.

1475  
1476 Please refer to national legislation for further details about which method is regarded most  
1477 appropriate in your Member State.

1478

**Table 7-1: Advantages and disadvantages of PCM, SEM and TEM**

	Advantages	Disadvantages
PCM	<ul style="list-style-type: none"><li>• Provides an index of exposure</li><li>• Images in real time</li><li>• Portable and robust</li><li>• Analysis can happen on site</li><li>• Quick results</li><li>• Simple sample prep</li><li>• Low initial cost</li><li>• Maintenance costs low</li><li>• No significant energy requirement</li><li>• Large amount of historical data to refer to</li></ul>	<ul style="list-style-type: none"><li>• Only fibres greater than 0,2 µm breadth visible</li><li>• Cannot differentiate different fibre types</li></ul>

<sup>185</sup> Directive 2009/148/EC, Article 7(7)

<sup>186</sup> Directive 2009/148/EC, Article 7(6)

**Table 7-1: Advantages and disadvantages of PCM, SEM and TEM**

	Advantages	Disadvantages
<b>SEM</b>	<ul style="list-style-type: none"> <li>All asbestos fibres possible to be visible</li> <li>Can use Energy Dispersive X-ray Analysis (EDX) to provide elemental composition of fibres to differentiate between different fibres and non-asbestos</li> <li>Quick sample prep</li> </ul>	<ul style="list-style-type: none"> <li>Very thin fibres will require high-quality image (increasing analysis time)</li> <li>Not portable (benchtop available but unlikely suitable to on-site)</li> <li>Samples must be sent to labs for analysis</li> <li>More complex equipment more susceptible to breakdowns</li> <li>Much more costly</li> <li>Additional costs from energy consumption, service contracts, replacement parts etc.</li> <li>Cannot compare data to historic PCM data</li> </ul>
<b>TEM</b>	<ul style="list-style-type: none"> <li>All asbestos fibres clearly visible in real time</li> <li>Can use EDX to provide elemental composition of fibres to differentiate between different fibres and non-asbestos</li> <li>Can use Selected Area Electron Diffraction (SAED) to give information on crystal structure</li> </ul>	<ul style="list-style-type: none"> <li>Not portable</li> <li>Samples must be sent to labs for analysis</li> <li>More complex equipment more susceptible to breakdowns</li> <li>Sample prep more difficult</li> <li>Much more costly</li> <li>Additional costs from energy consumption, service contracts, replacement parts etc.</li> <li>Cannot compare data to historic PCM data</li> </ul>

1479 **7.5.2 Limit of quantification (LoQ)**

1480 The limit of quantification (LoQ) of a measurement technique is the lowest concentration that can be  
 1481 measured with certainty using the standard methodology.<sup>187</sup> Methods with a low LoQ are often  
 1482 regarded as being very sensitive.

1483 The sensitivity of a method is a measure of how well the test can identify a positive result, and for  
 1484 analysis of asbestos fibres in air samples this depends on:

- 1485 • Filter deposit area, typically a set value as 25 – 50 mm filters used
- 1486 • Air volume sampled (correlated to both flow rate and sampling time)
- 1487 • Analysed surface

1488 The last two points have the possibility to be varied to allow suitable sensitivity. It is also worth noting  
 1489 that the PCM method cannot specifically identify asbestos, as such the fibre count will include other  
 1490 types of fibre and elongated particles that meet the shape and size criteria (e.g. organic, machine-  
 1491 made mineral fibres (MMMMF); mineral cleavage fragments).

1492 **7.5.2.1 Air volume sampled**

1493 In order to achieve low air fibre detection limits, equivalent to air concentrations  $\leq 0.01$  fibres/cm<sup>3</sup>, it  
 1494 is recommended to sample the largest possible volume of air and, in no case, less than 480 litres.<sup>188</sup> In  
 1495 practice, relatively low sample volumes are collected to prevent overloading of the filter when  
 1496 sampled in dusty environments. If sampling in a dusty environment it could be possible to use a bigger

<sup>187</sup> EFSA  
[https://www.efsa.europa.eu/en/glossary/loq#:~:text=The%20limit%20of%20quantification%20\(LOQ,with%20certainty%20using%20standard%20tests](https://www.efsa.europa.eu/en/glossary/loq#:~:text=The%20limit%20of%20quantification%20(LOQ,with%20certainty%20using%20standard%20tests)

<sup>188</sup> INSST 2022 <https://www.insst.es/documentacion/catalogo-de-publicaciones/guia-tecnica-para-la-evaluacion-y-prevencion-de-los-riesgos-relacionados-con-la-exposicion-al-amianto-ano-2022>

1497 filter (e.g. 47 mm rather than the usual 25 mm) or take successive shorter measurements and combine  
1498 these into a collective result. Alternatively, overloaded samples can be treated to remove other  
1499 components of the dust e.g. by plasma ashing to remove organic material, rinsing with dilute HCl to  
1500 remove salts or by resuspending in water and filtering to remove inorganic dust.<sup>189</sup> However, such  
1501 techniques increase the risk of errors or contamination of the sample.

### 1502 **7.5.2.2 Analysed surface**

1503 To increase sensitivity of the EM methods a greater amount of filter surface can be analysed. However,  
1504 in doing this, the time taken for analysis will increase, and therefore so will the cost. Future  
1505 advancement looks to include automation in the analysis by EM, which would assist in increasing the  
1506 number of fields counted and as a result the efficiency of these methods. Automated, AI-assisted  
1507 microscopy and energy dispersive X-ray (EDX) analysis will enable laboratories to evaluate a larger  
1508 part or even all of the filter at much lower effort compared with a human analyst.<sup>190</sup>

## 1509 **7.6 Documentation**

1510 The report detailing air sampling results should contain various contextual information such as details  
1511 of the appraiser and institution who took the measurements, purpose of the assessment, name and  
1512 address of premises, details of workplace factors and working conditions (including all control  
1513 measures in place and their use), date and time of sampling, measuring procedure, equipment used,  
1514 and any observations made during monitoring.<sup>191</sup>

1515 The report should then go on to describe the exposure results, with comparison to a relevant OEL (see  
1516 Section 7.3), and details of quality assurance.<sup>192</sup> The results obtained by EM methods should be  
1517 reported with the upper and lower 95% confidence limits, using protocols such as those described in  
1518 their relevant ISO methods.<sup>193</sup>

1519 Finally, reference to any accreditation held by the appraiser and institution who took and analysed  
1520 the measurements is typically also provided in the report (see Section 7.8.1 for further discussion on  
1521 accreditation requirements).

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<sup>189</sup>TNO 2021 - R12180 [https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos\\_TNO-R12180-Nov-2021.pdf](https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos_TNO-R12180-Nov-2021.pdf)

<sup>190</sup>TNO 2021 - R12180 [https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos\\_TNO-R12180-Nov-2021.pdf](https://perosh.eu/wp-content/uploads/2022/06/Memorandum-Measuring-Methods-Asbestos_TNO-R12180-Nov-2021.pdf)

<sup>191</sup> EN 689:2018

<sup>192</sup> EN 689:2018

<sup>193</sup> ISO 14966 (SEM direct method), ISO 10312 (TEM direct method) or ISO 13794 (TEM indirect method)

1522 Employers must keep a register of  
1523 workers that are or may be exposed in  
1524 the course of their work to dust arising  
1525 from asbestos or MCAs, which must  
1526 indicate the exposure to which they  
1527 have been subjected.<sup>194</sup>

1528 The full air exposure measurement  
1529 report, including details of any  
1530 subsequent remedial action, should be  
1531 kept on file and used for further risk  
1532 assessment review. Details of worker  
1533 personal exposure results should be  
1534 discussed with the worker after the  
1535 sample is collected. This information  
1536 should be provided to the worker when  
1537 employment ends.

## 1538 **7.7 Direct-reading** 1539 **instruments**

1540 Direct-reading instrumentation allows exposure to be monitored in real-time, providing information  
1541 about variation in the exposure with respect to time, location and worker. These instruments can be  
1542 an excellent tool to provide continuous monitoring of air and can therefore be used as an early  
1543 indicator of exposure.

1544 However, direct-reading instruments suffer from a lack of specificity (i.e. cannot confirm asbestos,  
1545 only presence of fibres) and often have high limits of detection (i.e. the lowest concentration that can  
1546 be measured). There is also concern that they cannot detect thin fibres. Despite being portable, they  
1547 are typically large in size often making them difficult to manoeuvre and unsuitable as personal  
1548 monitors.

## 1549 **7.8 Quality assurance and quality control**

### 1550 **7.8.1 Sample and analysis accreditation**

1551 Some Member States (e.g. Ireland, Greece, Portugal, Slovenia, the Netherlands) recommend that  
1552 surveyors and laboratories used for collection and analysis of samples are accredited to ISO/IEC 17025.  
1553 This accreditation requires the surveyor or laboratory to demonstrate that they operate competently  
1554 and generate valid results, thereby promoting confidence in their results. The accreditation covers  
1555 organisation, quality systems, control of records, personnel, accommodation and environmental  
1556 conditions, test and calibration methods, method validation, equipment, handling of test and  
1557 calibration items, and reporting results.

1558 Other Member States have different requirements for accreditation schemes (e.g. COFRAC in France),  
1559 therefore it is important to check the relevant scheme for your country.

### **Box 7.5: Keeping records of personal exposure**

Article 19 of Directive 2009/148/EC:

(2) The employer shall enter the information on the workers engaged in the activities referred to in Article 3(1) in a register. That information shall indicate the nature and duration of the activity and the exposure to which they have been subjected. The doctor and/or the authority responsible for medical surveillance shall have access to this register. Workers shall have access to the results in the register which relate to them personally. The workers and/or their representatives shall have access to anonymous, collective information in the register.

(3) The register referred to in paragraph 2 and the medical records referred to in the fourth subparagraph of Article 18(2) shall be kept for at least 40 years following the end of exposure, in accordance with national laws and/or practice.

(4) The documents referred to in paragraph 3 shall be made available to the responsible authority in cases where the undertaking ceases trading, in accordance with national laws and/or practice.

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<sup>194</sup> Directive 2009/148/EC, Article 19



1560 The responsibility to ensure analysis is conducted by suitably competent laboratories, such as  
1561 following ISO/IEC 17025 or other relevant standards, is placed on those who commission the work (i.e.  
1562 the employer).

1563 If employers perform their own measurements of asbestos fibres in air or of worker exposure, the  
1564 work should be performed, recorded and assessed by people with suitable training, supervision and  
1565 quality control systems to enable the results to be equivalent in accuracy to those achieved under  
1566 ISO/IEC 17025.

### 1567 **7.8.2 Effective QA/QC programmes**

1568 Details of standard procedures to ensure validity of results is defined in ISO/IEC 17025. The following  
1569 are some examples of the key determinants of an effective QA programme:

- 1570 • Written protocols describing the procedures of each step;
- 1571 • All equipment should be maintained in good order, and sufficient checks carried out before  
1572 each use;
- 1573 • For companies conducting materials assessments, a portion of materials assessments should  
1574 be 'reinspected' (i.e. rechecked) while the materials assessment is still in progress;
- 1575 • For analytical procedures, limits on maximum samples analysed in one day should be set and  
1576 details provided of any requirements for reanalysis by other analysts;
- 1577 • Use of reference materials or quality control materials;
- 1578 • Routine QA checks to assess the quality of results produced;
- 1579 • Analyst/laboratory should perform satisfactorily in the external suitability testing schemes;
- 1580 • All reports should be checked before being issued to clients; and
- 1581 • Routine checks on records should be conducted.

### 1582 **7.8.3 Internal and external audits**

1583 Analysts and surveying organisations should have robust internal quality control and auditing  
1584 procedures. These are also conditions to obtain accreditation. Accreditation also requires a laboratory  
1585 to have a documented training and competence procedure which should include an element of  
1586 supervised laboratory and on-site experience for staff.

1587 Auditing procedures should be developed for each area of the analyst's work. They should be part of  
1588 documented performance management for individuals.<sup>195</sup> Annual auditing of each analyst's  
1589 performance is needed as a minimum. Auditing is normally be carried out by a designated 'competent  
1590 auditor' within the organisation. This person needs to possess a suitable combination of qualifications,  
1591 training, experience and knowledge for the work. Records of analysts' training are required to be kept.  
1592 Records of auditing and performance need to be retained and be available for inspection as part of  
1593 external audits. The information is then used by the analyst organisation to ensure consistency of  
1594 standards and to identify training needs, operational issues and competence improvements where  
1595 appropriate.

1596 A requirement of accreditation is that laboratories actively participate in external fibre suitability  
1597 testing schemes. Such schemes are available for fibre counting by PCM, EM fibre counting,  
1598 identification of asbestos in bulk samples and asbestos in soils. In some Member States a national  
1599 scheme is available. A database of proficiency testing schemes is available at <https://www.eptis.org/>.

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<sup>195</sup> HSG 248



## 1600 **7.8.4 Contamination and morphologically similar materials**

### 1601 **7.8.4.1 Contamination on filters**

1602 The type and number of blanks that are available for analysis and are analysed will depend on a  
1603 number of factors (e.g. the total number of samples collected). The source of any blank contamination  
1604 should be investigated and the batch-to-batch consistency of membrane filters monitored.<sup>196</sup>

1605  
1606 Types of blank filters:

- 1607 • Sampling media blanks – used to check that the batch of filters is satisfactory.
- 1608 • Field blanks – used to assess contamination on-site. These are collected by briefly removing  
1609 the cap from a loaded cowl in the sampling area (never attached to pump nor had air drawn  
1610 through them). These blanks are only counted if actual samples have >20 fibres counted.<sup>197</sup>
- 1611 • Laboratory blanks – used to assess laboratory contamination.

1612 The sampling organisation is responsible for initiating field blanks, and these should be labelled to  
1613 make sure they can be identified.

### 1614 **7.8.4.2 Fibres with morphological and/or optical properties similar to asbestos**

1615 Some common materials that are mistaken for asbestos include:

- 1616 • Polyethylene fibres, leather swarf fibres, macerated aramid fibres, spiders' webs and talc  
1617 fibres that can all resemble chrysotile, and
- 1618 • Fibrous brucite (nemalite), fibrous wollastonite and diatomaceous earth that can each  
1619 resemble amphibole asbestos fibres.

1620 The protocols defined for each analytical method are described in such a way as to limit the impact of  
1621 misidentification of these materials for asbestos. Appropriate contextual information and QA/QC  
1622 procedures utilised by laboratories are other ways to reduce the chances of mistaking these materials  
1623 for asbestos.

## 1624 **7.8.5 The calibration of instruments**

1625 As stated above, an effective QA programme includes maintaining all equipment in good working  
1626 order and carrying out sufficient checks before each use. Records of regular calibration of equipment  
1627 is a requirement of accreditation schemes.

1628 The primary standard or master flow meter should be a flow meter whose accuracy is traceable to  
1629 national standards. These should only be used for in-house calibration of the working flow meters and  
1630 should be used paying careful attention to the conditions of the calibration certificate. Master flow  
1631 meters should be visually checked for damage regularly and at least every three months and calibrated  
1632 to traceable national standards annually. The working flow meters should be calibrated monthly (or  
1633 necessary documentary evidence of at least one year to justify longer intervals between calibration,  
1634 e.g. quarterly). Records of the checks and calibrations should be kept.<sup>198</sup>

1635 Similarly, any time keeping devices can be calibrated in a similar manner to flow meters by calibrating  
1636 against a standard timepiece.

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<sup>196</sup> HSG 248

<sup>197</sup> HSG 248

<sup>198</sup> HSG 248

1637 The SEM should be calibrated against a standard grating covering the magnification range (2000–10  
 1638 000x) used for measuring and sizing fibres. <sup>199</sup> Normally the EDX will require calibration using one or  
 1639 more known elements in a reference sample to position the peaks at the correct energy. A similar  
 1640 calibration method for TEM can be used.

1641 All other equipment used should be checked regularly (at least monthly) for any faults and be  
 1642 calibrated, where possible, annually.

## 1643 7.9 Interpreting monitoring results and taking corrective actions

### 1644 7.9.1 Understanding monitoring data

1645 Understanding what to do with monitoring data will depend on the purpose of sampling.

Table 7-2: Purpose of sampling and understanding air monitoring results	
Purpose of sampling	Understanding air monitoring results
Evaluation of the exposure of workers	If the OEL is exceeded, action must be taken (e.g. stop work immediately, review control measures) and the reasons for the limit value being exceeded must be identified and appropriate measures to remedy the situation must be taken as soon as possible. <sup>200</sup> Once control measures are implemented, a new exposure assessment must be conducted to ensure compliance with the OEL. <sup>201</sup>
Design and improvement of work procedures	Monitoring results should be as low as reasonably possible, therefore if fibres are detected (even if below OEL) further improvement of work procedures may be required.
Control of the effectiveness of preventive measures to avoid the dispersion of fibres	Monitoring results should be as low as reasonably possible, therefore if fibres are detected (even if below OEL) further improvement of preventative measures may be required.
Verification of the correct selection of respiratory protective equipment (RPE)	Monitoring results can be used to select the most suitable protection factor for RPE. If deemed suitable based on the initial risk assessment, air monitoring data from literature or national databases can be used for decision making.
Verification of decontamination	Air measurements should be used to determine whether it is safe for workers to re-enter areas where asbestos removal/repair has been completed.
Support current and future risk assessments	Monitoring results provide useful input for risk assessments and allow decisions to be made about suitable control measures to be implemented. If deemed suitable based on the initial risk assessment, air monitoring data from literature or national databases can be used for decision making.

### 1646 7.9.2 Corrective actions and communicating the results

1647 The EN 689 standard describes both a preliminary and a statistical test to evaluate compliance with  
 1648 an OEL. The preliminary test only provides a 'Compliance' result if all results in a SEG are below 10%  
 1649 OEL if 3 valid measurements are included, 15% x OEL for 4 valid measurements and 20% x OEL for 5  
 1650 valid measurements. For the statistical test the process for determining compliance is more complex,  
 1651 whereby a compliance result provides ≥70% confidence that less than 5% of the measurements in the

<sup>199</sup> ISO 14966:2019

<sup>200</sup> Directive 2009/148/EC, Article 10

<sup>201</sup> EN 689:2018

1652 SEG exceed the OEL. These tests should be followed as defined in the standard,<sup>202</sup> or by other suitable  
1653 protocols, and the results clearly described.

1654 As stated above and in Box 7.5, if the  
1655 limit value is breached, work must stop  
1656 immediately. The reasons for the limit  
1657 value being exceeded must be identified  
1658 and appropriate measures to remedy  
1659 the situation must be taken as soon as  
1660 possible.<sup>203</sup>

1661 The results of asbestos-in-air  
1662 concentration measurements and an  
1663 explanation of the significance of those  
1664 results must be accessible to workers  
1665 and/or their representatives in the  
1666 undertaking or establishment (e.g.  
1667 health and safety representatives for the  
1668 workplace).<sup>204</sup> If results exceed the limit  
1669 value, the workers concerned and their  
1670 representatives in the undertaking or establishment must be informed as quickly as possible of the  
1671 fact and the workers and/or their representatives in the undertaking or establishment are then  
1672 consulted on the measures to be taken or, in an emergency, are informed of the measures which have  
1673 been taken.<sup>205</sup>

1674 In some Member States, it is a requirement for exposure assessment data to be sent to the labour  
1675 authority.

1676 The results of the exposure monitoring should be used to review and update the risk assessment.

**Box 7.5: Corrective action following exceedance of the OEL**

Article 10 of Directive 2009/148/EC:

(1) Where the relevant limit value as laid down in Article 8 is exceeded, or if there is reason to believe that materials containing asbestos which are not identified prior to the work have been disturbed so as to generate dust, work shall stop immediately.

Work shall not be continued in the affected area until adequate measures have been taken for the protection of the workers concerned.

Where the relevant limit value as laid down in Article 8 is exceeded, the reasons for the limit value being exceeded shall be identified and appropriate measures to remedy the situation shall be taken as soon as possible.

(2) In order to check the effectiveness of the measures mentioned in the first subparagraph of paragraph 1, a further determination of the asbestos-in-air concentrations shall be carried out immediately.

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<sup>202</sup> EN 689:2018

<sup>203</sup> Directive 2009/148/EC, Article 10

<sup>204</sup> Directive 2009/148/EC, Article 17(2)(a)

<sup>205</sup> Directive 2009/148/EC, Article 17(2)(b)

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## 8 Passive exposure and secondary exposure

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### 8.1 Definitions

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#### 8.1.1 Passive exposure

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The definition of workers subject to passive exposure used in this guide is based on Recital 5 of Directive (EU) 2023/2668: workers who work either in the vicinity of someone working with materials containing asbestos, or in premises where materials containing asbestos are degrading in building structures.<sup>206</sup>

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Examples of situations where passive exposure may occur include, but are not limited to, the following:

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- Asbestos contaminated area is not correctly cordoned off, such that fibres are released into “clean” zones.

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- Degrading MCAs not correctly enclosed within a building, resulting in fibre release (e.g. in schools, office buildings and hospitals).

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- Maintenance work or cleaning conducted on MCAs due to incorrect inventory/suitable working practices, resulting in fibre release.

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- Insufficient control measures used when removing MCAs, resulting in fibre release and exposure to workers nearby.

1707

1708

- Building maintenance work where others are working in the vicinity of someone disturbing asbestos and appropriate systems of work are not in place.

1709

1710

#### 8.1.2 Secondary exposure

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The definition of secondary exposure used in this guide is based on Recital 5 of Directive (EU) 2023/2668 of secondary exposure is as follows: people are exposed to asbestos fibres brought home

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#### Box 8.1: Passive and secondary exposure to asbestos

Recital 5 of Directive (EU) 2023/2668:

There are types of exposure to asbestos that do not result from the active handling of asbestos. Such types of exposure include passive exposure, where workers who work either in the vicinity of someone working with materials containing asbestos, or in premises where materials containing asbestos are degrading in building structures, are exposed to asbestos, and secondary exposure, where people are exposed to asbestos fibres brought home by occupationally exposed individuals mostly from their clothing or hair. Both passive and secondary exposure can have significant impacts on health.

[...]

Avoiding exposure to asbestos, in whatever form, therefore remains an imperative.

With regard to the passive exposure of workers to asbestos, Council Directive 89/391/EEC and Directive 2009/148/EC require employers to be in possession of an assessment of all the risks to the safety and health of workers at work by identifying potential hazards, including those stemming from passive exposure to asbestos, and to put in place the necessary preventive and protective measures to protect the safety and health of workers, with the risk avoidance principle always being the primary basis for any measures to be implemented.

With regard to secondary exposure to asbestos or materials containing asbestos, the occupational safety and health requirements provided for in this Directive are important means by which to avoid such exposure.

<sup>206</sup> Directive (EU) 2023/2668, Recital 5

1713 by occupationally exposed individuals mostly from their clothing or hair<sup>207</sup>. The same mechanism can  
1714 lead to occupational exposure where fibres are transferred outside the workplace of first exposure.

1715 Examples of situations where secondary exposure may occur include, but are not limited to, the  
1716 following:

- 1717 • Shaking dust from work overalls prior to laundering and subsequent transfer to other clothes  
1718 and surfaces outside the original workplace of exposure.
- 1719 • Exposure of transport workers or other people when travelling home from work using public  
1720 transport after incorrect decontamination.
- 1721 • Exposure at a domestic home from asbestos dust carried on the work clothes, skin and hair of  
1722 someone who has been exposed to asbestos at work (e.g. demolition or construction worker).
- 1723 • Family and friends hugging a contaminated worker upon arriving home.
- 1724 • Family members using the same vehicle the exposed worker drives home from work, which  
1725 can accumulate if the vehicle is enclosed, and the exposure occurs repeatedly.

## 1726 8.2 Examples of at-risk groups

1727 Both passive and secondary exposure can have significant impacts on health.<sup>208</sup>

1728 Women are at particular risk of secondary exposure.<sup>209</sup> Historically, women have been at greater risk  
1729 of secondary exposure due to their roles within households. Additionally, other groups of workers  
1730 may be at risk of unknowingly encountering asbestos (i.e. via passive exposure) and these workers  
1731 may be at particular risk since they are at risk of insufficient information, training, and preventive/risk  
1732 reduction measures. This may involve temporary labour or external workers (e.g. maintenance  
1733 workers or cleaners). Therefore, it is essential to consider all relevant workers who could at risk from  
1734 exposure to asbestos or MCAs when preparing a risk assessment or implementing preventive and risk  
1735 management measures.

## 1736 8.3 Risk assessment and management

### 1737 8.3.1 Risk assessment

1738 A suitable risk assessment must be prepared for any activity likely to involve a risk of exposure to dust  
1739 arising from asbestos or MCAs (see Section 5 for further details).<sup>210</sup> Therefore, risk assessment for all  
1740 asbestos activities must consider the likelihood of passive and secondary exposure<sup>211</sup> and ensure  
1741 appropriate measures are in place to minimize this risk (see also Box 8.1). Provide information about  
1742 the main findings of the risk assessment to all relevant workers is an important step in preventing  
1743 exposure, including passive and secondary exposure (see Section 4.4 for more details).

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<sup>207</sup> Directive (EU) 2023/2668, Recital 5

<sup>208</sup> Directive 2023/2668, Recital 5

<sup>209</sup> Directive 2023/2668, Recital 6

<sup>210</sup> Directive 2009/148/EC, Article 3(2)

<sup>211</sup> Directive 2009/148/EC, Article 3(2)

1744 **8.3.2 Control measures**

1745 The risk of passive and secondary exposure can increase when risk management measures in place do  
1746 not target the relevant workers or if they are inadequate or not used correctly.

1747 To prevent passive exposure, it is important to, for example:

- 1748 • Correctly identify all asbestos and MCAs and the associated risk (see Sections 5 and 6).
- 1749 • Implement all the necessary risk management measures to prevent or minimise passive  
1750 exposure to asbestos and MCAs (see Section 5).
- 1751 • Ensure the condition of MCAs is inspected regularly and the risk assessment is regularly  
1752 updated. Early detection of degrading MCAs is very important in reducing passive exposure.  
1753 See Sections 5 and 6 for further information.
- 1754 • If degrading MCAs is identified, evacuate the area until appropriate measures, such as  
1755 removal, have been implemented (see Section 9).
- 1756 • During removal activities, ensure that the removal area is correctly enclosed from “clean”  
1757 zones (see Section 9).
- 1758 • Once removal has taken place, ensure all areas and equipment are thoroughly cleaned and  
1759 airborne fibre levels are as low as technically possible before re-entering the area (see Section  
1760 9).
- 1761 • Provide all relevant staff with the necessary information about the presence of asbestos  
1762 (including temporary staff or those hired from external contractors and any emergency  
1763 service workers), see Sections 4.4 and 10.
- 1764 • Ensure safe and correct waste procedures for asbestos are followed when required (see  
1765 Section 10).
- 1766 • Follow all good housekeeping and personal hygiene recommendations (e.g. use of signage,  
1767 correct washing procedures and removal of disposable PPE). See Section 9 for further details.

1768 Examples of control measures relating to secondary exposure include:

- 1769 • Follow correct protocols for decontamination following asbestos removal and/or handling  
1770 (see Section 9).
- 1771 • Follow all proper hygiene recommendations (e.g. handwashing, correct removal of disposable  
1772 PPE, provide working clothes and a laundry service so contaminated clothes are not washed  
1773 at home). See Section 9 for further details.

1774 **8.3.3 Air monitoring**

1775 Air monitoring can be used as a tool to ensure workers are not passively exposed to asbestos. For  
1776 example, this can involve regular monitoring in buildings where MCAs are identified or regular  
1777 monitoring of various staff (not only those who are thought to be in direct contact with asbestos) to  
1778 ensure everyone is following correct procedures.

1779 There is no known safe level of exposure to asbestos and exposure must be kept as low as technically  
1780 possible<sup>212</sup>. For example, if asbestos fibres are identified during the routine air monitoring of buildings  
1781 containing MCAs then an inspection of the building should be conducted to find the cause of the  
1782 exposure.

1783 The requirements for air monitoring are described further in section 7 on air monitoring.

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<sup>212</sup> Directive 2009/148/EC, Article 6



### 1784 8.3.4 Training

1785 The requirements for training and education are described in detail in Section 10.

1786 This includes those who directly work with asbestos (e.g. removal, waste) and those who may come  
1787 in contact inadvertently and are therefore at risk of passive exposure (e.g. cleaners, maintenance  
1788 workers). The content of the training typically includes various topics, including proper control  
1789 measures which should be used to prevent both passive and secondary exposure.

## 1790 8.4 Health surveillance

1791 Health surveillance for all groups of workers exposed to asbestos must comply with the minimum  
1792 requirements in Directive 2009/148/EC (see Section 11) regardless of whether it occurs as direct,  
1793 passive, or secondary exposure.

## 1794 8.5 Passive and secondary exposure – examples

### Box 8-2: Example of passive exposure

**Where:** Tripode building in Nantes, France.

**Summary:** The building housed government offices and was found to have significant asbestos contamination. In the 1980s, samples of asbestos dust were taken within the building and concerns were raised by workers. Air samples taken between 1980 and 1990 showed asbestos levels in the order of 0.015 fibres/cm<sup>3</sup> (15,000 fibres/m<sup>3</sup>).<sup>213</sup> The building was vacated in 1992, and every worker was allowed the right to specific medical monitoring. Cases of maintenance workers dying of lung cancer have since been requested to be recognised as occupational diseases. The inter-union association commissioned an epidemiological study, in which the result noted a high number of deaths as a result of tumours.<sup>214</sup>

#### **Learnings<sup>215</sup>:**

In this example, air samples were taken as early as 1980 but the building was not evacuated until 1992. Air monitoring results were considered based on the exposure limits applied at the time, which were less stringent than the limits in place now. However, workers expressed concern over the air sampling results and should have been consulted about the actions that followed after these measurements were taken. A summary of the learnings from this case include:

- Need for suitable risk assessments involving workers and their representatives
- Mandatory air exposure measurements when degrading MCAs are suspected or identified
- Evacuate if exposure is identified as a problem (i.e. if exposure levels exceed or are close to OELs)
- Inform workers of presence of MCAs and of air monitoring results
- Removal, rather than encapsulation
- Medical follow-up of exposed workers

### 1795 Secondary exposure - examples

<sup>213</sup> Archives of the Tripode inter-union association of Nantes consulted by the ETUI – final report of Mr Paul Order to the Administrative Court, Nantes, of 23 December 2002.

<sup>214</sup> [https://www.etui.org/sites/default/files/2023-06/HM27\\_Asbestos%20in%20the%20Tripode%2C%20a%20warning%20for%20Europe\\_2023.pdf](https://www.etui.org/sites/default/files/2023-06/HM27_Asbestos%20in%20the%20Tripode%2C%20a%20warning%20for%20Europe_2023.pdf)

<sup>215</sup> Source: discussion at a workshop organised as part of the stakeholder consultation for the development of this guide.



## 9 Control measures

### 1797 9.1 Introduction

1798 Control measures should be implemented based on the findings of the asbestos risk assessment.  
 1799 Control measures are designed to prevent or minimise the release of asbestos fibres into the air and  
 1800 exposure to individuals.

#### 1801 9.1.1 Key principles and requirements for implementing control measures

1802 For all activities in which workers are or  
 1803 may be exposed to dust arising from  
 1804 asbestos or MCAs, exposure must be  
 1805 minimised to a level that is as low as  
 1806 technically possible (and in any case  
 1807 lower than the OEL specified in Section  
 1808 7.3).<sup>216</sup> The control measures that must  
 1809 be implemented are set out in Box 9.1.<sup>217</sup>

1810 The measures listed in Box 9.1 apply to all  
 1811 activities in which workers are or may be  
 1812 exposed to asbestos or MCAs. Additional  
 1813 requirements apply to situations where it  
 1814 is foreseeable that even when all possible  
 1815 technical measures are used, the OEL  
 1816 specified in Section 7.3 will be  
 1817 exceeded.<sup>218</sup>

1818 The list of control measures in Box 9.1 is  
 1819 non-exhaustive and additional measures  
 1820 can be implemented. When  
 1821 implementing additional measures, the  
 1822 STOP principle should be followed:

- 1823 • Substitution – Replacing  
 1824 hazardous materials or processes  
 1825 with safer alternatives. The  
 1826 removal of asbestos or MCAs  
 1827 must be prioritised over other  
 1828 forms of asbestos handling.<sup>219</sup>
- 1829 • Technical measures –  
 1830 Engineering controls. Isolating  
 1831 people from the hazard through  
 1832 physical means, such as using  
 1833 enclosures or ventilation systems to reduce airborne asbestos fibres.

#### Box 9.1: Control measures - all activities in which workers are or may be exposed to asbestos or MCAs

Article 6 of Directive 2009/148/EC (AWD):

[...] the exposure of workers to dust arising from asbestos or materials containing asbestos at the place of work shall be reduced to a minimum and in any case to as low a level as is technically possible below the relevant limit value as laid down in Article 8, in particular through the following measures:

(a) the number of workers exposed or likely to be exposed to dust arising from asbestos or materials containing asbestos shall be limited to the lowest possible figure;  
 (b) work processes shall be designed so as not to produce asbestos dust or, if that proves to be impossible, to avoid the release of asbestos dust into the air by taking measures such as:

- (i) asbestos dust suppression;
- (ii) the suction of asbestos dust at source;
- (iii) the continuous sedimentation of asbestos fibres suspended in the air;

(ba) workers shall be subject to an appropriate decontamination procedure;

(bb) for work carried out under confinement, adequate protection shall be ensured;

(c) all premises and equipment involved in the treatment of asbestos shall be capable of being regularly and effectively cleaned and maintained and subject to regular cleaning and maintenance;

(d) asbestos or dust-generating materials containing asbestos shall be stored and transported in suitable sealed packing;

(e) waste, other than waste arising from mining activities, shall be collected and removed from the place of work as soon as possible in suitable sealed packing with labels indicating that it contains asbestos and shall then be dealt with in accordance with Directive 2008/98/EC of the European Parliament and of the Council.

<sup>216</sup> Directive 2009/148/EC, Article 6

<sup>217</sup> Directive 2009/148/EC, Article 6

<sup>218</sup> Directive 2009/148/EC, Article 12

<sup>219</sup> Directive 2009/148/EC, Article 3(2)

- 1834 • Organisational measures – Implementing procedures and policies to reduce exposure,  
1835 including training, scheduling work to limit exposure time, and establishing safe work  
1836 practices.
- 1837 • Personal protective equipment (PPE) – Providing equipment like respirators and protective  
1838 clothing to workers to minimise exposure when other controls are insufficient.

1839 This approach prioritises control methods from most to least preferable, underpinning effective  
1840 minimisation of occupational exposure to asbestos.

1841 In case of activities for which it is  
1842 foreseeable that the OEL specified in  
1843 Section 7.3 will be exceeded despite the  
1844 use of all possible technical preventive  
1845 measures, the requirements in Box 9.2  
1846 must be followed.<sup>220</sup>

1847 The list of measures in Box 9.2 is non-  
1848 exhaustive and additional measures can  
1849 be implemented. When implementing  
1850 additional measures, the STOP principle  
1851 should be followed.

1852 The choice and combination of the  
1853 specific control measures depends on the  
1854 risks identified during the asbestos risk  
1855 assessment (see Section 5).

1856 **9.1.2 Useful information before**  
1857 **work begins**

1858 The specific control measures selected  
1859 should be documented (see Section 5.2).  
1860 This helps ensure the asbestos activity  
1861 such as demolition, removal, repair or  
1862 maintenance is well planned and carried  
1863 out in a safe manner. It is essential to consider:

- 1864 • How the asbestos activity will be carried out, including the methods, tools, equipment and  
1865 PPE to be used.
- 1866 • Characteristics of the location, environment and circumstances, type and condition of the  
1867 asbestos.
- 1868 • Specifications or drawings that are relevant to:
  - 1869 • the asbestos work,
  - 1870 • any relevant additional information about the situation.
- 1871 • The control measures for other (than exposure to asbestos) health and safety risks.

<p><b>Box 9.2: Control measures – activities where it is foreseeable that the OEL will be exceeded despite the use of technical measures</b></p> <p>Article 12 of Directive 2009/148/EC (AWD):</p> <p>In the case of certain activities such as demolition, asbestos removal work, repairing and maintenance, in respect of which it is foreseeable that the relevant limit value as laid down in Article 8 will be exceeded despite the use of all possible technical preventive measures for limiting asbestos in air concentrations, the employer shall determine the measures intended to ensure protection of the workers while they are engaged in such activities, in particular the following:</p> <p>(a) workers shall be issued with suitable personal protective equipment to be worn, which shall be appropriately handled and, in particular with regard to respiratory equipment, which shall be individually adjusted, including through fitting checks, in accordance with Council Directive 89/656/EEC;</p> <p>(b) warning signs shall be put up indicating that it is foreseeable that the limit value laid down in Article 8 will be exceeded; and</p> <p>(c) the spread of dust arising from asbestos or materials containing asbestos outside the premises or site of action shall be prevented, and for work performed under confinement, the enclosure shall be airtight and under mechanical extraction ventilation.</p>
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<sup>220</sup> Directive 2009/148/EC, Article 12

1872 In France, the prevention of asbestos exposure during various phases of asbestos operations involves  
1873 four stages: phases 1 and 2 are conducted before the operation begins, phase 3 takes place during the  
1874 operation, and phase 4 occurs after the operation is completed.<sup>221</sup>

1875 This structured approach aims to minimize exposure risks and ensure effective management  
1876 throughout all stages of asbestos-related activities. Other Member States have similar approaches and  
1877 standards.

## 1878 9.2 Removal

1879 The removal of asbestos or MCAs must be prioritised over other forms of handling.<sup>222</sup> The chosen  
1880 techniques should be selected with the aim of<sup>223</sup>:

- 1881 • Minimizing workers' exposure to asbestos fibers during activities such as removal, brushing,  
1882 and cleaning.
- 1883 • Reducing fiber emissions in the worksite environment to the lowest possible level.
- 1884 • Facilitating the management, removal, and disposal of MCAs based on the substrate's nature  
1885 and geometry.
- 1886 • Lowering the physical strain on employees to an acceptable level, considering the demanding  
1887 conditions and constraints of these worksites.

## 1888 9.3 Technical measures

1889 A range of technical measures have the potential to prevent the generation of asbestos dust or avoid  
1890 the release of asbestos dust into the air, including<sup>224</sup>:

- 1891 • Manual wet scraping or, in exceptional cases, dry scraping for limited areas.
- 1892 • Mechanized scraping with debris collection at the source.
- 1893 • Blast cleaning at varying pressure levels - low, medium, high, and ultra-high (10 to 2,000 bar)  
1894 - with or without water additives.
- 1895 • Sandblasting, shot blasting, or spraying with synthetic granules.
- 1896 • Chiseling.
- 1897 • Dry ice blasting (cryogenics).
- 1898 • Automation, such as robots equipped with high-precision cutting tools, vacuum systems, and  
1899 real-time monitoring sensors (see e.g. robotic extraction<sup>225</sup>).<sup>226</sup>
- 1900 • Other validated, specialized methods as required.<sup>227</sup>

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<sup>221</sup> French Regional Directorates for the Economy, Employment, Labor, and Solidarity (DREETS) (2024). Les fondamentaux de la prévention du risque d'exposition à l'amiante dans les immeubles bâtis. Retrieved from: <https://pays-de-la-loire.dreets.gouv.fr/Les-fondamentaux-de-la-prevention-du-risque-d-exposition-a-l-amiante-dans-les>

<sup>222</sup> Directive 2009/148/EC, Article 3(2)

<sup>223</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide

<sup>224</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide

<sup>225</sup> CORDIS - EU research results. H2020. Robots to Re-Construction Robotic extraction of asbestos fibres from buildings | Bots2ReC Project | Results in brief | H2020 | CORDIS | European Commission

<sup>226</sup> Burkhard Corves (ed.), Tobias Haschke (ed.), Mathias Hüsing (ed.) (2021), "Robots to Re-Construction - The Roadmap to Robotized Asbestos Removal", Boston-Delft, <http://dx.doi.org/10.1561/9781680837155>

<sup>227</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide

1901 New techniques might be developed and introduced, such as covers, sprays and foams. It is highly  
1902 recommended to validate new methods, techniques, pieces of equipment or machines independently  
1903 before introduction (see e.g. the Validation and Innovation Point Asbestos in the Netherlands<sup>228</sup>).

1904 Other technical measures include the use of asbestos dust suppression approaches such as low  
1905 intensity tools, wetting or suction of asbestos dust at source, containment, decontamination and use  
1906 of equipment that can be easily cleaned.

### 1907 9.3.1 Containment

1908 A containment should (and in case where it is foreseeable that the OEL specified in Section 7.3 will be  
1909 exceeded despite the use of all possible technical preventive measures, must) be used with the right  
1910 equipment and locks for personnel, material, equipment and waste. The containment should be in  
1911 negative pressure which is monitored continuously. Asbestos negative pressure machines (HEPA  
1912 filtered) should be used.<sup>229</sup>

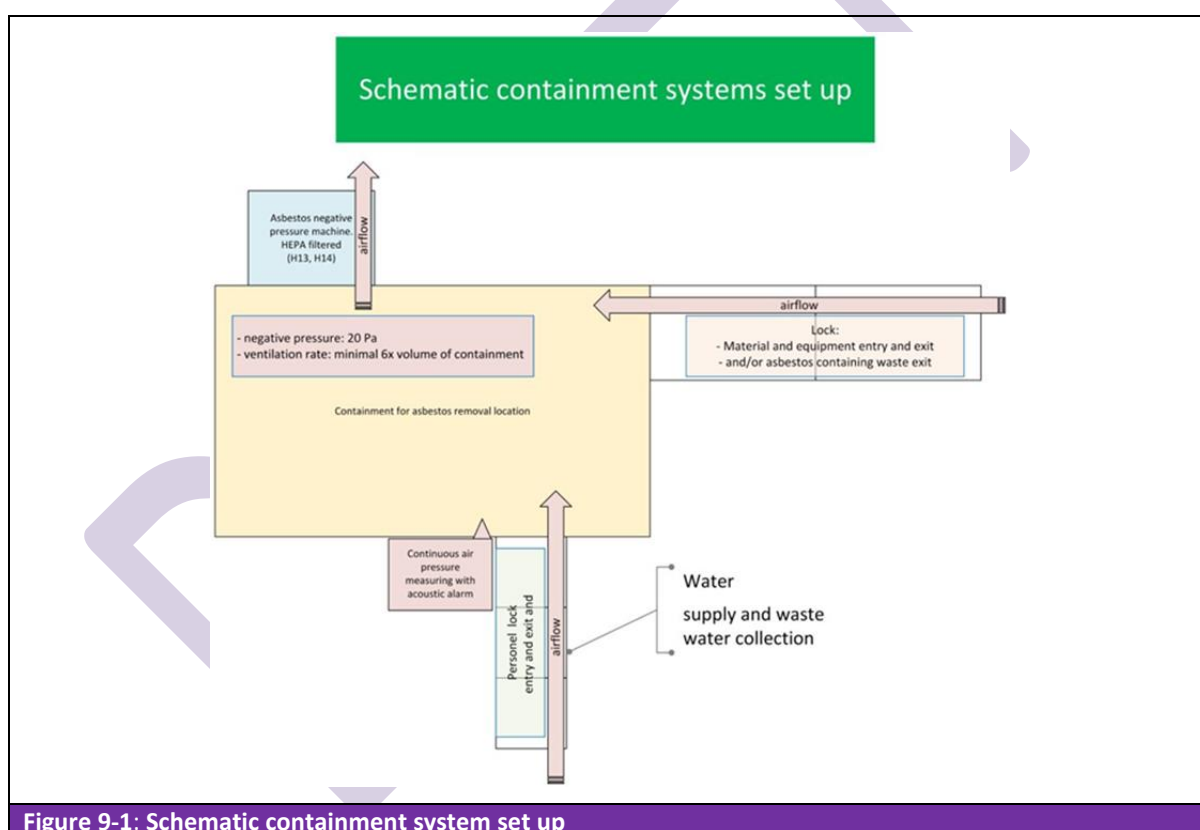


Figure 9-1: Schematic containment system set up

1913 For short-term tasks of approximately one hour of duration, including cleaning, where there is no  
1914 significant asbestos dust, the work could be carried out in a one-man boot tent that encloses the work  
1915 area.<sup>230</sup>

<sup>228</sup> The Validation and Innovation Point Asbestos | VIPasbest). <https://www.vipasbest.nl/en>.

<sup>229</sup> [https://stofvrijwerken.tno.nl/wp-content/uploads/sites/8/2022/04/Infoblad\\_ODM-maart\\_2022.pdf](https://stofvrijwerken.tno.nl/wp-content/uploads/sites/8/2022/04/Infoblad_ODM-maart_2022.pdf)

<sup>230</sup> <https://www.hse.gov.uk/pubns/guidance/em3.pdf>

1916 In Belgium<sup>231</sup> and France<sup>232</sup>, it is mandatory to do a smoke test to check for leaks and ensure there are  
1917 no "dead zones" where air is not properly circulated to ensure the integrity of the containment. The  
1918 smoke should disappear within 15 minutes in every part of the confined space when the extractors  
1919 are activated.

1920 A glove bag (or: glove box, sleeve bag, glove bag, incubator bag, glove tarpaulin) is a special  
1921 containment device used in small-scale asbestos removal work, e.g. from pipes and similar structures  
1922 where electrical equipment must remain in operation<sup>233</sup>. It consists of an impervious plastic enclosure  
1923 with built-in glove-like appendages that allow workers to safely handle and remove asbestos-  
1924 containing materials without direct contact. Whilst glove bags are an effective control measure for  
1925 small-scale asbestos removal work, they should be used in conjunction with other safety measures,  
1926 including appropriate personal protective equipment and proper decontamination facilities nearby.  
1927 The plastic film is sensitive to tearing or punching and can therefore release asbestos dust, particularly  
1928 during removal of the bag and using tools. Employees must receive special training in the use of this  
1929 technique. In some countries, such as Belgium and the Netherlands, the use of glove bags as a single  
1930 control method is discouraged or heavily restricted, with their use only admitted in combination with  
1931 a containment system.

### 1932 **9.3.2 Decontamination**

1933 Workers must be subject to an appropriate decontamination procedure.<sup>234</sup>

1934 A three-chamber airlock system ensures that asbestos dust stays inside the work area. A three-  
1935 chamber lock consists of three steps in three different chambers to ensure adequate  
1936 decontamination.

1937 Constructing a decontamination chamber involves using a wooden frame covered with thick,  
1938 transparent plastic sheeting<sup>235</sup>. It should be ensured all openings are sealed with double layers of  
1939 plastic to prevent dust spread. The chamber should preferably be made at least 0.8 meters wide and  
1940 1.9 meters high, with space for changing clothes and showering and adequate ventilation. However,  
1941 at the same time, the size of decontamination area should be minimised to reduce the need for air  
1942 purification and cleaning. Time spent showering with adequate warm water supply (8 litres/min, 38  
1943 degrees Celsius) should be limited (90 sec). Single use materials should be disposed of and reusable  
1944 ones thoroughly cleaned, ensuring post-ventilation and BAS-U checks before dismantling.

1945 When using a three-chamber lock:

- 1946
- Visible dust should be vacuumed from the suit, footwear and personal protective equipment  
1947 in the work area by using an H-labelled vacuum cleaner.
  - Footwear, suit and PPE should be thoroughly vacuumed, including the outside of the  
1948 respirator in the first chamber of the airlock. A vacuum cleaner nozzle should be fitted with a  
1949 brush.
- 1950

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<sup>231</sup> Source: discussions at a workshop organised within the framework of the development of this guide

<sup>232</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide

<sup>233</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide

<sup>234</sup> Directive 2009/148/EC, Article 6 (ba)

<sup>235</sup> [SCi Eisen aan arbeidsmiddelen 04022022](#)

- 1951 • Disposable suits should be disposed of as asbestos waste.
  - 1952 • The second chamber should contain a shower.
  - 1953 • Suit and footwear should be removed in the second chamber of the airlock.
  - 1954 • The respirator and footwear should be wiped thoroughly with wet wipes.
  - 1955 • The respirator should be removed in the third chamber of the airlock, after showering for
  - 1956 thorough cleaning of the respiratory equipment.
  - 1957 • The airlock should be cleaned daily with an H-labelled vacuum cleaner. During the cleaning of
  - 1958 the airlock personal protective equipment should be worn.
  - 1959 • Waste, tools and materials should be packed in strong plastic bags (0.095 mm thick) that are
  - 1960 sealed airtight with yellow tape labelled 'Asbestos'. It should be carried out when the work
  - 1961 area is cleaned.
  - 1962 • If it is necessary to remove waste, tools or materials while work is in progress, it should be
  - 1963 packed in the same way and the packaging cleaned in the airlock.
- 1964 It should be ensured that there is a possibility of:
- 1965 • Safe and clean storage of PPE.
  - 1966 • Separate changing facilities with wardrobes/two changing rooms separated by showers.
  - 1967 • Showering and washing hands.
  - 1968 • Regular rest periods during the day.
- 1969 Personal decontamination including hand and fingernail washing should be carried out each time
- 1970 workers leave the asbestos work area and at the completion of asbestos maintenance and service
- 1971 work.
- 1972 The decontamination unit should be cleaned daily using a HEPA vacuum cleaner. Workers performing
- 1973 this cleaning should wear appropriate personal protective equipment.

### 1974 **9.3.3 Cleaning after asbestos work**

- 1975 After completing the asbestos work and removing the waste, the area, maintained under negative
- 1976 pressure (-5Pa) where applicable, undergoes a thorough cleaning process as outlined below<sup>236</sup>:
- 1977 • Visual Inspection: Check all surfaces, including hard-to-reach areas (e.g., corners, flanges,
  - 1978 supports), to confirm no MCA residues remain.
  - 1979 • Vacuuming: Vacuum all surfaces and equipment using HEPA-filtered vacuum cleaners. Treat
  - 1980 uncleaned equipment for reuse as waste: identify, package, and remove in transport crates.
  - 1981 • Plastic Film/Sheeting/Cover Inspection: Inspect protective plastic for tears or delaminations
  - 1982 and repair as needed.
  - 1983 • Washing: Clean walls, equipment, and plastic films with water or wet cleaning methods. Filter
  - 1984 washing water before discharge. Apply a surfactant to plastic films to prevent fiber suspension
  - 1985 during removal.
  - 1986 • Plastic Film/Sheeting/Cover Removal: Remove the first layer of plastic before drying, fold it
  - 1987 with the contaminated side inward, and dispose of it as waste. If torn, clean and repair the
  - 1988 second layer before removal.
  - 1989 • Atmospheric Testing: Perform air sampling and fiber analysis to detect residual pollution and
  - 1990 take corrective actions (e.g., further cleaning or dust measurements) if needed.
  - 1991 • Final Inspection: The project owner, client, or representative inspects treated surfaces and
  - 1992 ensures rectification of any MCA residues or inadequate encapsulation.

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<sup>236</sup> The French National Institute for Research and Safety (INRS) (2012). ED6091. Removal or encapsulation of materials containing asbestos. Prevention guide



- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- Final Plastic Layer Removal: Remove the last plastic layer progressively, maintaining a slight vacuum. Clean exposed surfaces during removal by vacuuming or damp wiping if water damage is a risk.
  - Equipment Maintenance: Replace filters on vacuum cleaners and extractors per manufacturer instructions, using trained personnel. Pack and label replaced filters for transport or storage if done off-site.
  - Rented Equipment Decontamination: Fully decontaminate rented equipment and remove polluted consumables (e.g. filters) before return, unless otherwise agreed in the rental contract. Record decontamination in the ERP.

2002 The following cleaning equipment should be used:

- 2003
- 2004
- 2005
- An H-marked vacuum cleaner.
  - Wetting MCAs.
  - Dust shielding with sluice and negative pressure.

2006 **9.3.3.1 Cleaning up after fires and storms**

2007 MCAs will often be scattered and can release large amounts of dust during handling in a dry state. In  
2008 general, fire sites and storm damage are considered asbestos-infested areas. Cleaning up these areas  
2009 requires specific knowledge and equipment. Personnel executing these activities should be well  
2010 trained and instructed about the use of the appropriate control measures, the PPE to be used as well  
2011 as decontamination and waste management.

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## 2012 9.4 Organisational measures

### 2013 9.4.1 Segregation and warning signs

2014 The areas in which activities with  
2015 asbestos take place must not be  
2016 accessible to workers other than those  
2017 required to enter them for their work or  
2018 duties<sup>237</sup>, subject to any potential  
2019 derogations implemented by the  
2020 Member States for sporadic and low  
2021 intensity exposure.<sup>238</sup>

2022 The asbestos work area must be  
2023 restricted to ensure unauthorised  
2024 personnel are restricted from entry.<sup>239</sup>

2025 The distance for segregation should be  
2026 determined by asbestos risk assessment.

2027 The following should be observed:

- 2028 • Warning signs and demarcation  
2029 must be used.<sup>240</sup> The signs used  
2030 must fulfil the requirements of  
2031 the national legislation  
2032 transposing Directive 92/58/EEC  
2033 on the minimum requirements  
2034 for the provision of safety and/or  
2035 health signs at work<sup>241</sup>. They  
2036 should be used at all entry points.
- 2037 • Demarcation can include the use  
2038 of barrier tape.
- 2039 • Doors should be closed.
- 2040 • Appropriately labelled heavy  
2041 duty plastic asbestos waste  
2042 disposal bags should be available.
- 2043 • If possible, heavy-duty plastic  
2044 sheeting should be used, secured  
2045 with adhesive (cloth or duct)  
2046 tape, to cover any surface within the asbestos work area that could become contaminated.
- 2047 • It should be ensured that there is adequate lighting.

#### Box 9.3: Control measures – segregation and warning signs

Article 12 of Directive 2009/148/EC (AWD):

In the case of certain activities such as demolition, asbestos removal work, repairing and maintenance, in respect of which it is foreseeable that the relevant limit value as laid down in Article 8 will be exceeded despite the use of all possible technical preventive measures for limiting asbestos in air concentrations, the employer shall determine the measures intended to ensure protection of the workers while they are engaged in such activities, in particular the following:

[...]

(b) warning signs shall be put up indicating that it is foreseeable that the limit value laid down in Article 8 will be exceeded; and

Article 16(1) of Directive 2009/148/EC (AWD):

In the case of all activities referred to in Article 3(1), and subject to Article 3(3), appropriate measures shall be taken to ensure that:

(a) the places in which the above activities take place:

(i) are clearly demarcated and indicated by warning signs;

(ii) are not accessible to workers other than those who by reason of their work or duties are required to enter them;

(iii) constitute areas where there should be no smoking;

(b) areas are set aside where workers can eat and drink without risking contamination by asbestos dust;

[...]

(d) separate storage places are provided for working or protective clothing and for street clothes;

(e) workers are provided with appropriate and adequate washing and toilet facilities, including showers in the case of dusty operations;

<sup>237</sup> Directive 2009/148/EC, Article 16(1)(a)(ii)

<sup>238</sup> Directive 2009/148/EC, Articles 16 and 3(3)

<sup>239</sup> Directive 2009/148/EC, Article 16(1)(a)(ii)

<sup>240</sup> Directive 2009/148/EC, Article 16(1)(a)(i)

<sup>241</sup> Council Directive 92/58/EEC of 24 June 1992 on the minimum requirements for the provision of safety and/or health signs at work (ninth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L 245 26.8.1992, p. 23). As regards the practical application of Directive 92/58/EEC and the relationship of the Directive with the ISO standard on safety and health signs (EN ISO 7010), see also the *Non-binding guidelines regarding Directive 92/58/EEC*, available at <https://op.europa.eu/en/publication-detail/-/publication/5079cf93-7811-11ec-9136-01aa75ed71a1/language-en>

2048 Access to the working/removal area and/or containment should be limited to:

- 2049 • Trained asbestos workers and supervisors;
- 2050 • Competent personnel for end control.

2051 In addition, the following should be observed:

- 2052 • Special measures should be taken when working in windy environments, such as negative  
2053 pressure covers or side covers.
- 2054 • If drilling a roof from outside, the area below should be segregated.
- 2055 • If access is available to the rear of the asbestos cement, segregate this area as well as above.

2056 The areas in which activities with asbestos take place must be non-smoking.<sup>242</sup>

2057 Warning signs must be placed to mark the asbestos working area, and if it is foreseeable that the OEL  
2058 specified in Section 7.3 will be exceeded despite the use of all possible technical preventive measures  
2059 for limiting asbestos in air concentrations.<sup>243</sup>

2060 Signs should be placed at all the main entrances to the work area where asbestos is present to restrict  
2061 entry. The warning signs should be weatherproof, constructed of lightweight material and adequately  
2062 secured. A permit-to-work system should be implemented.

#### 2063 **9.4.2 Limitation of number of workers**

2064 The number of workers exposed or likely to be exposed to dust arising from asbestos or MCA's must  
2065 be limited to the lowest possible.<sup>244</sup>

#### 2066 **9.4.3 Final inspection**

2067 For activities for which a plan of work must be drawn up (demolition work or work on removing  
2068 asbestos and/or asbestos-containing products from buildings, structures, plants or installations or  
2069 from ships - see Article 13 of Directive 2009/148/EC and Section 5.2.2), when the work has been  
2070 completed, the absence of risks of exposure to asbestos at the place of work must be verified before  
2071 other activities resume.<sup>245</sup> This should include:

- 2072 • Visually inspecting if all asbestos and/or MCAs that were supposed to be removed has been  
2073 removed (supplemented with gel tape samples).
- 2074 • Checking that protective measures have been taken to prevent recontamination of the  
2075 location.
- 2076 • Checking that MCA waste has been disposed of outside of the location/containment or  
2077 properly packed and decontaminated inside.
- 2078 • Checking that the tools and equipment used have been disposed of the location/containment  
2079 or properly packed and decontaminated inside.
- 2080 • Checking that no asbestos waste or loose MCA parts were left in the area or containment; the  
2081 area or containment is cleaned properly.
- 2082 • Air measurements of the concentration of asbestos fibres. The concentration of asbestos  
2083 fibres should be below the OEL specified in Section 7.3.

2084 The final inspection should be documented before releasing the site for reuse.

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<sup>242</sup> Directive 2009/148/EC, Article 16 (1, a,iii)

<sup>243</sup> Directive 2009/148/EC, Article 12 and 16(1, a, i)

<sup>244</sup> Directive 2009/148/EC, Article 6(a)

<sup>245</sup> Directive 2009/148/EC, Article 13(2)c

2085 **9.5 Personal protective equipment (PPE)**

2086 The used PPE, including Respiratory protection equipment (RPE), must fulfil the requirements of the  
2087 national legislation transposing Directive 89/656/EEC.<sup>246</sup>

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<sup>246</sup> Council Directive 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L 393 30.12.1989, p. 18).

## 2088 9.5.1 Respiratory protection equipment (RPE)

2089 At a minimum, the following respiratory  
2090 protection equipment (RPE) should be  
2091 used: a P3-filtered mask with appropriate  
2092 protection factor<sup>247</sup>. In some Member  
2093 States the requirements are more  
2094 stringent because of the lower OEL. For  
2095 short-duration disposable respirators or  
2096 half-mask respirators will be suitable. For  
2097 long periods of continuous use power-  
2098 assisted equipment should be used. For  
2099 example, a Powered Air Purifying Helmet  
2100 Respirator (PAPR). This is a self-contained  
2101 helmet with batteries, a blower / fan unit  
2102 and filters for easy mobility, is cool and  
2103 comfortable.  
2104

2105 Facepieces (masks or half-masks) should  
2106 fit securely to the face to ensure optimal  
2107 protection. Improperly fitted facepieces,  
2108 particularly filtering devices, can provide  
2109 significantly reduced protection. Users  
2110 must ensure that no hair, beard,  
2111 spectacle arms, or other objects (such as  
2112 the hood of a garment) interfere with the  
2113 face seal. Additionally, the size of the  
2114 facepiece should be appropriately chosen  
2115 to fit the wearer. Face masks with silicone  
2116 facial cushion are recommended,  
2117 because they are soft and adaptive  
2118 ensuring a good fit factor. Workers must  
2119 be medically fit to wear RPE.

2120 To verify the fit and tightness of a  
2121 facepiece, a face fit test is recommended  
2122 conducted by a competent person<sup>248</sup>. A  
2123 "negative pressure test" can be done or  
2124 more advanced techniques can be used,  
2125 like the use of a particle counter, which  
2126 quantifies the fit by comparing the  
2127 number of particles inside and outside  
2128 the facepiece.

2129 A leak- and seal-check should be  
2130 performed every time a worker puts on a respirator. Only clean PPE in good condition should be used,

### Box 9.4: Control measures – PPE

Article 10(3) of Directive 2009/148/EC (AWD):

Where exposure cannot be reduced by other means and where compliance with the limit value makes necessary the wearing of individual respiratory protective equipment, this shall not be permanent and shall be kept to the strict minimum necessary for each worker. During periods of work which require the use of such equipment, provision shall be made for regular breaks appropriate to the physical and climatological conditions and, where relevant, in consultation with the workers and/or their representatives within the undertaking or establishment, in accordance with national law and practice.

Article 12 of Directive 2009/148/EC (AWD):

In the case of certain activities such as demolition, asbestos removal work, repairing and maintenance, in respect of which it is foreseeable that the relevant limit value as laid down in Article 8 will be exceeded despite the use of all possible technical preventive measures for limiting asbestos in air concentrations, the employer shall determine the measures intended to ensure protection of the workers while they are engaged in such activities, in particular the following: [...]

(a) workers shall be issued with suitable personal protective equipment to be worn, which shall be appropriately handled and, in particular with regard to respiratory equipment, which shall be individually adjusted, including through fitting checks, in accordance with Council Directive 89/656/EEC

Article 16(1) of Directive 2009/148/EC (AWD):

In the case of all activities referred to in Article 3(1), and subject to Article 3(3), appropriate measures shall be taken to ensure that:

(c) workers are provided with appropriate working or protective clothing; this working or protective clothing remains within the undertaking; it may, however, be laundered in establishments outside the undertaking which are equipped for this sort of work if the undertaking does not carry out the cleaning itself; in that event the clothing shall be transported in closed containers;

(f) protective equipment is placed in a well-defined place and checked and cleaned after each use, and appropriate measures are taken to repair or replace defective equipment before further use.

<sup>247</sup> Netherlands Association for Occupational Hygiene (2024). Respiratory Protective Equipment Guideline. Practical information on the selection and use of respiratory protective equipment when working with hazardous substances [20210554 NVVA Richtlijn Ademhalen Digitaal.indd](#).

<sup>248</sup> [https://face-fit.co.uk/wp-content/uploads/2016/03/282\\_28.pdf](https://face-fit.co.uk/wp-content/uploads/2016/03/282_28.pdf)

2131 and the effectiveness of PPE should be reviewed at least annually<sup>249</sup> All reusable PPE should be cleaned  
2132 immediately after use<sup>250</sup>.

2133 Filters have to be changed regularly on supplier's advice.

2134 Maintenance and storage of RPE:

- 2135 • RPE should be stored in a clean container. Wet wipe the external surface of the container to  
2136 remove any adhering dust before they are removed from the asbestos work area.
- 2137 • RPE should be used until all contaminated disposable coveralls and clothing have been  
2138 vacuum cleaned and/or removed and bagged for disposal and personal washing has been  
2139 completed.
- 2140 • RPE should be cleaned with a rag or fine-water spray and cloth.
- 2141 • Face pieces should be cleaned and disinfected.
- 2142 • RPE should be properly stored when not in use.

2143 Burdensome RPE use should be limited to a maximum time limit per day. RPE could be used for no  
2144 more than four hours per day, including time taken putting RPE on and removing RPE<sup>251</sup>, to minimise  
2145 the discomfort experienced by workers wearing RPE.

## 2146 **9.5.2 Personal protection equipment (PPE) other than RPE**

2147 In addition to RPE, at least the personal protection equipment (PPE) set out in the remainder of this  
2148 section should be used.

### 2149 **9.5.2.1 Coveralls**

2150 Disposable coveralls rated type 5, category 3 (EN ISO 13982–1), with fitted hoods (worn over the straps  
2151 of RPE) and cuffs should be worn.

2152 To prevent asbestos fibres from being transported outside the asbestos work area, coveralls should  
2153 be decontaminated by thoroughly vacuuming the coveralls using a HEPA filtered H-Class industrial  
2154 vacuum cleaner or by using a water spray bottle or damp cloths.

2155 The following should be observed for removal and waste management:

- 2156 • To remove coveralls, they should be turned inside-out to entrap any remaining contamination.
- 2157 • Subsequently, they should then be placed into appropriately labelled asbestos waste disposal  
2158 bags or should be wrapped in a double layer of heavy-duty plastic, which should then be  
2159 sealed using adhesive (cloth or duct) tape.
- 2160 • This should be appropriately labelled as asbestos-containing waste (see section 12).

### 2161 **9.5.2.2 Gloves**

2162 Single-use disposable nitrile gloves should be worn. If latex gloves are used, low protein (powder free)  
2163 gloves should be provided. As with the coveralls, the gloves must be disposed of in the same manner  
2164 as asbestos waste after use.

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<sup>249</sup> TRGS, 517

<sup>250</sup> FIOSH, 2019

<sup>251</sup> Under the Royal Decree 396/2006 in Spain for which establishes the minimum health and safety provisions applicable to work with risk of exposure to asbestos"; <https://www.boe.es/eli/es/rd/2006/03/31/396/con>

2165 **9.5.2.3 Footwear**

2166 Footwear should not have laces. Shoe covers can be used, however, they might reduce the grip and  
2167 traction on the bottom of your feet introducing safety risks (e.g. tripping).

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## 10 Education and training

2169 Education develops a worker's  
2170 knowledge base to underpin any  
2171 activities the worker may later  
2172 undertake. Academic studies for  
2173 occupations with a high risk of exposure  
2174 to asbestos should include education on  
2175 asbestos.

2176 Training concentrates on developing  
2177 specific skills. Any training which  
2178 supports developing knowledge and  
2179 understanding of asbestos exposure is  
2180 contributing to the worker's education.  
2181 Training should include practice  
2182 evaluation.

2183 The health risks associated with asbestos must be covered by the training, taking care to provide the  
2184 right balance. Everyone needs to respect asbestos, but not to fear it. Asbestos is an extremely emotive  
2185 subject, and often the simple knowledge of its presence is enough to make workers afraid of being in  
2186 the same room. This can result in poor decisions being made about remedial action when it is found.

2187 Any reference to competence, or competent workers, in relation to working with asbestos is a  
2188 reference to a worker who has received adequate information, instruction and training for the task  
2189 being done and can demonstrate an adequate and up-to-date understanding of the work, required  
2190 control measures and applicable law. They should also have enough experience to apply this  
2191 knowledge effectively.

2192 A training course on its own will not make a worker competent. Competence is developed over time  
2193 by implementing and consolidating skills learnt during training, on-the-job learning, instruction and  
2194 assessment.

2195 It is essential for recently trained workers, particularly those new to asbestos-related work, to  
2196 consolidate their newly acquired skills and knowledge by putting them to use on the job as soon as  
2197 possible. Employers, supervisors and managers play an important role in coaching new workers by  
2198 reinforcing good work practices and correcting bad ones. Where persistent problems occur, retraining  
2199 may be required. Further training can then be tailored to deal with performance weakness and gaps  
2200 in relevant skills. To build up evidence of worker competence, employers could use logbooks to  
2201 demonstrate the type of work that the worker has been carrying out and to what standard.

2202 Similarly, longstanding workers may benefit from reassessment and a skills update.

### Box 10.1: Training requirement

Article 14 of Directive 2009/148/EC (AWD):

(1) Employers shall provide appropriate training for all workers who are, or are likely to be, exposed to dust from asbestos or materials containing asbestos. Such training must be provided at regular intervals and at no cost to the workers.

(2) The content of the training shall be easily understandable for workers. It shall enable them to acquire the necessary knowledge and skills in terms of prevention and safety in accordance with the national law and practice applicable where the work takes place.

(3) The minimum requirements with regard to the content, duration and frequency of the training provided pursuant to this Article and the documentation relating thereto are set out in Annex Ia.

### Box 10.2: Minimum requirements for training

Annex Ia of Directive 2009/148/EC (AWD):

Workers who are, or who are likely to be, exposed to dust from asbestos or materials containing asbestos shall receive mandatory training, encompassing at least the following minimum requirements:

(1) The training shall be provided at the start of an employment relationship and whenever additional training needs are identified.

(2) The length of the training shall be adequate in relation to the tasks of the workers concerned.



(3) The training shall be provided by an instructor whose qualification is recognised in accordance with national law and practice.

(4) Every worker who has attended training in a satisfactory manner shall receive a training certificate indicating all of the following:

- (a) the date of the training;
- (b) the duration of the training;
- (c) the content of the training;
- (d) the language of the training;
- (e) the name, qualification, and contact details of the instructor, or the institution providing the training, or both.

(5) Workers who are, or are likely to be, exposed to dust from asbestos or materials containing asbestos shall receive theoretical and practical training concerning at least the following:

- (a) the applicable law of the Member State in which the work is carried out;
- (b) the properties of asbestos and its effects on health, including the synergistic effect of smoking;
- (c) the types of product or material likely to contain asbestos;
- (d) the operations that could result in exposure to asbestos and the importance of preventive controls to minimise such exposure;
- (e) safe working practices, controls and protective equipment;
- (f) the appropriate role, choice, selection, limitations and proper use of protective equipment, with particular regard to respiratory equipment;
- (g) emergency procedures;
- (h) decontamination procedures;
- (i) waste disposal;
- (j) medical surveillance requirements.

The training shall be adapted as closely as possible to the characteristics of the profession of the workers and the specific tasks and working methods of that profession.

(6) Workers who engage in demolition or asbestos removal work shall be required to receive training in addition to the training provided for pursuant to point (5) regarding the use of technological equipment and machines to contain the release and spread of asbestos fibres during work processes, in accordance with this Directive.

## 2203 10.1 Who is responsible for delivering training?

2204 The responsibility for ensuring that workers that are, or are likely to be, exposed to dust from asbestos  
2205 or materials containing asbestos, are adequately trained, always lies with the employer<sup>252</sup>. The training  
2206 must be adequate to safeguard both the worker, and any other people around them, as they carry out  
2207 their work<sup>253</sup>. Workers need to be informed of the training available and should have completed it,  
2208 see section 10.5. Workers' representatives with a specific role in protecting the safety and health of  
2209 workers should be aware of the training available and must be entitled to appropriate training<sup>254</sup>. The  
2210 employer may designate the training tasks to in-house workers or enlist the assistance of external  
2211 services or persons. The persons providing the training should have the following competencies  
2212 (whilst complying with any applicable national legislation or guidance):

- 2213 • Knowledge, skills and experience to assess the training needs for all roles and develop the  
2214 training programme
- 2215 • Understanding of asbestos, workplace, tasks undertaken, how and when exposure can  
2216 happen, and health & safety regulations
- 2217 • Appropriate authority and seniority level

<sup>252</sup> Directive 2009/148/EC, Article 14(1)

<sup>253</sup> Directive 89/391/EEC, Article 12(1)

<sup>254</sup> Directive 89/391/EEC, Article 12(3)

2218 The employer must ensure that the designated in-house workers or external services or persons  
2219 include sufficient people to assess the training needs, and to develop and implement the training  
2220 programme<sup>255</sup>: the assistance of external services or persons, does not discharge the employer from  
2221 these responsibilities<sup>256</sup>. All training must be provided by an instructor whose qualification is  
2222 recognised in accordance with national law and practice<sup>257</sup>.

2223 Where appropriate, external training courses offered by professional bodies should have accreditation  
2224 from the relevant authority and contribute to the workers continuing professional development.

2225 Workers and/or their representatives must be consulted and allowed to take part in discussions also  
2226 on questions relating to occupational safety and health training<sup>258</sup>.

## 2227 **10.2 Scope**

### 2228 **10.2.1 Scope of the training**

2229 The objective of training about asbestos is to enable workers to acquire the necessary knowledge and  
2230 skills in terms of prevention and safety with regard to (potential) exposure to asbestos<sup>259</sup> workers'  
2231 exposure to asbestos. The training must cover all aspects listed in Annex Ia of Directive 2009/148/EC,  
2232 including, where relevant, the risks and safe handling of asbestos during both specific activities to  
2233 remove or seal asbestos and the normal workplace activities in areas where there could be asbestos  
2234 The training should also include the OSH aspects of the handling of any waste that might contain  
2235 asbestos and cover incidents such as uncontrolled release of asbestos dust into the workplace. The  
2236 training must be adapted to take into account any new risks or changes to risks, whilst relevant training  
2237 must be provided in the event of the introduction of new work equipment or a change in equipment,  
2238 or of the introduction of any new technology<sup>260</sup>. The training, instruction and information given to a  
2239 worker must be specific to the worker's workstation or job<sup>261</sup> and should reflect their work activity  
2240 and level of exposure to asbestos as is defined in the risk assessment and asbestos risk management  
2241 plan, see section 5.

2242 Workers must have received appropriate training before carrying out work involving asbestos<sup>262</sup>: this  
2243 applies to workers with roles listed in Section 1.3. Staff working with asbestos should have their  
2244 competency assessed after the initial training and subsequently at regular intervals such as annually.

2245 Asbestos exposure training must not be at the workers' expense or at that of the workers'  
2246 representatives<sup>263</sup>. The training of workers must take place during working hours. The training of  
2247 workers' representatives must take place during working hours or in accordance with national practice  
2248 either within or outside the undertaking and/ or the establishment<sup>264</sup>.

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<sup>255</sup> Directive 89/391/EEC, Article 7(1) and 7(5)

<sup>256</sup> Directive 89/391/EEC, Article 5(2)

<sup>257</sup> Directive 2009/148/EC, Annex 1a (3)

<sup>258</sup> Directive 89/391/EEC, Article 11

<sup>259</sup> Directive 89/391/EEC, Article 14 (2)

<sup>260</sup> Directive 89/391/EEC, Article 12 (1)

<sup>261</sup> Directive 89/391/EEC, Article 12 (1)

<sup>262</sup> Directive 89/391/EEC, Article 14 (1)

<sup>263</sup> Directive 89/391/EEC, Article 12(4)

<sup>264</sup> Directive 89/391/EEC, Article 12(4)

## 2249 **10.2.2 Which workers need training (roles)**

2250 The workers with roles listed in section 1.3 who are, or are likely to be, exposed to dust from asbestos  
2251 or materials containing asbestos must be trained in the safe use of asbestos<sup>265</sup> as required by the risk  
2252 assessment, see section 5. This includes workers from external organisations or external persons (such  
2253 as contractors; casual, agency, or temporary workers; or volunteers) providing any of the roles in  
2254 section 1.3.

## 2255 **10.2.3 What is required?**

2256 Workers' training needs should be assessed by role and should typically consider:

- 2257 • Level of risks found in the risk assessment, see section 5
- 2258 • Activities carried out in the workplace
- 2259 • Workers' roles
- 2260 • Existing training provided and any evaluation of it
- 2261 • Workers' level of education, language skills and training already received
- 2262 • Delivery methods likely to be most effective (which may differ by factors such as size of  
2263 organisation or type of worker)

2264 Based upon the training needs, a structured training programme should be developed to cover all  
2265 roles, activities, and workplaces involving asbestos exposure. The training needs and, therefore, the  
2266 training programme relating to asbestos that is required, for example, for asbestos removal workers  
2267 and electricians are quite different.

2268 Workers should be encouraged to see education as an ongoing process, and attend in-house or  
2269 external courses, workshops, seminars, and conferences.

## 2270 **10.3 Methods**

### 2271 **10.3.1 How is it achieved?**

2272 The training is achieved through a structured education programme with different modules enabling  
2273 workers with different roles and levels of risk to receive appropriate training, including practical  
2274 training. There should be a core set of compulsory training for every worker that is, or is likely to be,  
2275 exposed to dust from asbestos or materials containing asbestos handles asbestos, to complete. The  
2276 remaining asbestos exposure training should then also include activities specific to the worker's role  
2277 and workplace.

2278 Training must be easily understood by workers, in a format, manner and language that is accessible  
2279 to workers<sup>266</sup>. Written training materials should be provided to workers. If any workers might not be  
2280 proficient in the language of the training or might have low levels of literacy, the training should be  
2281 carefully developed to ensure that everyone understands it. The length of the training must be  
2282 adequate in relation to the tasks of the workers concerned<sup>267</sup>.

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<sup>265</sup> Directive 89/391/EEC, Article 14 (1)

<sup>266</sup> Directive 2009/148/EC Article 14 (2)

<sup>267</sup> Directive 2009/148/EC Annex 1a (2)

2283 **10.3.2 Core training**

2284 Core theoretical and practical training must include<sup>268</sup>:

- 2285 • Applicable law of the Member State in which the work is carried out
- 2286 • Properties of asbestos and its effects on health, including latency periods and the synergistic/multiplicative effect of smoking, see section 2
- 2287
- 2288 • Types of product or material likely to contain asbestos, the history of their being imported,
- 2289 see section 6.2.1, their friability, their previous treatment methods, and the conditions under
- 2290 which they might release fibres
- 2291 • Operations that could result in exposure to asbestos and the importance of preventive
- 2292 controls to minimise such exposure, see section 9
- 2293 • Safe working practices, controls and protective equipment, see sections 4 and 9
- 2294 • Appropriate role, choice, selection, limitations, proper use, maintenance, storage, and
- 2295 disposal of protective equipment with particular regard to respiratory protection equipment
- 2296 (RPE), dust/fibre suppression, vacuums, enclosures and negative pressure equipment, see
- 2297 section 9
- 2298 • Incident procedures, see section 13.5.5
- 2299 • Decontamination procedures, see section 9.3.2
- 2300 • Waste disposal, see section 12
- 2301 • Medical surveillance requirements, see section 11

2302 The core training for workers engaged in demolition or asbestos removal must cover the use of  
2303 technological equipment and machines to contain the release and spread of asbestos fibres during  
2304 work processes<sup>269</sup> relevant to the particular asbestos situation:

- 2305 • Buildings, see section 13
- 2306 • Ships, trains, aircraft, vehicles and machines, see section 14
- 2307 • Mining and quarrying, see section 15
- 2308 • Civil engineering, see section 16

2309 The core training should also include (list is not exhaustive):

- 2310 • Identification of asbestos, see section 6
- 2311 • Understanding the risk assessment and plan of work for the task, see section 5
- 2312 • Rights of workers, including an individual risk assessment to assess exposure levels, see
- 2313 section 5
- 2314 • Understanding the results of air exposure monitoring relating to the task, see section 7
- 2315 • Understanding details of any notification or licences required for the task by national
- 2316 legislation, see section 5.2.1
- 2317 • Understanding their personal health records and the information given in anonymised health
- 2318 records for other workers
- 2319 • Understanding the importance of achieving and maintaining a good seal between face and
- 2320 RPE often known as face fit tests
- 2321 • Risk awareness, see section 4.4

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<sup>268</sup> Directive 2009/148/EC Annex 1a (5)

<sup>269</sup> Directive 2009/148/EC Annex 1a (6)

- 2322 • Health risks to worker’s families and other workers due to contaminated equipment and
- 2323 clothing (secondary exposure) see section 8.1.2
- 2324 • Consideration of all other relevant risks such as working at height, electric shocks, noise,
- 2325 vibration, slips, or working with fire (firefighters) in addition to the risk of exposure to asbestos
- 2326 • Site clean-up and clearance procedures, before reoccupation, see section 13.5.3

2327 The core training for workers engaged in emergency services is covered in section 17.6 and includes  
 2328 determining the risk of asbestos being present on a site.

### 2329 10.3.3 Additional training

2330 Additional asbestos exposure training depends upon the role, activities and workplace of the worker  
 2331 but could typically include:

- 2332 • Other relevant health and safety legislation
- 2333 • Procedures for medical examinations
- 2334 • Relevant aspects of waste management legislation
- 2335 • Relevant aspects of the inland transport of dangerous goods legislation
- 2336 • Any other relevant legislation
- 2337 • Procedures for notifications or licences required for the task by Member State legislation, see
- 2338 section 5.2.1
- 2339 • Written standard operating procedures (SOPs)
- 2340 • Risk assessment process and risk management plan, see section 5
- 2341 • Workplace monitoring and air exposure measurement, see section 7
- 2342 • Responsibilities of different workers’ roles in handling asbestos
- 2343 • Identifying workplace hazards for exposure to asbestos
- 2344 • Correct selection, use (donning and doffing), cleaning, decontamination and disposal of PPE
- 2345 • Hygiene requirements and facilities
- 2346 • Detailed work activities and measures to control exposure to asbestos when maintaining,
- 2347 renovating or demolishing structures where asbestos could be present
- 2348 • Understanding and correct use of equipment during work activities
- 2349 • Maintenance of equipment used routinely by workers during work activities, including
- 2350 procedures for recording, reporting and correcting defects in equipment and work methods

### 2351 10.3.4 How often?

2352 Training must take place at the following times<sup>270</sup>:

- 2353 • New staff: immediately upon starting work: before exposure to asbestos. This should apply
- 2354 to all roles listed in section 1.3 at risk of being exposed to asbestos.
- 2355 • Staff moving to a new role at risk of being exposed to asbestos: immediately upon changing
- 2356 role

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<sup>270</sup> Directive 89/391/EEC, Article 12(1), Directive 2009/148/EC, Article 14 and Annex 1a (1); see also Directive 2004/37/EC, Article 11; and Directive 98/24/EC, Article 8

- 2357 • If new work equipment is introduced, or a change in work equipment takes place, or any new  
2358 technology is introduced, or if new or changed risks occur (for example, because of  
2359 amendments made to processes): training should take place before the change is made  
2360 • When any additional training needs or gaps in competencies are identified.  
2361 • At regular intervals to the extent necessary.

2362 Workers returning to work after a prolonged absence, whose roles are listed in section 1.3 as being at  
2363 risk of exposure to asbestos, should be retrained immediately upon returning work.

2364 Regular training can typically take place at the following times:

- 2365 • All workers handling asbestos should have an annual refresher course on incident  
2366 management (such as uncontrolled release of asbestos dust into the workplace)  
2367 • All workers handling asbestos should have refresher training on all aspects of asbestos  
2368 relevant to their role every one to three years to maintain skills and awareness. The frequency  
2369 depends upon the role and should be identified in the risk assessment, see section 5.  
2370 • All workers should have regular competency checks, which should be at least annually.

2371 All workers at risk of exposure to asbestos should receive information about training appropriate to  
2372 their role, level of risk, activities, and workplace, see section 4.4.

## 2373 **10.4 Evaluate and revise**

2374 Several elements of training should typically be evaluated:

- 2375 • What is the worker's feedback on the training and the trainers?  
2376 • What is the trainer's feedback on the worker?  
2377 • Is the worker competent at the end of training?  
2378 • Does the worker remain competent over time? Competency should be checked at least  
2379 annually.  
2380 • Are workers following the training in their work?  
2381 • Do the processes given in training actually reduce exposure? This should be checked using air  
2382 exposure measurement, see section 7, before and after the training

2383 Worker assessment could typically include testing their competency to:

- 2384 • Define basic concepts and specific terms  
2385 • Complete tests or practical presentations, to show their understanding of processes  
2386 • Show how they would transfer their new skills and knowledge into the workplace

2387 The evaluation should also consider any specific reasons to revise the training including:

- 2388 • New or changed administration processes for asbestos  
2389 • Any other changes to working practices relating to asbestos exposure

2390 The evaluation of training should take place annually and be revised as necessary, based upon the  
2391 information gathered above.

## 2392 10.5 Record keeping

2393 Every worker who has attended training in a satisfactory manner must receive a training certificate  
2394 indicating the following<sup>271</sup>:

- 2395 • Name of the worker trained
- 2396 • Date of the training
- 2397 • Duration of the training
- 2398 • Content of the training
- 2399 • Language of the training
- 2400 • Name, qualification, and contact details of the instructor, or the institution providing the  
2401 training, or both.

2402 Records should be kept about the training course and about each worker completing the training. The  
2403 data kept should include the information above plus:

- 2404 • Signature of trainer to confirm they provided the training
- 2405 • Names of all workers attending the session
- 2406 • Signatures of the workers to confirm that they completed the training
- 2407 • Feedback from workers on the training
- 2408 • Training evaluations
- 2409 • Assessment of competencies

2410 Records about each training course should be held by the education provider. Records of all training  
2411 completed by a worker should be held in their human resources file until retirement. Workers should  
2412 be given a copy of their training certificates and records

2413 Record keeping must comply with any applicable national legislation or guidance, which can vary  
2414 considerably.

2415

2416

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<sup>271</sup> Directive 2009/148/EC Annex 1a (4)



# 2417 11 Health surveillance

## 2418 11.1 Introduction

### 2419 11.1.1 Scope and objectives

2420 Health surveillance must be carried out  
2421 for all workers exposed to dust arising  
2422 from asbestos or MCAs at the place of  
2423 work, before and during exposure.<sup>272</sup>  
2424 Where a doctor or authority responsible  
2425 for health surveillance indicates so,  
2426 health surveillance must continue after  
2427 the end of exposure.<sup>273</sup>

2428 Health surveillance of workers prior,  
2429 during, and after exposure to asbestos is  
2430 important for assessing both the  
2431 potential consequences of asbestos  
2432 exposure for workers' health and  
2433 validating/checking the effectiveness of  
2434 exposure prevention and minimisation  
2435 measures. This includes:

- 2436 • Detecting ill-health effects in workers at an early stage, may improve chances for effective  
2437 treatment and/or prevent worsening of ill-health.
- 2438 • Providing data to help employers evaluate health risks.
- 2439 • Enabling workers to raise concerns about how work affects their health.
- 2440 • Highlighting lapses in workplace control measures, therefore providing invaluable feedback  
2441 to the asbestos risk assessment and risk management.
- 2442 • Providing an opportunity to reinforce training and education of workers (e.g. on the impact of  
2443 health effects and the use of protective equipment).

2445 Workers' health surveillance must be appropriate to the health and safety risks workers incur at  
2446 work<sup>274</sup>, i.e. may need to take into account occupational risks other than the six asbestos fibres listed  
2447 in Article 2 of Directive 2009/148/EC; specifically, requirements for health surveillance are established  
2448 in EU legislation for carcinogens, mutagens or reprotoxic substances<sup>275</sup>, other hazardous chemical  
2449 agents<sup>276</sup>, and other occupational risks<sup>277</sup>. In this regard, it is of note that other types of asbestos in  
2450 addition to the six asbestos fibres in Article 2 of Directive 2009/148/EC, including erionite<sup>278</sup>,

#### Box 11.1: Health surveillance in Directive 2009/148/EC (AWD)

Article 18(2) of Directive 2009/148/EC (AWD):

An assessment of each worker's state of health must be available prior to the beginning of exposure to dust arising from asbestos or materials containing asbestos at the place of work.

[...]

A new assessment must be available at least once every three years for as long as exposure continues.

Article 18(4) of Directive 2009/148/EC (AWD):

The doctor or authority responsible for the medical surveillance of workers may indicate that medical surveillance must continue after the end of exposure for as long as they consider it necessary to safeguard the health of the person concerned.

<sup>272</sup> Directive 2009/148/EC, Article 18

<sup>273</sup> Directive 2009/148/EC, Article 18

<sup>274</sup> Directive 89/391/EEC, Article 14(1)

<sup>275</sup> Directive 2004/37/EC, Article 14

<sup>276</sup> Directive 98/24/EC, Article 10

<sup>277</sup> Directive 89/391/EEC, Article 14

<sup>278</sup> See <https://echa.europa.eu/substance-information/-/substanceinfo/100.149.232> and <https://echa.europa.eu/substance-information/-/substanceinfo/100.171.103>

2451 riebeckite, winchite, richterite or fluoro-edenite, do or potentially may meet the criteria for  
2452 classification as hazardous, for example carcinogenic<sup>279</sup>.

### 2453 11.1.2 Responsibility

2454 Given that it is the Member States that  
2455 are responsible for establishing the  
2456 arrangements for carrying out health  
2457 surveillance, employers should  
2458 familiarise themselves with national  
2459 legislation and/or guidance in their  
2460 Member State to establish the extent of  
2461 their responsibilities for health  
2462 surveillance. Health surveillance must  
2463 always comply with other EU and  
2464 national legislation and/or practices,  
2465 including on the protection of personal  
2466 data.<sup>280</sup>

#### Box 11.2: Health surveillance in Directive 2009/148/EC (AWD)

Article 18(3) of Directive 2009/148/EC (AWD):

Following the clinical surveillance referred to in the second subparagraph of paragraph 2, the doctor or authority responsible for the medical surveillance of the workers shall, in accordance with national laws, advise on any individual protective or preventive measures to be taken or determine such measures.

Those measures may include, where appropriate, the withdrawal of the worker concerned from all exposure to asbestos.

2467 In addition, employers should follow the advice of the doctor or authority responsible for the medical  
2468 surveillance of the workers as regards individual protective or preventive measures to be taken.

2469 It is the responsibility of the worker to follow the instructed working procedures and use of control  
2470 measures including the correct use of personal protective equipment such as respiratory protection.<sup>281</sup>

### 2471 11.1.3 Asbestos-related occupational diseases

2472 Member States must keep a register of all  
2473 cases of medically diagnosed asbestos-  
2474 related occupational diseases.<sup>282</sup> An  
2475 indicative list of diseases that can be  
2476 caused by exposure to asbestos is set out  
2477 in Annex I of Directive 2009/148/EC (see  
2478 Box 11.3).

#### Box 11.3: An indicative list of diseases that can be caused by exposure to asbestos

Annex I of Directive 2009/148/EC (AWD):

Current knowledge indicates that exposure to free asbestos fibres can give rise to at least the following diseases:

- Asbestosis.
- Mesothelioma.
- Lung carcinoma.
- Gastro-intestinal carcinoma.
- Carcinoma of the larynx.
- Carcinoma of the ovary.
- Non-malignant pleural diseases.

2479 The recognition of occupational diseases  
2480 related to exposure to asbestos is a  
2481 Member State competence. In the  
2482 following paragraphs the minimum  
2483 requirements for health surveillance are provided.

<sup>279</sup> <https://ntp.niehs.nih.gov/sites/default/files/ntp/roc/content/profiles/erionite.pdf>;  
<https://publications.iarc.fr/552>; <https://nap.nationalacademies.org/catalog/11665/asbestos-selected-cancers>.

<sup>280</sup> Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation GDPR), in particular Article 9, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504&qid=1674485543249>

<sup>281</sup> See Directive 89/391/EEC, Article 13

<sup>282</sup> Directive 2009/148/EC, Article 21

2484 **11.1.4 Who should conduct health surveillance?**

2485 A health surveillance is a multidisciplinary activity in which various disciplines should be involved.

2486 Starting point is the risk assessment by a trained occupational hygienist and/or workplace safety  
2487 officer. In case of asbestos exposure, the risk assessment points towards all employees at risk for work  
2488 related health problems.

2489 In general, the occupational health surveillance should be conducted by an occupational medical  
2490 doctor or a medical doctor trained in the health risks of the specific work activities.

2491 Specific lung examination should be conducted by a medical lung specialist (pulmonologist and  
2492 radiologist).

2493 Post exposure examination should be conducted by a trained general physician or medical lung  
2494 specialist.

2495 **11.1.5 Training and education**

2496 The occupational hygienist, workplace safety officer, occupational medical doctor and/or general  
2497 physician should be educated and trained in the risks of asbestos exposure.

2498 **11.1.6 Risk assessment**

2499 The result of health surveillance should  
2500 be used in revisions of the risk  
2501 assessment and the design of risk  
2502 management measures. This is  
2503 particularly useful since all workers for  
2504 whom the results of the risk assessment  
2505 reveal a risk to health or safety must  
2506 undergo health surveillance<sup>283</sup> and health  
2507 surveillance is thus an important tool for  
2508 validation of the risk assessment and  
2509 identification of additional risk.

2510 Conversely, the risk assessment is  
2511 important for determining the scope of  
2512 the health surveillance since it is carried  
2513 out to reveal that there's a risk of  
2514 exposure to asbestos. The doctor and/or  
2515 authority responsible for health surveillance must be familiar<sup>284</sup> with the exposure conditions and  
2516 circumstances of each worker and the risk assessment is thus a useful source of information.

2517 The risk assessment should identify all workers exposed or likely to be exposed to asbestos as well as  
2518 individuals with higher risk associated with the tasks that imply higher exposure and/or due to

**Box 11.4: Relationship between risk assessment/management and health surveillance**

Article 18(3) of Directive 2009/148/EC (AWD):

Following the clinical surveillance referred to in the second subparagraph of paragraph 2, the doctor or authority responsible for the medical surveillance of the workers shall, in accordance with national laws, advise on any individual protective or preventive measures to be taken or determine such measures.

Those measures may include, where appropriate, the withdrawal of the worker concerned from all exposure to asbestos.

Annex I of Directive 2009/148/EC (AWD):

The doctor and/or authority responsible for the health surveillance of workers exposed to carcinogens, mutagens or reprotoxic substances must be familiar with the exposure conditions or circumstances of each worker.

<sup>283</sup> Directive 2009/148/EC, Article 18

<sup>284</sup> Directive 2009/148/EC, Annex I

2519 personal health conditions that may be exacerbated by exposure. This could be useful information for  
2520 adapting the health surveillance programme to each worker situation.<sup>285</sup>

2521 Health surveillance should not be a substitute for undertaking an asbestos risk assessment or using  
2522 effective controls.

## 2523 **11.2 Groups that should undergo asbestos health surveillance**

2524 Health surveillance must be carried out for all workers that are exposed to asbestos in the workplace,  
2525 starting prior to the beginning of exposure.<sup>286</sup>

2526 The asbestos risk assessment should typically make a distinction for the following groups of workers:

- 2527 • Direct exposure – refers to workers who are directly involved in activities that expose them to  
2528 asbestos fibres. This includes, but is not limited to, tasks such as demolition, construction,  
2529 insulation work, and asbestos removal.
- 2530 • Secondary exposure – refers to exposure to asbestos fibres transferred by occupationally  
2531 exposed individuals mostly from their clothing or hair. Occupational secondary exposure can  
2532 occur, for example, when clothes, which are contaminated with asbestos, are washed in an  
2533 industrial laundry.
- 2534 • Passive exposure - refers to workers who work either in the vicinity of someone working with  
2535 materials containing asbestos, or in premises where materials containing asbestos are  
2536 degrading in building structures, are exposed to asbestos.

2537  
2538 It may be useful to design health surveillance approaches to the relevant of the three types of  
2539 exposure listed above.

2540 See also Section 8 for more information about secondary and passive exposure.

## 2541 **11.3 Key elements of health surveillance**

2542 Health surveillance for asbestos workers consists of:<sup>287</sup>

- 2543 • Risk assessment (see section 5 to be considered)
- 2544 • Risk communication and education (see section 10):
  - 2545 • Inform workers about asbestos risks, symptoms to watch for, and the importance of  
2546 regular medical check-ups.
  - 2547 • Provide clear instructions on using personal protective equipment (PPE) and minimising  
2548 exposure.
  - 2549 • Training sessions (see section 10)
  - 2550 • Written guides and accessible resources (e.g. multilingual materials).
- 2551 • Data management and compliance:
  - 2552 • Maintain detailed records of medical evaluations, exposure levels, and follow-up  
2553 schedules.

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<sup>285</sup> Directive 2009/148/EC, Article 3 and Annex I.

<sup>286</sup> Directive 2009/148/EC, Article 18

<sup>287</sup> [https://www.bgbau.de/fileadmin/Medien-Objekte/Medien/DGUV-Vorschriften/6\\_BGV\\_A4\\_BGV\\_A4\\_Arbeitsmedizinische\\_Vorsorge.pdf](https://www.bgbau.de/fileadmin/Medien-Objekte/Medien/DGUV-Vorschriften/6_BGV_A4_BGV_A4_Arbeitsmedizinische_Vorsorge.pdf) and <https://medischekeuringen.net/medische-keuring/werken-met-gevaarlijke-stoffen/asbest/>

- 2554 • Multidisciplinary collaboration:
- 2555 • Involve medical professionals (occupational medical doctors, pulmonologists,
- 2556 radiologists), occupational hygienists, and workplace safety officers in designing and
- 2557 executing the health surveillance.
- 2558 • Medical health examinations:
- 2559 • Pre-exposure examination.
- 2560 • During exposure examination.
- 2561 • Post-exposure medical examination.

## 2562 11.4 Health surveillance requirements

### 2563 11.4.1 Medical health examinations

2564 Performing medical health surveillance:

- 2565 • General occupational health surveillance pre-exposure and during exposure should be
- 2566 conducted by an occupational medical doctor or a medical doctor trained in the health risks
- 2567 of the specific work activities.
- 2568 • Specific lung examination should be conducted by a medical lung specialist (radiologist).
- 2569 • Post exposure examination should be conducted by a trained general physician or medical
- 2570 lung specialist.

#### 2571 11.4.1.1 Pre-exposure examination

2572 Pre-exposure examination is a job  
2573 specific health check and a baseline check  
2574 before the worker is exposed to asbestos.

2575 Pre-exposure examination must include  
2576 at least the measures in Box 11.5. More  
2577 generally, it should include:<sup>288</sup>

- 2578 • A medical history.
- 2579 • Assessment of fitness for the job
- 2580 and the risks of asbestos
- 2581 exposure:
- 2582 • Basic health examination (for
- 2583 example, height, weight, blood
- 2584 pressure measurement and
- 2585 pulse).
  - 2586 ○ Physical examination by
  - 2587 a doctor, with respect to
  - 2588 the job demands, including working with compressed air.
- 2589 • Baseline check before exposure to asbestos:
  - 2590 ○ Lung function tests (respiratory flow volumes and rates; FEV1 and FVC)
- 2591 • On indication, advanced imaging (use latest radiologic guidelines);<sup>289</sup> considerations:

#### Box 11.5: Minimum requirements for health surveillance

Annex I of Directive 2009/148/EC (AWD):

Health examination of workers should be carried out in accordance with the principles and practices of occupational medicine. It should include at least the following measures:

- keeping records of a worker's medical and occupational history,
- a personal interview,
- a general clinical examination, with particular reference to the chest,
- lung function tests (respiratory flow volumes and rates).

The doctor and/or authority responsible for health surveillance should decide on further examinations, such as sputum cytology tests or a chest X-ray or a tomodensitometry, in the light of the latest occupational health knowledge available.

<sup>288</sup> [https://nvab-online.nl/app/uploads/2024/08/Leidraad\\_Aanstellingskeuringen\\_okt2020.pdf](https://nvab-online.nl/app/uploads/2024/08/Leidraad_Aanstellingskeuringen_okt2020.pdf)

<https://medischekeuringen.net/medische-keuring/werken-met-gevaarlijke-stoffen/asbest/>

<sup>289</sup> Consensus report. Asbestos, asbestosis, and cancer, the Helsinki criteria for diagnosis and attribution 2014: recommendations. *Scand J Work Environ Health*. 2015;41(1):5–15. doi:10.5271/sjweh.3462. In several EU Member States, an annual X-ray examination is mandatory.

- 2592 ○ Workers' demographic and lifestyle.
- 2593 ○ Medical and occupational history (including previous occupational asbestos
- 2594 exposure).
- 2595 ○ On indication and from 40 years of age a cardiac film/ECG.
- 2596 ○ Advice and recommendations (lifestyle/anti-smoking advice).
- 2597 ● Establishing and keeping the records of the worker's medical and occupational history.

#### 2598 **11.4.1.2 During exposure examination**

2599 Health surveillance during exposure is a periodical surveillance of the health condition of the worker  
 2600 to check if there are changes in the health status because of the work, specifically concerning exposure  
 2601 to asbestos. The periodicity and content of the medical examination can be Member State specific;  
 2602 however, the minimum requirements in Directive 2009/148/EC on the measures and periodicity must  
 2603 be followed: examination during exposure must include at least the measures in Box 11.5<sup>290</sup> and must  
 2604 be carried out at least once every three years for as long as exposure continues.<sup>291</sup>

2605 More generally, a periodic examination during exposure should include:<sup>292</sup>

- 2606 ● A medical history.
- 2607 ● Exposure evaluation.
- 2608 ● Basic health examination.
- 2609 ● Physical examination by doctor, with respect to the job demands, including working with
- 2610 compressed air.
- 2611 ● Assessing welfare of workers: For example: hydration, use of fan-powered or compressed-
- 2612 airline respirator, modified working hours for those using respiratory protection.
- 2613 ● Updated medical history, focusing on respiratory symptoms such as persistent coughing or
- 2614 shortness of breath.
- 2615 ● Repeat lung function tests (respiratory flow volumes and rates; FEV1 and FVC).
- 2616 ● On indication advanced imaging for early detection of asbestos-related conditions such as
- 2617 mesothelioma.
- 2618 ● On indication and from 40 years of age a cardiac film / ECG.
- 2619 ● Screening only in case of high risk: e.g. breast cancer, BRCA gene mutations or a strong family
- 2620 history of ovarian cancer. Screening in case of high risk should include a CA-125 blood test;
- 2621 and in case of increased level of marker a TVUS (transvaginal ultrasound) is recommended.
- 2622

2623 An up-to-date health record for each worker should be maintained, including exposure data.  
 2624

<sup>290</sup> Directive 2009/148/EC, Annex I

<sup>291</sup> Directive 2009/148/EC, Article 18(2)

<sup>292</sup> [https://nvab-online.nl/app/uploads/2024/08/Leidraad\\_Aanstellingskeuringen\\_okt2020.pdf](https://nvab-online.nl/app/uploads/2024/08/Leidraad_Aanstellingskeuringen_okt2020.pdf) and  
<https://medischekeuringen.net/medische-keuring/werken-met-gevaarlijke-stoffen/asbest/>



2625 **11.4.1.3 Post-exposure examination**

2626 Post exposure examination should  
2627 include:

2628 • End-of-employment medical  
2629 examination – A final medical  
2630 examination should be carried  
2631 out with emphasis on the  
2632 respiratory system. Workers with  
2633 health conditions or continuing  
2634 symptoms possibly due to  
2635 asbestos exposure should be  
2636 advised to seek further  
2637 additional diagnostics by a  
2638 registered medical specialist (e.g.  
2639 pulmonologist). This could be organised by the registered medical practitioner supervising the  
2640 health surveillance.

2641 • Post-employment medical examinations – It should be ensured that workers continue to be  
2642 monitored for potential health issues after leaving their jobs, recognising the long latency  
2643 period of asbestos-related diseases such as mesothelioma and asbestosis.

2644  
2645 Content of post-employment medical examination:

- 2646 • Employers are obligated to provide former workers with information on how and where to  
2647 access previous health surveillance reports. .  
2648 • Medical professionals involved in the post-employment medical examination should also have  
2649 access to and knowledge of these previous health surveillance reports  
2650 • Monitoring should focus on early detection of diseases, particularly respiratory issues, even  
2651 decades after exposure.  
2652

2653 Existing sources suggest that follow-up for high exposed workers should be continued for up to 30  
2654 years after the cessation of exposure.<sup>293</sup> However, it is recommended in this guide that the follow up  
2655 should be lifelong considering the long latency time (can be over 40 years) between exposure and  
2656 disease.

2657 **11.4.2 Health surveillance requirements per group**

2658 Health surveillance for all groups must comply with the minimum requirements in Directive  
2659 2009/148/EC (see Boxes 11.1-11.6). However, some variation between the groups may be useful to  
2660 reflect the differences in nature and degree of the workers' exposure to dust arising from asbestos or  
2661 MCAs.

2662 Workers with direct exposure should undergo full health surveillance:

- 2663 • Pre-exposure medical examination) before the worker is exposed to asbestos.

**Box 11.6: Health surveillance after the end of exposure**

Article 18(4) Directive 2009/148/EC (AWD):

Information and advice must be given to workers regarding any assessment of their health which they may undergo following the end of exposure.

The doctor or authority responsible for the medical surveillance of workers may indicate that medical surveillance must continue after the end of exposure for as long as they consider it necessary to safeguard the health of the person concerned.

Such continuing surveillance shall be carried out in accordance with national laws and/or practice.

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<sup>293</sup> Consensus report. Asbestos, asbestosis, and cancer, the Helsinki criteria for diagnosis and attribution 2014: recommendations. Scand J Work Environ Health. 2015;41(1):5–15. doi:10.5271/sjweh.3462.).



- Periodic medical examinations at least once every 3 years while the worker is exposed to asbestos, specific periodicity according to national legislation. The frequency may be more frequent depending on exposure levels and the asbestos risk assessment.
- Post-exposure surveillance may continue for a number of years after the exposure has ended, depending on the health risks and any potential symptoms or conditions related to asbestos exposure.

Workers subject to secondary and passive exposure must undergo pre-exposure and period checks (see Boxes 11.1-11.6) but their content and frequency can be tailored to the exposure level and the potential risk (as long as the minimum requirements in Directive 2009/148/EC and the applicable national legislation are complied with). If exposure is minimal and well below the Occupational Exposure Limit (OEL), the health checks may be less frequent than for workers with direct exposure. Similarly, post-exposure health surveillance can be tailored to the level of risk linked to the type of exposure.

## 11.5 Record keeping

### 11.5.1 Exposure register (personal)

The employer must enter the information about nature and duration of activities on the workers in which they are or may be exposed in the course of their work to dust arising from asbestos or MCAs in a register.<sup>294</sup> This information must indicate the nature and duration of the activity and the exposure to which they have been subjected.<sup>295</sup> The doctor and/or the authority responsible for medical surveillance must have access to this register. Workers must have access to the results in the register which relate to them personally, whilst the workers and/or their representatives must have access to anonymous, collective information in the register.<sup>296</sup>

All records of exposure assessment should state the employer's business name and address, the site address where appropriate and the date of assessment, and should also include:

- the type of work being done and, where relevant, its exact location;
- the period that individuals are exposed;
- the measured or estimated fibre concentration of exposure;
- the fibre type, if known.

#### Box 11.7: Register of workers and exposures

Article 19 of Directive 2009/148/EC (AWD):

(2) The employer shall enter the information on the workers engaged in the activities referred to in Article 3(1) in a register. That information shall indicate the nature and duration of the activity and the exposure to which they have been subjected. The doctor and/or the authority responsible for medical surveillance shall have access to this register. Workers shall have access to the results in the register which relate to them personally. The workers and/or their representatives shall have access to anonymous, collective information in the register.

(3) The register referred to in paragraph 2 and the medical records referred to in the fourth subparagraph of Article 18(2) shall be kept for at least 40 years following the end of exposure, in accordance with national laws and/or practice.

(4) The documents referred to in paragraph 3 shall be made available to the responsible authority in cases where the undertaking ceases trading, in accordance with national laws and/or practice.

<sup>294</sup> Directive 2009/148/EC, Article 19(2)

<sup>295</sup> Directive 2009/148/EC, Article 19(2)

<sup>296</sup> Directive 2009/148/EC, Article 19(3)

2702 Any summary of results should contain enough information about airborne fibre levels to allow  
2703 individual average exposure to be estimated for different types of work, as accurately as possible.

2704 Both the register and the medical records of health surveillance must be kept for at least 40 years  
2705 following the end of exposure.<sup>297</sup>

### 2706 **11.5.2 Medical register (personal)**

2707 All records of health monitoring should include:

- 2708 • the worker's name and date of birth;
- 2709 • the name of the occupational health practitioner;
- 2710 • the name and address of the person or organization who commissioned the health  
2711 monitoring;
- 2712 • the date the health monitoring took place;
- 2713 • any test results or assessment that indicate whether the worker was exposed to a health  
2714 hazard;
- 2715 • any evidence/suggestion that test results indicate the worker may have a disease, an illness  
2716 or injury as a result of carrying out the work that triggered the requirement for health  
2717 monitoring;
- 2718 • any recommendation that the person or organization takes remedial measures, including  
2719 whether the worker is able to continue to carry out the type of work that triggered the  
2720 requirement for health monitoring.
- 2721 • personal health records should be available for the worker even after end of contract.

2722  
2723 Both the register and the medical records of health surveillance must be kept for at least 40 years  
2724 following the end of exposure.<sup>298</sup>

2725  
2726 Because of the personal medical information in the health records these records should be kept  
2727 separate from the register with the exposure assessments.

### 2728 **11.5.3 National Register**

2729 Member States must keep a register of all cases of medically diagnosed asbestos-related occupational  
2730 diseases.<sup>299</sup> An indicative list of diseases that can be caused by exposure to asbestos is provided in Box  
2731 11.3.<sup>300</sup> The EU published a recommendation about occupational diseases in 2022.<sup>301</sup>

### 2732 **11.5.4 Retention of medical records**

2733 Medical records must be preserved supporting:

- 2734
- 2735 • Facilitation of long-term health monitoring.
- 2736 • Research and Member States specific compensation claims related to occupational diseases.

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<sup>297</sup> Directive 2009/148/EC, Article 19(3)

<sup>298</sup> Directive 2009/148/EC, Article 19(3)

<sup>299</sup> Directive 2009/148/EC, Article 21

<sup>300</sup> Italy started a national register of mesothelioma and ARD in 2003. Reference:

<sup>301</sup> Recommendation EU 2022/2337.

2737 Individual medical records must be kept for at least 40 years following the end of exposure.<sup>302</sup>  
2738 Because of the personal medical information in the health records these records should be kept  
2739 separate from the register with the exposure assessments.

#### 2740 **11.5.5 Storage and accessibility of health surveillance data**

2741 Employers or relevant authorities must securely store the records, ensuring they are accessible if  
2742 needed by former workers or medical professionals.<sup>303</sup>

2743 The individual medical record, health surveillance data and report must be kept in a manner that  
2744 assures worker's confidentiality and privacy.<sup>304</sup> Access to medical records (other than by the doctor  
2745 and the worker) should only be provided by previous written consent of the worker concerned.

2746 Employers should keep all health surveillance records separate from all other human resources (HR)  
2747 reports and other unrelated hospital medical records.

2748 Upon the termination of employment, employers should provide the worker with a statement of the  
2749 record which typically includes:

- 2750 • Asbestos or MCAs to which the worker has been exposed.
- 2751 • Period of exposure or potential exposure.
- 2752 • Details about how the worker can gain access to the records.
- 2753 • Any recommendations as to the worker continuing follow-up health assessments after the  
2754 cessation of employment, together with the types of health examinations.

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<sup>302</sup> Directive 2009/148/EC, Article 19(3)

<sup>303</sup> Directive 2009/148/EC Article 19 (3), <https://www.worksafe.govt.nz/topic-and-industry/asbestos/management-and-removal-of-asbestos/>  
Managing and working with asbestos. Control of Asbestos Regulations 2012. Approved Code of Practice and guidance (hse.gov.uk)

[https://www.hsa.ie/eng/publications\\_and\\_forms/publications/chemical\\_and\\_hazardous\\_substances/asbestos-containing\\_materials\\_acms\\_in\\_workplaces\\_-\\_practical\\_guidelines\\_on\\_acm\\_management\\_and\\_abatement.html](https://www.hsa.ie/eng/publications_and_forms/publications/chemical_and_hazardous_substances/asbestos-containing_materials_acms_in_workplaces_-_practical_guidelines_on_acm_management_and_abatement.html)

<sup>304</sup> Regulation (EU) 2016/679

## 2755 12 Waste management

### 2756 12.1 Definition of waste within the scope of this guide and applicable 2757 EU legislation

2758 Asbestos waste — sometimes also referred to as ‘waste containing asbestos or WCA’ — refers to any  
2759 asbestos product or MCA which the holder discards or intends or is required to discard<sup>305</sup>. Due to the  
2760 past extensive use of asbestos in construction materials, building maintenance, renovation and  
2761 demolition activities are the main sources of WCA. Indeed, over 95% of WCA is construction materials  
2762 containing asbestos<sup>306</sup>, around 2% is insulation materials containing asbestos<sup>307</sup>, and the remaining  
2763 comes from different types of asbestos containing products, such as automotive parts (e.g. brake pads  
2764 and clutches), textiles and paper products.<sup>308</sup>

2765 According to the concentration limit for carcinogenic substances<sup>309</sup> defined in Annex III of the Waste  
2766 Framework Directive (Directive 2008/98/EC, or WFD), waste is classified as hazardous waste if  
2767 contains asbestos in proportions above or equals 0.1%. If there is any doubt about the presence —  
2768 even as trace contaminant — of asbestos, waste should be disposed of as hazardous waste. Since  
2769 hazardous waste poses a greater risk to the environment and human health than non-hazardous  
2770 waste, there is a stricter regime for hazardous waste, as set out in the WFD. The WFD sets out  
2771 obligations from hazardous waste generation to final disposal or recovery, including additional  
2772 labelling, record keeping, monitoring and control.

#### Box 12-1: Collection, transport and temporary storage of hazardous waste

Article 19(1) of the WFD states that:

*Member States shall take the necessary measures to ensure that, in the course of collection, transport and temporary storage, hazardous waste is packaged and labelled in accordance with the international and Community standards in force.*

2773 The WFD prohibits the mixing of hazardous waste with other categories of hazardous waste, and with  
2774 non-hazardous waste; Section 12.2.3 summarises how hazardous waste should be separated from  
2775 non-hazardous waste and labelled. Council Directive 1999/31/EC on the landfill of waste<sup>310</sup> establishes  
2776 stricter general requirements for hazardous waste landfills.

2777 In the context of this guide, asbestos waste management — which covers waste collection, transport,  
2778 recovery and disposal — is discussed in the context of occupational health and safety aspects of waste  
2779 handling. Asbestos waste management is covered by the OSH Framework Directive, Council Directive  
2780 98/24/EC on the protection of the health and safety of workers from the risks related to chemical

<sup>305</sup> In line with the WFD definition of ‘waste’ (Article 3(1)).

<sup>306</sup> List of Waste (LoW) code 17 06 05\* in the European Waste Catalogue.

<sup>307</sup> LoW 17 06 01\*.

<sup>308</sup> European Commission: Directorate-General for Environment, Akelytè, R., Chiabrandò, F., Camboni, M., Ledda, C. et al., *Study on asbestos waste management practices and treatment technologies*, Publications Office of the European Union, 2024, <https://data.europa.eu/doi/10.2779/251640>

<sup>309</sup> Carc. 1A

<sup>310</sup> Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01999L0031-20240804>

2781 agents at work (CAD)<sup>311</sup>, Directive 2004/37/EC on the protection of workers from the risks related to  
2782 exposure to carcinogens, mutagens or reprotoxic substances at work (CMRD)<sup>312</sup> and the Asbestos at  
2783 Work Directive. Therefore, employers must undertake a risk assessment<sup>313</sup> (see Section 5 ‘Risk  
2784 assessment’) and ensure that the level of exposure of workers is minimised by following the hierarchy  
2785 of control measures. For example, under the CMRD, the employer must provide:

2786 *means for safe collection, storage and disposal of waste by workers, including the use of sealed and*  
2787 *clearly and visibly labelled containers.*

2788 If asbestos waste management activities produce or may produce dust from asbestos or materials  
2789 containing asbestos, the AWD requires the establishment of appropriate work organisation and the  
2790 use of diverse protection measures to reduce workers' exposure to a minimum and in any case to as  
2791 low a level as is technically possible below the relevant limit value<sup>314</sup>.

## 2792 **12.2 Waste management and organisation**

### 2793 **12.2.1 Identification of asbestos containing waste**

2794 The first step to allow correct management of asbestos waste is identification. In case of demolition,  
2795 maintenance or renovation work in premises built before the entry into force of the Member State’s  
2796 asbestos ban, the identification of MCAs must be completed before starting any work.<sup>315</sup> Information  
2797 sources that should be consulted include: building owners, who may have historical knowledge or  
2798 documentation; other employers involved in ongoing or past works on the premises; relevant  
2799 registers, such as national or local asbestos registers, where available. When sufficient information is  
2800 unavailable, the employer is responsible for arranging an examination by a qualified operator. This  
2801 examination must align with national laws and practices to ensure compliance and safety. Employers  
2802 must acquire and review the results of the asbestos examination before beginning any work, to ensure  
2803 proper planning and implementation of protective measures to mitigate health risks. Employers must  
2804 make examination results available to other employers upon request.

#### **Box 12-2: Further reading on the identification and management of WCA in buildings**

For more information on asbestos management in buildings, see:

- Section 13 ‘Buildings’
- The updated edition 2024 of the EU Construction & Demolition Waste Management Protocol including guidelines for pre-demolition and pre-renovation audits of construction works<sup>316</sup>, which

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<sup>311</sup> Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01998L0024-20240408>

<sup>312</sup> Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens, mutagens or reprotoxic substances at work <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02004L0037-20240408>

<sup>313</sup> Directive 2004/37/EC, Article 3(2).

<sup>314</sup> Directive 2009/148/EC, Article 6.

<sup>315</sup> Directive 2009/148/EC, Article 11

<sup>316</sup> European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Oberender, A., Fruergaard Astrup, T., Frydkjær Witte, S., Camboni, M. et al., *EU construction & demolition waste management protocol including guidelines for pre-demolition and pre-renovation audits of construction works – Updated edition 2024*, Publications Office of the European Union, 2024, <https://data.europa.eu/doi/10.2873/77980>

#### Box 12-2: Further reading on the identification and management of WCA in buildings

sets out non-mandatory rules and includes examples of best practices, technologies and tools for the management of construction and demolition waste, of which WCA may be part of.

- The European Commission's study on asbestos waste management practices and treatment technologies<sup>317</sup>, which provides an overview of the different asbestos waste management practices followed in all EU Member States.

The UK Asbestos Training Association (UKATA)'s website includes a gallery of pictures of MCAs in domestic and non-domestic products: <https://www.ukata.org.uk/library/about-asbestos/asbestos-gallery/>

2805 The identification of asbestos-containing products in waste streams outside of construction and  
2806 demolition waste requires tailored strategies due to the diverse nature of such materials. These waste  
2807 streams may include automotive parts (e.g., brake pads and gaskets), industrial equipment (e.g., heat-  
2808 resistant textiles, insulation panels), and consumer goods like old electrical appliances and fireproof  
2809 materials. Effective identification begins with detailed waste profiling, often requiring historical  
2810 knowledge of products likely to contain asbestos, such as those manufactured before bans were  
2811 implemented. Visual inspections and documentation reviews can aid in preliminary identification.  
2812 Given that definitive detection may require laboratory analysis, which can be costly, suspected items  
2813 should be handled precautionary as hazardous. Waste handlers must be trained to recognise potential  
2814 ACMs and adhere to strict handling and segregation protocols to minimise contamination risks.

2815 The European List of Waste (LoW) includes the following classes of WCA<sup>318</sup>:

- 2816 • 06 07 01\* wastes containing asbestos from electrolysis
- 2817 • 06 13 04\* wastes from asbestos processing
- 2818 • 10 13 09\* wastes from asbestos-cement manufacture containing asbestos
- 2819 • 15 01 11\* metallic packaging containing a hazardous solid porous matrix (for example  
2820 asbestos), including empty pressure containers
- 2821 • 16 01 11\* brake pads containing asbestos
- 2822 • 16 02 12\* discarded equipment containing free asbestos
- 2823 • 17 06 01\* insulation materials containing asbestos
- 2824 • 17 06 05\* construction materials containing asbestos

2825 It should be noted that WCA may be potentially classified under other codes, e.g.: 17 05 03\* soil and  
2826 stones containing hazardous substances.

#### 2827 **12.2.2 Waste management plan**

2828 Pre-renovation and pre-demolition audits allow to identify the nature and quantities of MCAs (and all  
2829 other materials), leading to the optimisation of waste management (e.g. how many containers, on-  
2830 site versus off-site sorting, etc.). Audits consist of two parts: the inventory of materials and  
2831 construction products, which should lead to the identification of all WCA that will be generated during  
2832 demolition or renovation, including quantity, quality, location, and how the MCAs are installed (glued,  
2833 screwed, etc.); the resource management recommendations, which include information, advice and

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<sup>317</sup> European Commission: Directorate-General for Environment, Akelytè, R., Chiabrandò, F., Camboni, M., Ledda, C. et al., *Study on asbestos waste management practices and treatment technologies*, Publications Office of the European Union, 2024, <https://data.europa.eu/doi/10.2779/251640>

<sup>318</sup> European Commission (2018). Commission notice on technical guidance on the classification of waste. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018XC0409\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018XC0409(01))



2834 guidelines on separation of MCAs at source and WCA management. The resource management  
2835 recommendations may include:

- 2836 • Legal requirements that need to be followed
- 2837 • Recommendations on the safe removal of WCA, including techniques for its removal and for  
2838 the reduction of pollution surrounding the site;
- 2839 • Recommendations regarding health and safety precautions to take during the deconstruction  
2840 phase and the waste management phase;
- 2841 • Recommendations on how to best implement separate on-site removal and sorting activities  
2842 that may include the description of the (legally binding) requirements and conditions for  
2843 storage, handling, separation, transport, treatment and any other operation to manage WCA;
- 2844 • If available, identification and recommendation of local companies/solutions for WCA  
2845 management;
- 2846 • Recommendations deriving from the limitations of the field materials assessment, such as the  
2847 need for additional tests to decide on the management possibilities of materials or elements,  
2848 etc.

2849 The results of the pre-demolition or pre-renovation audit should inform the risk assessment that must  
2850 be carried out to determine the nature and degree of the workers' exposure to dust from asbestos  
2851 and MCAs and to design safe handling procedures.<sup>319</sup>

2852 Some EU Member States have mandatory requirements for the preparation of waste management  
2853 plans. These differ from demolition plans, which focus on the practical execution of demolition work  
2854 and are prepared by contractors or other intervention stakeholders. A waste management plan is a  
2855 document that outlines how waste generated during a project, such as construction, demolition, or  
2856 maintenance, will be managed to comply with legal requirements, prioritising health and safety. For  
2857 projects involving WCA, the plan addresses its specific hazards and regulatory obligations.

2858 The plan describes its purpose, scope, and relevance to the project, along with an overview of the  
2859 legal and regulatory framework. It includes a detailed inventory and classification of all expected waste  
2860 types and quantities, highlighting the identification of hazardous wastes such as WCA. It should  
2861 contain a dedicated section focusing on asbestos management, covering the identification of MCAs,  
2862 as well as the methods for their safe removal, handling, and containment. It should also outline  
2863 procedures for waste handling, emphasising the segregation of different waste types and specifying  
2864 packaging and labelling standards for WCA, following national and international guidelines. It should  
2865 provide detailed instructions on the transportation and disposal of WCA, ensuring the use of sealed  
2866 containers, licensed carriers, and authorised disposal facilities while maintaining a strict chain-of-  
2867 custody documentation.

2868 The plan should also designate the roles and responsibilities of various parties involved in waste  
2869 management, such as site managers, contractors, and waste removal companies, and specifies the  
2870 training requirements for personnel handling WCA. It also includes a monitoring and reporting  
2871 framework to ensure compliance with the plan and maintain accurate records, especially concerning  
2872 WCA removal and disposal.

2873 Emergency response procedures are another key component, detailing actions to address accidental  
2874 releases of asbestos fibres and including contact information for relevant emergency services and  
2875 regulatory authorities. The plan should provide specific details about WCA, such as the location of

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<sup>319</sup> Directive 2009/148/EC, Article 3(2)



2876 MCAs identified in risk assessments, estimated quantities of WCA to be generated, methods for their  
2877 safe removal, and the identification of authorised disposal sites. It should also highlight worker safety  
2878 measures, including training, use of personal protective equipment, and decontamination protocols,  
2879 ensuring that all activities comply with applicable laws and standards.

## 2880 **12.2.3 Removal, separation, collection, storage and transport of WCA**

### 2881 **12.2.3.1 Removal**

2882 MCAs should be removed selectively before demolition techniques are applied. Asbestos removal  
2883 work must be carried out by undertakings which can demonstrate to have completed adequate  
2884 training and upon obtaining a permit.<sup>320</sup> For instructions about safe removal, please consult Section 9  
2885 'Control measures'.

### 2886 **12.2.3.2 Separation, collection, and storage**

2887 WCA must be collected and removed from the worksite as soon as possible. It must not be mixed with  
2888 other waste, substances or materials.<sup>321</sup> It must be stored in sealed, secure containers, skips or  
2889 packaging to prevent the release of fibres, until transport to an appropriate site. Containers or skips  
2890 are preferable but, if not available, WCA should be double-bagged. These packages must be clearly  
2891 labelled to indicate they contain asbestos, covered and locked when not in use to prevent and restrict  
2892 access. The standard practice is to package WCA using a red inner bag that displays clear asbestos  
2893 hazard warnings (Figure 12-1). This bag is then placed inside a clear outer bag, which carries the  
2894 transport label compliant with the Agreement Concerning the International Carriage of Dangerous  
2895 Goods by Road (ADR)<sup>322</sup>, if applicable (see Section 12.2.3.3). This dual-layer system minimises the risk  
2896 of asbestos fibre release and ensures compliance with regulatory requirements.

2897 For larger pieces of asbestos waste, breaking them into smaller fragments should be avoided to reduce  
2898 the risk of fibre dispersion. Instead, large pieces should be double-wrapped in durable polythene  
2899 sheeting with a thickness of at least 1000-gauge. The wrapping must be securely sealed to prevent  
2900 any material from escaping. Each package should then be labelled with asbestos hazard warnings and  
2901 ADR labels.

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<sup>320</sup> Directive 2009/148/EC, Article 15

<sup>321</sup> Directive 2008/98/EC, Article 19(1)

<sup>322</sup> <https://unece.org/transport/standards/transport/dangerous-goods/adr-2023-agreement-concerning-international-carriage>



Figure 12-1: Warning contains asbestos label – Source: UNEP and UNDP (nd)<sup>323</sup>

2902 Where appropriate, asbestos waste should be wetted before being sealed in containers to minimise  
 2903 the risk of fibre release during handling and transport. It is useful to designate waste collection areas  
 2904 within the premises for the temporary storage of WCA before it is transported off-site. These areas  
 2905 should be clearly marked, and access should be restricted to authorised personnel only.

2906 All materials used for cleaning after asbestos removal, including disposable PPE, should be treated as  
 2907 asbestos waste and disposed of accordingly, i.e. they should be sealed in a container and labelled  
 2908 before being removed from the asbestos waste area.

2909 For situations where disposing of PPE that includes clothing is not reasonably practicable, alternative  
 2910 measures must be taken. The clothing must be laundered at a facility equipped to handle asbestos-  
 2911 contaminated materials safely. If laundering is not an option, the clothing must be stored in a sealed  
 2912 and labelled container and reserved solely for reuse in asbestos removal activities. This ensures that  
 2913 contaminated clothing does not pose a risk to other environments or individuals.

2914 In cases where other types of PPE cannot be reasonably disposed of, decontamination becomes  
 2915 mandatory. PPE must be thoroughly cleaned in the asbestos removal area to remove any traces of  
 2916 asbestos. If it is not feasible to decontaminate the PPE in the work area, it must be placed in a sealed  
 2917 and labelled container until it is reused for asbestos-related tasks.

2918 WCA can be stored temporarily before collection by an authorised manager. Temporary storage and  
 2919 collection should follow the waste management plan. WCA can be stored temporarily for a maximum  
 2920 of six months, starting from the start of the deposit of waste at the storage site. When sealed  
 2921 containers are used for storing contaminated PPE, these containers must also be labelled and  
 2922 decontaminated before leaving the asbestos removal area.

<sup>323</sup> UNEP and UNDP (nd). Asbestos handling and disposal guidelines. International Best Practice.

2923 Records of all WCA generated should be maintained, including information on the quantity, source,  
2924 and disposal method. These records should be kept for the period specified by national regulations.

### 2925 **12.2.3.3 Transport**

2926 Transport of WCA outside buildings must comply with the ADR. Unbonded or fibrous asbestos, such  
2927 as thermal insulation material or asbestos insulation boards, is classified as dangerous for carriage  
2928 under ADR Class 9.

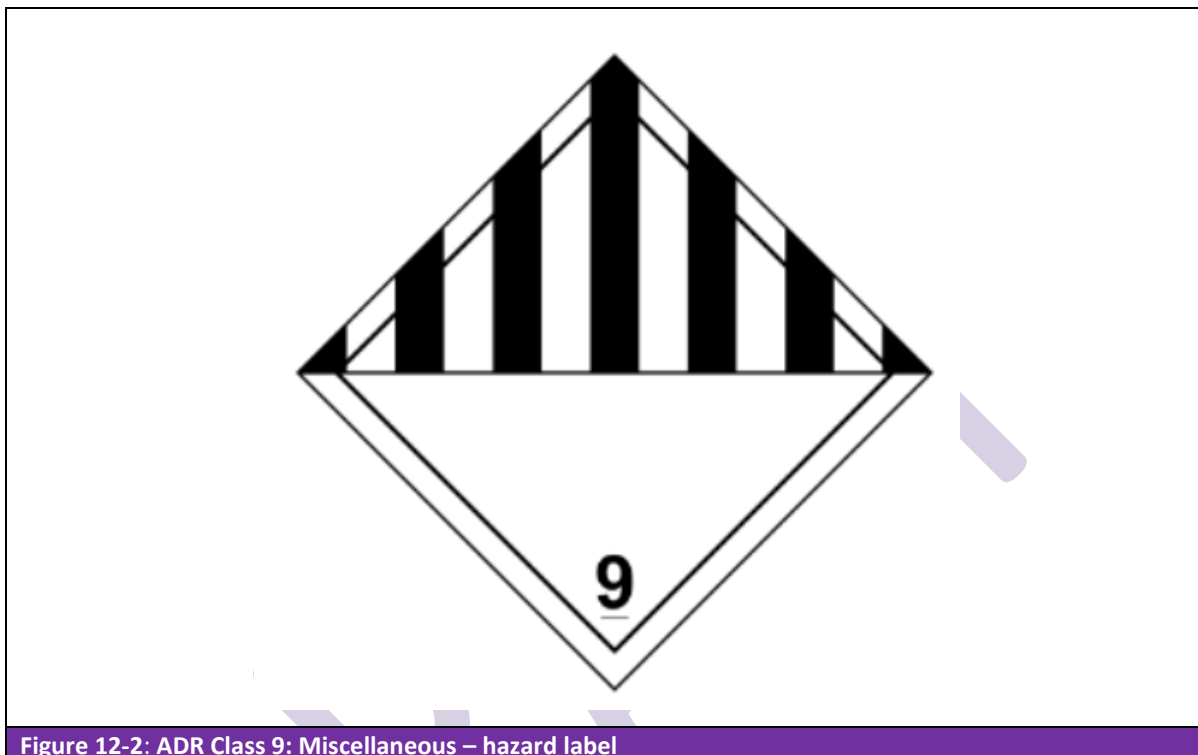


Figure 12-2: ADR Class 9: Miscellaneous – hazard label

2929 Drivers must hold an ADR driver training certificate, while all personnel involved in handling asbestos,  
2930 including drivers of smaller loads, must receive dangerous goods awareness training as required by  
2931 ADR.

2932 WCA must be accompanied by a transport document provided by the waste holder (consignor),  
2933 containing:

- 2934 • The word “waste”
- 2935 • The UN number preceded by the letter “UN”
- 2936 • The proper shipping name supplemented, when applicable with the technical name in  
2937 brackets
- 2938 • The hazard label model 9
- 2939 • The packing group (PG): “PG II” for Asbestos, Amphibole and “PG III” for Asbestos, Chrysotile
- 2940 • The number and description of the packages
- 2941 • The total quantity
- 2942 • The name and address of the waste holder
- 2943 • The name and address of the waste treatment or waste disposal facility
- 2944 • A declaration as required by the terms of any special agreement

- 2945 • The tunnel restriction code (E), unless it is known that the carriage will not pass any tunnel
- 2946 with restrictions for carriage of dangerous goods.

2947 Table 12-1 provides an example of a transport document for WCA.

Table 12-1: Example of a transport document for WCA		
<b>ADR Transport document</b>		
Waste consignor: Demolition company ABC		
Address: ABC street 2, ZIP ABCtown		
Date: dd/mm/yyyy		
Dangerous goods description	No. of packages / type	Total quantity
WASTE, UN2590, ASBESTOS, CHRYSOTILE, 9, PGIII, (E)	100 x 20 kg bags	2,000 kg
Consignee: Disposal facility XYZ		
Address: XYZ street 4, ZIP XYZville		

2948 The carrier must provide instructions in writing (so called transport emergency card or TREMc card) to  
 2949 the vehicle crew in a language understood by the driver and crew. The TREMc card sets out the actions  
 2950 to be carried out by the crew in emergency situations, the hazard characteristics of the WCA,  
 2951 additional guidance and a list of safety equipment to be carried on the vehicle. The vehicle crew must  
 2952 familiarise with the TREMc card before the start of the journey.<sup>324</sup>

2953 For more detailed instruction about the safe transport of WCA, please consult Annex 4 ‘Transport of  
 2954 asbestos containing waste’.

### 2955 12.2.4 Treatment and disposal

2956 As of 2025, almost all WCA in the EU is disposed of in landfills. However, inertisation technologies are  
 2957 available and the importance of asbestos waste treatment may increase in future. While asbestos  
 2958 waste treatment technologies are different in nature and are therefore associated with different  
 2959 exposure scenarios, they all must comply with the AWD: asbestos waste treatment operators must  
 2960 implement measures — including dust suppression techniques — to reduce workers’ exposure to a  
 2961 minimum and in any case to as low a level as it technically possible below the relevant limit value.

2962 Asbestos treatment or disposal activities can be carried out only if the following conditions are met:

- 2963 • The operator’s personnel are adequately trained
- 2964 • The available safety equipment is suitable
- 2965 • There is a qualified responsible person ensuring compliance with occupational safety and  
 2966 health legislation
- 2967 • There is an appointed supervisor who is familiar with the work, the risks involved and the risk  
 2968 mitigation measures. The supervisor ensures that all personnel have been instructed in the  
 2969 use of PPE, all safety measures specified in the risk assessment are applied, and all work  
 2970 procedures specified in the work plan are followed. The supervisor must be present on site at  
 2971 all times during the work
- 2972 • The operator meets all safety requirements in accordance with the state of the art

2973 Disposal of WCA must comply with the standards and procedures specified in the WFD, ensuring its  
 2974 safe and environmentally responsible management. It must be disposed of in approved facilities only.  
 2975 The disposal must be carried out in such a way to avoid the release of fibres. The control measures —

<sup>324</sup> Instructions in writing in different languages are available for download free of charge at:  
<https://unece.org/linguistic-versions-adr-instructions-writing>

2976 including technical and organisational measures and PPE — to be applied during the disposal  
2977 procedures must be based on the risk assessment (see Section 9).

#### Box 12-3: Disposal of WCA across the EU

In Austria, it is prohibited to dispose of hazardous waste on overground landfill sites. Pre-treated asbestos waste, however, can be deposited in landfills designed for non-hazardous waste in structurally separate compartments.

2978 If the WCA is disposed of in containers, these must not be destroyed. The WCA must be placed in  
2979 separate cells or separate disposal units. These should be covered daily with a stratum of soil of 20 cm  
2980 minimum, to avoid the spreading of fibres. If the cells or unit are not wrapped in plastics, they should  
2981 be moistened regularly. It is recommended not to compact landfilled WCA, and to avoid unnecessary  
2982 vehicle traffic on the site. The final cover of the disposal units should be applied as soon as possible  
2983 and with suitable material without sharp elements that may cause damage to any packaging. The  
2984 operator should implement measures for tracing, locating and limiting access to landfilled WCA. If  
2985 WCA is contaminated with other problematic substances, it should be landfilled in underground  
2986 storage facilities.

## 2987 12.3 Training

2988 In addition to the general education and training requirements outlined in Section 10, there are  
2989 specific considerations for workers handling WCA.

2990 Workers who are or are likely to be exposed to dust from asbestos or MCAs must receive theoretical  
2991 and practical training, including on waste disposal.<sup>325</sup>

2992 Training must be provided in a form, manner and language easily understandable. Training should be  
2993 tailored to specific workers groups (i.e. maintenance workers repairing water supply systems with  
2994 asbestos cement pipes and other elements, or municipal waste collectors) as each group faces  
2995 different risks and scenarios. Training must also be closely adapted to the features of specific working  
2996 tasks and methods used by the workers.<sup>326</sup>

2997 For specific content of the training for workers involved in the removal of asbestos in buildings, see  
2998 Section 13.6 'Education and training'. For all other workers handling WCA, training should include:

- 2999 • What equipment is necessary to handle WCA safely;
- 3000 • How to use and look after personal protective equipment;
- 3001 • How to identify and classify WCA;
- 3002 • What to do in case of materials suspected to contain or be contaminated with asbestos (e.g.  
3003 MCAs included in general building waste)
- 3004 • How to properly bag and wrap WCA;
- 3005 • How to label WCA;
- 3006 • How to load and unload WCA for transportation;
- 3007 • Emergency response in case of packaging failure;
- 3008 • Landfill procedures;
- 3009 • Emergency procedures.

<sup>325</sup> Directive 2009/148/EC, Article 14 and Annex Ia.

<sup>326</sup> Directive 2009/148/EC, Article 14(2)

## 3010 **13 Buildings**

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### 3011 **13.1 Scope**

3012 This section deals with occupational exposure to asbestos in the renovation and demolition of  
3013 buildings. Occupational exposure in renovation and demolition of civil engineering structures is dealt  
3014 with in Section 16. This section builds on Sections 4 to 10 by providing additional information that is  
3015 relevant to occupational exposure in the renovation and demolition of buildings.

### 3016 **13.2 Risk assessment**

3017 A risk assessment must be undertaken for any activity likely to involve a risk of exposure to dust arising  
3018 from asbestos or materials containing asbestos<sup>327</sup>, see section 5.

3019 The primary approach for managing asbestos in buildings must be its removal<sup>328</sup>. However, there may  
3020 be instances where immediate removal is not feasible or later removal (e.g. during planned  
3021 refurbishment) may reduce the overall occupational exposure. When making decisions about the  
3022 timing of removal, the potential for exposure during maintenance activities or other non-routine tasks  
3023 and passive and secondary exposure should be considered (see Section 8). When assessing risks  
3024 related to asbestos in buildings, it is crucial to consider not only the presence of asbestos but also its  
3025 condition and the likelihood of disturbance. Factors such as the type of asbestos-containing material,  
3026 its friability, location, and accessibility should all be taken into account.

3027 In cases where MCAs cannot be immediately removed, a structured management approach should be  
3028 ensured to minimise risks to workers.

#### 3029 **13.2.1 Notification**

3030 A notification must be submitted to the responsible authority of the Member State before work  
3031 commences on any activity likely to involve a risk of exposure to asbestos dust unless their Member  
3032 States has derogated certain activities from the notification requirement<sup>329</sup>, see section 5. The  
3033 notification process can vary in length between Member States, in Belgium, the notification process  
3034 for asbestos work can take 2-3 months for larger removal projects. For smaller works, a simpler  
3035 notification of work is used. Employers should be prepared for potentially longer notification and  
3036 permit processes as regulations become more stringent. They should factor these timeframes into  
3037 their project planning to avoid delays.

#### 3038 **13.2.2 Planning the work**

3039 Proper planning is crucial for safe asbestos removal or management in buildings. A plan of work must  
3040 be drawn up before any demolition work or work on removing asbestos and/or asbestos-containing  
3041 products from buildings, structures, plant or installations or from ships is started<sup>330</sup>.

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<sup>327</sup> Directive 2009/148/EC, Article 3(2)

<sup>328</sup> Directive 2009/148/EC, Article 3(2)

<sup>329</sup> Directive 2009/148/EC, Article 4(3)

<sup>330</sup> Directive 2009/148/EC, Article 13(1)

3042 The plan of work must prescribe the measures necessary to ensure the safety and health of workers  
3043 at the place of work.<sup>331</sup> It must specify that:

- 3044 • Asbestos and/or asbestos-containing products are to be removed before demolition  
3045 techniques are applied, except where this would cause a greater risk to workers than if the  
3046 asbestos had been left in place
- 3047 • Personal protective equipment shall be provided where necessary
- 3048 • When the work has been completed, the absence of asbestos exposure risks at the place of  
3049 work shall be verified before other activities resume<sup>332</sup>.

3050 The plan should (and if requested by the authorities, must<sup>333</sup>) also include information on:

- 3051 • The nature and probable duration of the work
- 3052 • The place where the work is carried out
- 3053 • The methods applied where the work involves handling asbestos or materials containing  
3054 asbestos
- 3055 • The characteristics of the equipment used for protection and decontamination of workers,  
3056 and protection of other persons present on or near the worksite

3057 When preparing the workplace, employers should:

- 3058 • Segregate the asbestos work area to restrict unauthorised access
- 3059 • Use warning signs at all entry points
- 3060 • Ensure that only trained asbestos removal workers and supervisors have access to the removal  
3061 area
- 3062 • Cover surfaces within the asbestos work area with heavy-duty plastic sheeting to prevent  
3063 contamination
- 3064 • Ensure adequate lighting
- 3065 • Avoid working in windy environments where asbestos fibres can be redistributed

3066 It is important to be aware that when removing a roof, there may be contamination underneath, which  
3067 should be part of the risk assessment.

3068 The work plan should also address decontamination procedures. In Belgium, a three-chamber airlock  
3069 system is used, with specific procedures for removing protective equipment and showering. The  
3070 decontamination unit should be at least 0.8 meters wide, with space for changing clothes and  
3071 handwashing.<sup>334</sup>

### 3072 **13.3 Identifying asbestos**

3073 No additional details are required for the identification of asbestos in buildings, therefore refer to the  
3074 details provided in Section 6.

### 3075 **13.4 Air exposure assessment**

3076 No additional details are required for air exposure assessment in buildings, therefore refer to the  
3077 details provided in Section 7.

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<sup>331</sup> Directive 2009/148/EC, Article 13(2)

<sup>332</sup> Directive 2009/148/EC, Article 13(2)

<sup>333</sup> Directive 2009/148/EC, Article 13(2)

<sup>334</sup> Information obtained at a workshop organised in the framework of the development of this guide.



## 3078 **13.5 Structured management of asbestos**

### 3079 **13.5.1 Control measures**

3080 In addition to the general information provided in Section 9, the following points are specific to control  
3081 measures for buildings:

- 3082 • Other parts of the building, or nearby buildings, may continue to be in use during asbestos  
3083 work, which may require additional control measures
- 3084 • Building ventilation systems may need to be blocked or modified
- 3085 • Plan routes for waste removal through the building
- 3086 • Consider access requirements for emergency services

### 3087 **13.5.2 Removal techniques & procedures**

3088 When removing MCAs from buildings, it is crucial to use techniques and procedures that minimise the  
3089 release of asbestos fibres into the air. The specific methods used will depend on the type of MCA, its  
3090 condition, and location.

3091 General principles for asbestos removal include:

- 3092 • Wetting the material to reduce dust generation
- 3093 • Using manual tools rather than power tools where possible
- 3094 • Working in small sections
- 3095 • Immediately bagging or wrapping removed material
- 3096 • Using negative pressure enclosures, especially for friable materials

3097 For all removal techniques, the following should be implemented:

- 3098 • Conduct a thorough risk assessment before starting work
- 3099 • Ensure all workers are properly trained and equipped
- 3100 • Use appropriate containment and negative pressure systems where required
- 3101 • Conduct air monitoring throughout the removal process
- 3102 • Properly decontaminate the area after removal is complete

3103 Sections 13.5.2.1 to 13.5.2.3 highlight elements that are important to consider for specific MCAs.

#### 3104 **13.5.2.1 Removal of asbestos cement**

3105 Asbestos cement products, commonly found in roofing sheets, wall cladding, pipes and guttering,  
3106 contain about 10-15% asbestos fibres bound in a cement matrix. While these materials are generally  
3107 considered non-friable when in good condition, they can become friable when weathered, damaged  
3108 or disturbed. This is particularly true for roofing materials that have been exposed to the elements for  
3109 decades, where the surface may have degraded allowing fibres to become more easily released.

- 3110 • Use warning signs and segregate the area
- 3111 • Cover surfaces with plastic sheets to catch debris
- 3112 • Wet the material if possible
- 3113 • Avoid using power tools
- 3114 • Handle waste properly with double bags
- 3115 • Always wear appropriate PPE

3116 **13.5.2.2 Removal of vinyl floor tiles and adhesives**

3117 Vinyl floor tiles and associated adhesives containing asbestos were widely used in buildings from the  
3118 1950s through to the 1980s. These materials typically contain asbestos fibres that were added to  
3119 strengthen the tiles or improve the adhesive properties. Despite their seemingly stable nature, the  
3120 removal process can generate significant fibre release, particularly when dealing with strongly  
3121 adhered materials or when the adhesive requires removal. In Belgium, removal of vinyl floor tiles and  
3122 adhesives containing asbestos is now required to be done under containment due to high fibre release  
3123 measurements.<sup>335</sup> The glue should also be removed along with the tiles to prevent future exposure  
3124 risks during renovation work.

3125 **13.5.2.3 Removal of textured coatings**

3126 Textured coatings, sometimes known as decorative plaster or artex, were commonly applied to walls  
3127 and ceilings and may contain up to 4% asbestos. These materials are particularly challenging to remove  
3128 as they often require destructive techniques that can generate significant amounts of dust and thus  
3129 requires strict control measures. The removal process typically involves scraping or other mechanical  
3130 methods that can readily release asbestos fibres into the air.

3131 Removal of textured coatings containing asbestos should always be done under containment in  
3132 Belgium, the UK, and the Netherlands (and possibly other countries).<sup>336</sup>

3133 **13.5.2.4 Highly friable MCAs**

3134 Highly friable MCAs include materials such as sprayed coatings, pipe insulation, and insulating boards  
3135 where asbestos fibres are loosely bound and can be easily released into the air when disturbed (see  
3136 Section 6.2.4 for further details). The presence of highly friable MCAs in a building significantly  
3137 increases the potential risks for workers. Although the practices set out below apply to all asbestos  
3138 and MCAs, their importance for highly friable MCAs is underscored:

- 3139
- 3140 • Condition assessment: Regular, thorough inspections should be conducted to monitor the  
3141 condition of these materials if they remain in place. Any signs of damage, deterioration, or  
3142 disturbance should be immediately addressed.
  - 3143 • Removal prioritised: In specific cases, properly encapsulating the material may be a temporary  
3144 solution<sup>337</sup>: this is the case when materials are in good condition. However, removal is the  
3145 safest long-term option and must be prioritised.<sup>338</sup> More information regarding situations  
3146 where MCAs are not removed can be found in Sections 8 and 13.5.4.
  - 3147 • Controlled work environment: Any work involving highly friable materials typically requires  
3148 that the highest level of containment and control measures must be adopted<sup>339</sup>, incl. proper  
3149 enclosures, negative air pressure systems, decontamination procedures, personal protective  
3150 equipment (PPE)<sup>340</sup>. Continuous air monitoring during and after any work is also required<sup>341</sup>,  
3151 as well as proper management of the removed waste in accordance with local regulations<sup>342</sup>.  
3152 More information on control measures, air monitoring and waste management can be found  
3153 in Sections 9, 7 and 10 respectively.

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<sup>335</sup> Source: discussion at a workshop organised in the framework of the development of this guide.

<sup>336</sup> Source: discussion at a workshop organised in the framework of the development of this guide.

<sup>337</sup> Directive 2009/148/EC, Article 3(3)(c)

<sup>338</sup> Directive 2009/148/EC, Article 3(2)

<sup>339</sup> Directive 2009/148/EC, Article 6 and 12

<sup>340</sup> Directive 2009/148/EC, Article 10(3), 12(a)

<sup>341</sup> Directive 2009/148/EC, Article 7

<sup>342</sup> Directive 2009/148/EC, Article 6(e)

3154 • Training and awareness: Training must cover applicable local laws, asbestos properties, health  
3155 effects, and the increased risk when combined with smoking. Workers must learn to identify  
3156 MCAs, understand operations that could lead to exposure, and implement preventive  
3157 controls. The curriculum must also cover safe working practices, proper use of protective  
3158 equipment, emergency procedures if these materials are encountered unexpectedly,  
3159 decontamination methods, and waste disposal techniques. Additionally, workers must be  
3160 informed about medical surveillance requirements. Importantly, the training must be tailored  
3161 to the specific characteristics of the workers' profession, tasks, and working methods to  
3162 ensure its relevance and effectiveness<sup>343</sup>. Comprehensive training should be provided not only  
3163 to those directly working with these materials but also for anyone who might encounter them,  
3164 including maintenance staff or other building users.

3165 This guide does not intend to suggest that the measures set out above should not be applied to non-  
3166 friable asbestos; this section merely highlights their importance for friable MCAs.

### 3167 **13.5.3 After removal**

3168 After the completion of asbestos removal work, several steps must be taken to ensure the safety of  
3169 workers re-entering:

- 3170 • Thorough cleaning: All surfaces in the work area must be cleaned using HEPA vacuum cleaners  
3171 and wet wiping techniques. This includes not only visible surfaces but also hidden areas where  
3172 dust might have settled.
- 3173 • Visual inspection: A competent person must conduct a thorough visual inspection to ensure  
3174 that all MCAs have been removed and the area is free from visible dust and debris.
- 3175 • Air clearance testing: Air samples must be taken to verify that the concentration of asbestos  
3176 fibres in the air is below the relevant limit value. In Belgium, this testing must be done by an  
3177 independent, certified laboratory<sup>344</sup>
- 3178 • Decontamination of equipment: All tools and equipment used during the removal process  
3179 must be thoroughly decontaminated or disposed of as asbestos waste if decontamination is  
3180 not possible.
- 3181 • Waste disposal: All asbestos waste, including disposable PPE and cleaning materials, must be  
3182 double-bagged in specially labelled bags and disposed of according to local regulations for  
3183 hazardous waste<sup>345</sup>
- 3184 • Documentation: A final clearance report should be prepared, documenting the removal  
3185 process, cleaning procedures, visual inspection results, and air testing results. This report  
3186 should be kept as part of the building's asbestos management records.
- 3187 • Update asbestos register: If the building had an asbestos register or management plan, this  
3188 should be updated to reflect the removal of the MCAs.

3189 After the removal work and final clearance, it is crucial to ensure that the area is safe for entry. The  
3190 employer must verify that there are no risks of exposure to asbestos at the place of work before other  
3191 activities resume<sup>346</sup>. This may involve a final inspection by a competent person and, in some cases,  
3192 additional air testing to confirm that fibre levels.

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<sup>343</sup> Directive 2009/148/EC, Article 14, Annex Ia

<sup>344</sup> Directive 2009/148/EC, Article 13(2)(c).

<sup>345</sup> Directive 2009/148/EC, Article 6(e).

<sup>346</sup> Directive 2009/148/EC, Article 13(2)(c)

3193 **13.5.3.1 Decontamination of personnel**

3194 No additional details are required for decontamination of personnel in buildings, therefore refer to  
3195 the details provided in Section 9.3.2

3196 **13.5.4 Passive and secondary exposure of workers**

3197 In addition to the general information provided in Section 8, this section addresses the management  
3198 of these risks in situations where MCAs remain in place within buildings.

3199 Situations where passive and secondary exposure risks may be present include, for example:

- 3200 • Buildings with known MCAs that are in good condition and are being managed in place
- 3201 • During the period between the identification of MCAs and their scheduled removal
- 3202 • In buildings where complete removal is not immediately possible due to structural or  
3203 operational constraints
- 3204 • During routine maintenance or renovation activities in buildings with MCAs
- 3205 • Following routine maintenance in buildings where MCAs are present

3206 In these situations, the following measures are essential:

- 3207 • Identification and inventory: A comprehensive asbestos inventory should be maintained for  
3208 the building. This inventory should be regularly updated and made available to all relevant  
3209 workers, including maintenance staff, contractors, and emergency responders.
- 3210 • Regular inspections: The condition of MCAs in buildings should be inspected regularly to  
3211 prevent degradation that could lead to passive exposure. If degrading MCAs are identified,  
3212 immediate action should be taken, which may include encapsulation, enclosure, or prioritised  
3213 removal.
- 3214 • Access control: Areas containing MCAs should have restricted access.
- 3215 • Air monitoring: Regular air monitoring should be conducted in buildings where MCAs are  
3216 present, not only in areas where direct work with asbestos is taking place but also in  
3217 surrounding areas to ensure workers are not passively exposed.
- 3218 • Training for all potentially exposed workers: All staff who may potentially be exposed to MCAs  
3219 in buildings, including maintenance workers, cleaners, and other support staff, should be  
3220 appropriately trained on the risks of these materials and the necessary precautions.<sup>347</sup>
- 3221 • Communication: Ensure that information about the presence of MCAs in buildings is  
3222 communicated to all relevant staff, including temporary staff or those hired from external  
3223 contractors and any emergency service workers.
- 3224 • Work practices: Implement and enforce work practices that minimise the likelihood of  
3225 disturbance of MCAs. This may include special procedures for maintenance activities near  
3226 MCAs.
- 3227 • Decontamination procedures: Even in buildings where MCAs are being managed in place,  
3228 proper decontamination procedures must be followed after any work that may have disturbed

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<sup>347</sup> Directive 2009/148/EC, Article 14 requires training for workers who are, or are likely to be, exposed to dust from asbestos or MCAs. In order to ensure that workers are protected from passive and accidental exposure, some training should be provided to all workers who may potentially be exposed.

3229 asbestos.<sup>348</sup> This includes the use of decontamination units with separate areas for removing  
3230 potentially contaminated clothing, showering, and changing into clean clothing.

3231 • Separate storage for clothing: Separate storage places for working or protective clothing and  
3232 for street clothes to prevent secondary exposure should be provided for all workers that may  
3233 be exposed to MCAs.<sup>349</sup>

3234 • Cleaning of protective equipment: Any protective equipment used near MCAs must be placed  
3235 in a well-defined place and checked and cleaned after each use<sup>350</sup>

3236 • Emergency procedures: Develop and communicate clear procedures for dealing with  
3237 accidental disturbance of MCAs.

3238 In Belgium, it was noted that there is a strong emphasis on having an asbestos inventory that is owned  
3239 by the employer and covers all types of work that may involve asbestos exposure, not just construction  
3240 work. This approach can help prevent passive and secondary exposure by ensuring all potential  
3241 sources of asbestos are identified and managed.

3242 It is important to note that while these measures can significantly reduce the risk of passive and  
3243 secondary exposure, they are not a permanent solution. The ultimate goal should always be the safe  
3244 removal of all MCAs from the building when it becomes feasible. Regular reassessment of the asbestos  
3245 management plan should be conducted to determine when removal can be safely undertaken.

#### 3246 **13.5.5 Incident management**

3247 Employers must establish procedures to deal with accidents, incidents, or emergencies related to the  
3248 presence of hazardous chemical agents, including asbestos, at the workplace<sup>351</sup>. However, the  
3249 diversity of activities involving asbestos makes it challenging to create a universal plan applicable to  
3250 all sites. Therefore, companies involved in asbestos-related activities should develop a plan tailored  
3251 to each specific worksite. This approach ensures effective actions in case of incidents, enabling victims  
3252 to receive prompt and appropriate care while protecting rescuers and minimizing the spread of  
3253 asbestos contamination beyond the confined area.<sup>352</sup>

3254 The company's manager is responsible for organizing a first aid plan. This plan should be developed in  
3255 collaboration with the company's physician and external emergency services to ensure thorough  
3256 preparedness and effective coordination.<sup>353</sup> And **should consider potential incidents, such as**<sup>354</sup>:

- 3257 • uncontrolled release of asbestos dust into the workplace;
- 3258 • major and minor injuries or illnesses occurring inside 'live' enclosures;
- 3259 • fire inside or outside enclosure;
- 3260 • other hazardous release such as toxic gas or radioactive dust occurring inside or outside  
3261 enclosure;
- 3262 • leak of asbestos is found outside the enclosure;

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<sup>348</sup> Directive 2009/148/EC, Article 6(ba)

<sup>349</sup> Directive 2009/148/EC, Article 16(1)(d) requires this but subject to Article 3(3) derogation implemented by the Member States.

<sup>350</sup> Directive 2009/148/EC, Article 16(1)(f) requires this but subject to Article 3(3) derogation implemented by the Member States.

<sup>351</sup> Directive 2004/37/EC, Article 7

<sup>352</sup> The French National Institute for Research and Safety (INRS) (2012). Removal or encapsulation of materials containing asbestos Prevention guide

<sup>353</sup> The French National Institute for Research and Safety (INRS) (2012). Removal or encapsulation of materials containing asbestos Prevention guide

<sup>354</sup> Health and Safety Executive (HSE) (2006). HSG247. Asbestos: The licensed contractors' guide

- 3263 • power on power-assisted respirator fails while inside ‘live’ enclosure;
- 3264 • negative pressure unit stops working;
- 3265 • complete loss of electrical power; and
- 3266 • loss of water supply to hygiene unit.

3267 **Risks of incidents may arise from:**

- 3268 • Reduced visual field caused by
- 3269 the use of personal protective
- 3270 equipment (PPE), such as mask
- 3271 eyepieces.
- 3272 • Fatigue associated with
- 3273 prolonged use of PPE.
- 3274 • Communication challenges, both
- 3275 among operators within the work
- 3276 zone and with individuals outside
- 3277 the work area.<sup>355</sup>

3278 Employers must ensure that all workers  
 3279 are well-versed in emergency procedures  
 3280 and prepared to respond effectively in  
 3281 case of an incident. Regular training  
 3282 sessions and drills are essential to equip  
 3283 workers with the knowledge and confidence to react promptly and appropriately during emergencies.

3284 **Measures should include:**

- 3285 • Providing a detailed explanation of emergency procedures to all operators before work begins
- 3286 and to new arrivals during ongoing work.
- 3287 • Identifying and maintaining a record of the number and identity of in-house trained first
- 3288 aiders.
- 3289 • Implementing warning systems within the workplace to alert workers of emergencies.
- 3290 • Establishing clear means of communication and, if necessary, relays with external emergency
- 3291 services.
- 3292 • Ensuring the availability of appropriate emergency equipment and facilities.
- 3293 • Developing and communicating site-specific instructions, especially for evacuations involving
- 3294 breaches of containment.
- 3295 • Displaying a site plan with clearly marked exits to guide workers during evacuation.

3297 Examples of procedures for responding to incidents are set out below. In addition, the procedures  
 3298 that must be followed if OEL specified in Section 7.3 is exceeded or if there is reason to believe that  
 3299 MCAs which are not identified prior to the work have been disturbed so as to generate dust are  
 3300 reproduced in Box 13.1:

- 3301 • Immediate cessation of work: Where the relevant limit value as laid down in Article 8 is
- 3302 exceeded, or if there is reason to believe that materials containing asbestos which are not

**Box 13.1: Emergency procedures for accidental OEL exceedance and unidentified MCA disturbance**

Article 10 of Directive 2009/148/EC (AWD):

(1) Where the relevant limit value as laid down in Article 8 is exceeded, or if there is reason to believe that materials containing asbestos which are not identified prior to the work have been disturbed so as to generate dust, work shall stop immediately.

Work shall not be continued in the affected area until adequate measures have been taken for the protection of the workers concerned.

Where the relevant limit value as laid down in Article 8 is exceeded, the reasons for the limit value being exceeded shall be identified and appropriate measures to remedy the situation shall be taken as soon as possible.

(2) In order to check the effectiveness of the measures mentioned in the first subparagraph of paragraph 1, a further determination of the asbestos-in-air concentrations shall be carried out immediately.

<sup>355</sup> The French National Institute for Research and Safety (INRS) (2012). Removal or encapsulation of materials containing asbestos Prevention guide



- 3303 identified prior to the work have been disturbed so as to generate dust, work must stop  
 3304 immediately.<sup>356</sup>
- 3305 • Containment of the area: Restrict access to the affected area by sealing it off, placing  
 3306 appropriate signage, and securing the perimeter. Inspect the ventilation system and block it if  
 3307 necessary.
  - 3308 • Alternative access: Arrange alternative routes or access points for remediation activities.<sup>357</sup>
  - 3309 • Remedial measures: Adopt remedial measures before continuing work.
  - 3310 • Identifying causes: Identify the causes of the incident.
  - 3311 • Worker protection: Until the situation has been restored to normal and the causes of the  
 3312 abnormal exposure have been eliminated, only essential workers with adequate protection  
 3313 should be permitted into the affected area.
  - 3314 • Information to workers: The employer must inform the workers concerned and their  
 3315 representatives in the undertaking or establishment in case of exceedance of the OEL.<sup>358</sup>
  - 3316 • Air Monitoring: To check the effectiveness of the remedial measures, a further determination  
 3317 of the asbestos-in-air concentrations must be carried out immediately.<sup>359</sup>
  - 3318 • Cleaning: Have the affected area cleaned by an accredited company.
  - 3319 • Emergency services: Employers must arrange any necessary contacts with external services,  
 3320 particularly for first aid, emergency medical care, rescue work, and firefighting.<sup>360</sup>
  - 3321 • Information for emergency Services: Employers must ensure that information on emergency  
 3322 arrangements involving hazardous chemical agents is available to relevant internal and  
 3323 external accident and emergency services.<sup>361</sup>
  - 3324 • Documentation: All incidents should be documented, including the causes, measures taken,  
 3325 and outcomes. This information can be valuable for preventing future incidents and may be  
 3326 required by authorities.

3327 In Belgium, it was noted that for unstable buildings containing asbestos, special procedures may be  
 3328 necessary. In such cases, it might be required to use mist cannons to suppress dust and allow the  
 3329 building to collapse before addressing the MCAs.<sup>362</sup>

## 3330 13.6 Education and training

3331 In addition to the general education and training requirements outlined in Section 10, there are specific  
 3332 considerations for workers who may encounter asbestos in buildings.

3333 Training must be provided to all workers who are, or are likely to be, exposed to dust from asbestos  
 3334 or materials containing asbestos in buildings<sup>363</sup>. Specifically for buildings, this broadens the scope of  
 3335 the training to not only asbestos removal workers but also maintenance staff, cleaners, and other  
 3336 support staff who may inadvertently come into contact with MCAs.

<sup>356</sup> Directive 2009/148/EC, Article 10(1)

<sup>357</sup> French Ministry of the Economy, Finance and Recovery (2021). Guide to asbestos risk prevention in building management

<sup>358</sup> Directive 2009/148/EC, Article 17(2)

<sup>359</sup> Directive 2009/148/EC, Article 10(2)

<sup>360</sup> Directive 89/391/EEC, Article 8(1)

<sup>361</sup> Directive 98/24/EC, Article 7(5)

<sup>362</sup> Source: discussion at a workshop organised in the framework of the development of this guide.

<sup>363</sup> Directive 2009/148/EC, Article 14(1)



3337 Further to this, training content must be adapted as closely as possible to the characteristics of the  
3338 profession of the workers and their specific tasks and working methods.<sup>364</sup> Thus, in addition to the  
3339 general topics, examples of specific topics that training for workers in buildings should cover are:

- 3340 • Identification of MCAs in buildings;
- 3341 • Understanding the asbestos inventory and its importance;
- 3342 • Procedures for working around MCAs that are being managed in place;
- 3343 • Recognition of degrading MCAs and reporting procedures; and
- 3344 • Special precautions for maintenance and renovation activities in buildings with MCAs.

3345 Similarly, additional training must be provided to workers who engage in demolition or asbestos  
3346 removal work in buildings, with specific focus on technological equipment and machines to contain  
3347 the release and spread of asbestos fibres during work processes<sup>365</sup>.

3348 Training should include detailed information on emergency procedures specific to the building,  
3349 including how to respond to accidental disturbance of MCAs and evacuation procedures.

3350 In some Member States, such as Belgium, there are different levels of training depending on the type  
3351 of work. For example, certified companies performing work in confined spaces or using glove bags  
3352 require more extensive training than those performing simpler removals with trained personnel.

### 3353 **13.7 Health surveillance**

3354 No additional details are required for health surveillance in buildings, therefore refer to the details  
3355 provided in Section 11.

### 3356 **13.8 Waste management**

3357 In addition to the general information provided in Section 12, the following points are specific to waste  
3358 management in buildings:

- 3359 • Waste collection areas: Designate specific areas within the building for the temporary storage  
3360 of asbestos waste before it is transported off-site. These areas should be clearly marked, and  
3361 access should be restricted to authorized personnel only.
- 3362 • Transport within buildings: When transporting asbestos waste within buildings, use sealed  
3363 containers on wheel-driven carts. These carts should be cleaned regularly to remove any  
3364 potential external contamination.
- 3365 • Disposal of cleaning materials: All materials used for cleaning after asbestos removal,  
3366 including disposable PPE, should be treated as asbestos waste and disposed of accordingly.

3367 In Belgium, it was noted that all glue or adhesive should be removed along with asbestos-containing  
3368 floor tiles to prevent future exposure risks during renovation work.<sup>366</sup> This approach ensures that all  
3369 potential sources of asbestos contamination are removed from the building.

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<sup>364</sup> Directive 2009/148/EC, Article 14(2)

<sup>365</sup> Directive 2009/148/EC, Annex Ia

<sup>366</sup> Source: discussion at a workshop organised in the framework of the development of this guide.

## 3370 **14 Ships, trains, aircraft, vehicles, and machines**

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### 3371 **14.1 Scope**

3372 This section deals with occupational exposure to asbestos in relation to various modes of  
3373 transportation, including ships, trains, aircraft, and vehicles, as well as in machinery and related  
3374 equipment. This section builds on Sections 4 to 10 by providing additional information that is relevant  
3375 to occupational exposure in relation to transportation means including ships, trains, aircraft, and  
3376 vehicles, as well as in machinery and related equipment.

3377 Asbestos can be found in components of ships, trains, aircraft, vehicles, and machinery, as summarised  
3378 in the sections below.

#### 3379 **14.1.1 Ships**

3380 Asbestos was widely used as a material in ships during the 1960s and 1970s<sup>367</sup>. Although the use of  
3381 MCAs was gradually restricted both within and outside the EU (for national bans in the EU, see Section  
3382 6.2.1), MCAs can still be found on many ships. In addition to the measures restricting the use of  
3383 asbestos in the EU, since July 2002, the international Convention for the Safety of Life at the Sea  
3384 (SOLAS)<sup>368</sup>, adopted by International Maritime Organization (IMO), only permitted the use of MCA in  
3385 specific components of ships such as:

- 3386 • Vanes used in rotary vane compressors and rotary vane vacuum pumps;
- 3387 • Watertight joints and linings used for the circulation of fluids when, at high temperature (in  
3388 excess of 350°C) or pressure (in excess of 7 x 10<sup>6</sup> Pa), there is a risk of fire, corrosion or toxicity;  
3389 and
- 3390 • Supple and flexible thermal insulation assemblies used for temperatures above 1000°C.

3391 At the international level, the final complete prohibition on the use of MCAs in ships came into in  
3392 forced from 1<sup>st</sup> January 2011, through an amendment in the SOLAS (Resolution MSC.282(86) 2009)<sup>369</sup>.  
3393 Thus, those ships built until 2011 may still contain asbestos in some components if they were built  
3394 outside the EU. Considering that the typical lifespan of a ship is approximately 30 years<sup>370,371</sup>, workers  
3395 may be exposed to asbestos in vessels built in this period.

3396 Since MCAs were mostly used as bulkhead/deck/pipe insulation, the most common places in which  
3397 asbestos can be found is in the accommodation (or living area) of the crew and the engine room. In  
3398 various void spaces on ships, the presence of asbestos fibres or dust in the air is likely to be detectable,  
3399 particularly in the following areas<sup>372</sup>:

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<sup>367</sup> Wu, W. Te, Lin, Y.J., Li, C.Y., Tsai, P.J., Yang, C.Y., Liou, S.H., Wu, T.N., 2015. Cancer attributable to asbestos exposure in shipbreaking workers: A matched-cohort study. *PLoS One* 10, 1–12. <https://doi.org/10.1371/journal.pone.0133128>

<sup>368</sup> International Maritime Organization (IMO). (n.d.). Asbestos. Retrieved June 17, 2024, from <https://www.imo.org/en/OurWork/Safety/Pages/Asbestos.aspx>

<sup>369</sup> Resolution MSC, 282(86); ANNEX, Part A-1 – Structure of ships.

<sup>370</sup> Du, Z., Zhang, S., Zhou, Q., Yuen, K.F., Wong, Y.D., 2018. Hazardous materials analysis and disposal procedures during ship recycling. *Resour. Conserv. Recycl.* 131, 158–171. <https://doi.org/10.1016/j.resconrec.2018.01.006>

<sup>371</sup> Mikelis, N.E., 2008. A statistical overview of ship recycling. *WMU J. Marit. Aff.* 7, 227–239. <https://doi.org/10.1007/BF03195133>

<sup>372</sup> Fraguera-Formoso, J.Á., Fernández-Soto, J.L., Fariñas-Alvariño, P., Carral-Couce, L., 2016. Seguridad marítima: Asbestos en la industria marítima. *DYNA* 83, 206–213. <https://doi.org/10.15446/dyna.v83n198.50065>

- 3400 • The backside of partition walls adjacent to bulkheads;
- 3401 • The cavities between partition walls;
- 3402 • The spaces between ceilings and upper decks;
- 3403 • The areas between floating floors and decks, and within escape trunks.

3404 Since these void spaces are not designed for regular crew access, they typically lack ventilation and  
 3405 often contain friable MCAs. The vibrations experienced on ships can cause these MCAs to release  
 3406 accumulated asbestos fibres into the air, creating hazardous conditions for workers and bystanders.<sup>373</sup>

3407 Special attention should be given to ships constructed or maintained outside the EU may still contain  
 3408 asbestos components,<sup>374</sup> and in particular to gaskets, as they can be replaced during servicing outside  
 3409 the EU with asbestos-containing gaskets in countries where its use remains permitted.<sup>375</sup>

3410 When a ship reaches the end of its operational life, it is sent to shipbreaking yards for dismantling.  
 3411 However, shipbreaking can pose significant risks to workers' health.<sup>376</sup> From 26 June 2025 the Hong  
 3412 Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (the Hong  
 3413 Kong Convention) will come into to force to regulate environmental and safety aspects of commercial  
 3414 ship recycling.<sup>377</sup> This convention, which applies to ships of at least 500 GT, establishes safety  
 3415 measures to be ensured by shipowners, ship building yards, and ship recycling facilities flying flags of  
 3416 the party states, which includes eleven EU Member States i.e., Belgium, Croatia, Denmark, Estonia,  
 3417 France, Germany, Luxembourg, Malta, Kingdom of the Netherlands, Portugal, Spain<sup>378</sup>. The adoption  
 3418 of the Kong Kong Convention implies that, commercial fom these EU Member States should have on  
 3419 board an Inventory of Hazardous Materials prepared in line with IMO guidelines<sup>379</sup> and keep additional  
 3420 materials assessments during the life of the ship, and a final materials assessment prior to recycling,  
 3421 ensuring that the vessels are free of asbestos<sup>380</sup>, among other restrictions to the use of hazardous  
 3422 materials as per Appendix 1 of the Hong Kong Convention.

### 3423 14.1.2 Trains

3424 The use of asbestos in the railway industry was widespread. From specific components such as gaskets  
 3425 to the insulation of boilers and even entire carriages.<sup>381,382</sup> Additionally, asbestos could also be found  
 3426 in signal boxes, depots, outbuildings and other electrical equipment beside the railway line<sup>383</sup>. Today,

<sup>373</sup> Singh, R., Cherrie, J.W., Rao, B., Asolekar, S.R., 2020. Assessment of the future mesothelioma disease burden from past exposure to asbestos in ship recycling yards in India. *Int. J. Hyg. Environ. Health* 225, 113478. <https://doi.org/10.1016/j.ijheh.2020.113478>

<sup>374</sup> Dutch Firefighting Department (2018). *Fire Department Operation in Case of Asbestos Incidents (Brandweer, NL)* (2018).

<sup>375</sup> Information provided by stakeholder in the workshop held on 19<sup>th</sup> November 2024 (WS07 - Ships and trains)

<sup>376</sup> Du, Z., Zhang, S., Zhou, Q., Yuen, K.F., Wong, Y.D., 2018. Hazardous materials analysis and disposal procedures during ship recycling. *Resour. Conserv. Recycl.* 131, 158–171. <https://doi.org/10.1016/j.resconrec.2018.01.006>

<sup>377</sup> Hong Kong International Convention For The Safe And Environmentally Sound Recycling Of Ships, 2009

<sup>378</sup> International Maritime Organization (IMO) (n.d). Recycling of ships and the Hong Kong Convention. <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Recycling-of-ships-and-Hong-Kong-Convention.aspx>

<sup>379</sup> Resolution MEPC.379(80). 2023 Guidelines For The Development Of The Inventory Of Hazardous Materials

<sup>380</sup> Resolution MEPC.222(64). 2012 Guidelines For The Survey And Certification Of Ships Under The Hong Kong Convention

<sup>381</sup> Battista, G., Belli, S., Comba, P., Fiumalbi, C., Grignoli, M., Loi, F., Orsi, D., Paredes, I., 1999. Mortality due to asbestos-related causes among railway carriage construction and repair workers. *Occup. Med. (Chic. Ill)*. 49, 536–539. <https://doi.org/10.1093/occmed/49.8.536>.

<sup>382</sup> Maltoni, C., Pinto, C., Mobiglia, A., 1991. Mesotheliomas due to Asbestos Used in Railroads in Italy. *Ann. NEW YORK Acad. Sci.* 623, 347–367. <https://doi.org/https://doi.org/10.1111/j.1749-6632.1991.tb24481.x>

<sup>383</sup> Office Rail Regulation (ORR) (2014). ORR position paper on asbestos in the rail industry.

3427 asbestos has largely been replaced by fibreglass<sup>384</sup>; however, given the long lifespan of most trains,  
3428 individual components may have asbestos present which can represent a risk to workers.<sup>385</sup>

### 3429 **14.1.3 Railway track ballast**

3430 The railway track ballast, consisting of crushed stone, often originates from the crushing of  
3431 serpentinite rocks. These serpentinite rocks can contain thin veins of two types of asbestos fibres —  
3432 chrysotile and tremolite. Additionally, ballast can become contaminated with asbestos from other  
3433 sources, such as materials falling from trains, stations, or trackside debris coming into contact with  
3434 the tracks. This contamination is particularly concerning for older trains where MCAs were used in  
3435 components like brake pads and insulation.<sup>386,387</sup>

### 3436 **14.1.4 Aircraft**

3437 The use of asbestos products in aircrafts was a common in some components such as brakes, where  
3438 the chrysotile asbestos content ranged from 16% to 23% by weight used as an aggregate for phenolic  
3439 binders.<sup>388</sup> Other components which can contain asbestos include the engine and electrical insulation,  
3440 blankets, brakes, cockpit heating system, heat shields for engines, torque valves, gaskets, electrical  
3441 wiring and insulation, cargo bays booths, etc.

### 3442 **14.1.5 Vehicles**

3443 Vehicles that may contain MCAs include cars, motorcycles, buses, trucks, agricultural vehicles,  
3444 tractors, cranes, excavators, and other special-purpose vehicles<sup>389</sup>. Until 1991, asbestos was widely  
3445 used in vehicles, meaning older vehicles—such as classic, vintage, heritage, and historic vehicles—may  
3446 still contain asbestos components. This is also true for vehicles produced in countries where asbestos  
3447 is not banned, which can pose risks during maintenance.<sup>390,391</sup> Historically, asbestos was used in  
3448 several areas of vehicle construction, including brake pads and linings, clutch plates and housings,  
3449 seals, gaskets, pipe wrap insulation (lagging), exhaust system insulation (flat and rope), firewalls, and  
3450 plastic asbestos parts (such as seat bases and battery holders). It was also used in bituminous coatings  
3451 for underbodies or soundproofing in areas like the interior floor pan, rear parcel shelf, boot, under the  
3452 bonnet, and wheel arches.

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<sup>384</sup> Maltoni, C., Pinto, C., Mobiglia, A., 1991. Mesotheliomas due to Asbestos Used in Railroads in Italy. *Ann. NEW YORK Acad. Sci.* 623, 347–367. <https://doi.org/https://doi.org/10.1111/j.1749-6632.1991.tb24481.x>

<sup>385</sup> Office Rail Regulation (ORR) (2024). 2023 REACH asbestos survey. Stakeholder Survey Report.

<sup>386</sup> European Parliament. (2012). Written question E-008194/2012: Asbestos contamination of railway ballast. Retrieved June 17, 2024, from [https://www.europarl.europa.eu/doceo/document/E-7-2012-008194\\_EN.htm](https://www.europarl.europa.eu/doceo/document/E-7-2012-008194_EN.htm)

<sup>387</sup> Safety and Health Practitioner (SHP) (2021). Informa, Railway Safety. Managing asbestos on the railway.

<sup>388</sup> Blake, C.L., Johnson, G.T., Harbison, R.D., 2009. Airborne asbestos exposure during light aircraft brake replacement. *Regul. Toxicol. Pharmacol.* 54, 242–246. <https://doi.org/10.1016/j.yrtph.2009.04.007>

<sup>389</sup> Australian Government. Asbestos Safety and Eradication Agency (n.d). Asbestos awareness for the automotive industry and historic vehicle enthusiasts.

<sup>390</sup> Dutch Firefighting Department (2018). Fire Department Operation in Case of Asbestos Incidents (Brandweer, NL (2018).

<sup>391</sup> Australian Government. Asbestos Safety and Eradication Agency (n.d). Asbestos awareness for the automotive industry and historic vehicle enthusiasts.

## 3453 14.1.6 Machinery

3454 Asbestos was commonly used in machinery parts for many years due to its ability to withstand high  
3455 friction, pressure, and heat.<sup>392</sup> In France, if it is suspected that materials in a machine room or  
3456 equipment manufactured outside the country before 1 January 1997 may contain asbestos, this could  
3457 justify conducting an asbestos identification operation in the building (see , even if the building itself  
3458 was constructed after 1 January 1997—the date when asbestos was banned in France.<sup>393</sup>

## 3459 14.2 Risk assessment

3460 A risk assessment must be undertaken for any activity likely to involve a risk of exposure to dust arising  
3461 from asbestos or materials containing asbestos<sup>394</sup>, see Section 5.

### 3462 14.2.1 Notification

3463 A notification must be submitted to the responsible authority of the Member State before work  
3464 commences on any activity likely to involve a risk of exposure to asbestos dust unless their Member  
3465 States has derogated certain activities from the notification requirement<sup>395</sup>, see Section 5.

### 3466 14.2.2 Planning the work

3467 A plan of work must be drawn up before work on removing asbestos and/or asbestos-containing  
3468 products from structures, plant or installations or from ships is started.<sup>396</sup>

## 3469 14.3 Identifying Asbestos

### 3470 14.3.1 General principles and examples

3471 Please refer to the details provided in Section 6.

3472 Where a material or component is suspected of containing asbestos, the item should be treated as an  
3473 MCA until proven otherwise. This should then be identified by a qualified person as an MCA or non-  
3474 MCA, and where appropriate, the type of asbestos should also be determined<sup>397</sup>.

3475 Components containing asbestos can enter the EU from products produced in countries where the  
3476 use of asbestos is not prohibited - even in some countries where asbestos is banned, small amounts  
3477 may be permitted. Whenever acquiring products online, one should establish the origin of the goods

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<sup>392</sup> University of Manchester (June 2017). Guidance on Asbestos in Equipment *Asbestos: Identification and management guidelines v 2.2*. Safety Services. Retrieved from <https://documents.manchester.ac.uk/display.aspx?DocID=23182>

<sup>393</sup> French Regional Directorates for the Economy, Employment, Labor, and Solidarity (DREETS) (2024). Les fondamentaux de la prévention du risque d'exposition à l'amiante dans les immeubles bâtis. Retrieved from: <https://pays-de-la-loire.dreets.gouv.fr/Les-fondamentaux-de-la-prevention-du-risque-d-exposition-a-l-amiante-dans-les>. Available in 24.01.2025.

<sup>394</sup> Directive (EU)2023/2668, Article 3(2)

<sup>395</sup> Directive 2009/148/EC, Article 4(3)

<sup>396</sup> Directive 2009/148/EC, Article 13

<sup>397</sup> Safety and Health Practitioner (SHP) (2021). Informa, Railway Safety. Managing asbestos on the railway.

3478 and what materials they contain. One should also be wary of general raw material descriptions such  
 3479 as ‘mineral fibres’ or ‘other materials’<sup>398</sup>.

3480 The main form of asbestos encountered in across various occupational scenarios is chrysotile asbestos  
 3481 (white asbestos) which belongs to serpentine group; however, other types of asbestos belonging to  
 3482 the amphibole group (e.g. amosite, crocidolite and anthophyllite) can be encountered in ships and  
 3483 trains.<sup>399</sup> The table below offers a non-exhaustive list of potential MCAs in the relevant means of  
 3484 transport.

Category	Components/ materials	Likely utilisation*
Thermal Insulation	Lagging, felts, blankets for pipes, boilers, pressure vessels, and calorifiers	<p>Ships: In thermal insulation and heat retention in steam systems, boilers, and engine rooms.</p> <p>Trains: In steam trains for insulation around boilers and steam pipes. In modern trains may be used for heat management in HVAC systems.</p> <p>Aircraft: For thermal insulation around aircraft engines, exhaust systems, and other high-temperature components such as around engines, or air ducts, and in fireproofing areas exposed to heat.</p> <p>Vehicles: Rarely used in standard vehicles, but present in large industrial or specialty vehicles with onboard heating or pressurized systems (e.g., mining trucks).</p> <p>Machinery: Standard for insulating high-temperature machinery, including boilers, pressure vessels, and calorifiers, in industrial setups.</p>
	Duct tapes	<p>Trains: For sealing and insulating ducts, pipes, and electrical components in technical areas.</p> <p>Ships: For sealing and insulation in high-pressure steam pipes and fittings</p> <p>Aircraft: Likely not used in aircrafts</p> <p>Vehicles: In maintenance of exhaust systems or thermal shielding in performance or heavy-duty vehicles.</p> <p>Machinery: For thermal insulation and to seal joints in machinery with high-temperature components.</p>
Fire Insulation	Millboard for heat insulation and fire protection in switchgear	<p>Trains: For heat insulation and fire protection in electrical components, such as switchgear and circuit boards, in older train models.</p> <p>Ships: For fire protection in electrical switchgear or control panels.</p>

<sup>398</sup> Australian Government. Asbestos Safety and Eradication Agency (n.d). Asbestos awareness for the automotive industry and historic vehicle enthusiasts.

<sup>399</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.

<sup>400</sup> University of Manchester (June 2017). Guidance on Asbestos in Equipment *Asbestos: Identification and management guidelines v 2.2. Safety Services*. Retrieved from <https://documents.manchester.ac.uk/display.aspx?DocID=23182>



**Table 14-1: List of components documented to contain asbestos in transport modes and machinery<sup>400</sup>**

Category	Components/ materials	Likely utilisation*
		<p>Aircraft: For fire protection and insulation in high-heat areas, including aircraft electrical systems and engines.</p> <p>Vehicles: In specialized vehicles requiring robust electrical insulation, such as industrial or heavy-duty vehicles.</p> <p>Machinery: In industrial machinery to insulate switchgear and prevent fire hazards.</p>
	<p>Insulation board for building materials and acoustic attenuators</p>	<p>Ships: For thermal and acoustic insulation, particularly in living quarters, engine rooms, or areas requiring noise reduction.</p> <p>Aircrafts: For soundproofing and insulation in aircraft cabins, around electrical systems, and for heat insulation.</p> <p>Vehicles: Less common but could be used in larger vehicles (e.g., buses, trains) for soundproofing and insulation.</p> <p>Machinery: In enclosures or areas where noise reduction or thermal management is necessary.</p>
	<p>Paper, felt, and cardboard for electrical/heat insulation in electrical equipment, wiring, air handling equipment, ducts, and pipes</p>	<p>Trains: In electrical insulation, air handling systems, and around pipes and ducts.</p> <p>Ships/Boats: For insulation in electrical equipment and ductwork to ensure safety and efficiency.</p> <p>Aircrafts: In electrical insulation, heat insulation, and as part of air handling systems in aircraft.</p> <p>Vehicles: In electrical systems for insulation, especially in older models or specialized vehicles.</p> <p>Machinery: In industrial settings for insulating electrical components and air-handling systems.</p>
<p><b>Ropes, Yarns, and Cloth</b></p>	<p>Ropes and yarns for lagging, jointing, packing, and heat/fire protection</p>	<p>Trains: For insulation and sealing in steam locomotives and older systems; still used for fire protection in modern applications.</p> <p>Ships/Boats: For sealing and insulating pipes, joints, and machinery in engine rooms and boiler areas. Also used for fire protection.</p> <p>Aircrafts: For sealing, lagging, and jointing in aircraft components exposed to heat, such as engines, exhaust systems, and electrical equipment.</p> <p>Vehicles: Less n standard vehicles but may be present in industrial or heavy-duty vehicles for sealing and insulation</p> <p>Machinery: For packing and sealing joints in industrial equipment, particularly in high-temperature or pressure systems.</p>



**Table 14-1: List of components documented to contain asbestos in transport modes and machinery<sup>400</sup>**

Category	Components/ materials	Likely utilisation*
	Plaited tubing in some electrical cables.	<p>Trains: For insulating electrical cables in high-heat areas, such as near engines or heating elements.</p> <p>Ships/Boats: For insulation and protection for electrical wiring, particularly in high-heat or high-moisture environments.</p> <p>Aircrafts: For insulating electrical cables in areas exposed to heat or abrasion.</p> <p>Vehicles: In specialized or older vehicle models, particularly for heavy-duty applications requiring additional electrical insulation.</p> <p>Trains: In electrical systems to protect wiring and ensure safety in high-voltage areas.</p> <p>Machinery: To protect electrical cables in industrial settings, especially in equipment exposed to heat or abrasion.</p>
	Cloth for thermal insulation, lagging, blankets, mattresses, curtains, gloves, aprons, and overalls (sometimes aluminized to reflect heat)	<p>Trains: For insulation in engine compartments and for fire-resistant curtains or protective gear in maintenance.</p> <p>Ships: For thermal insulation in engine rooms and as protective gear for crew members working near heat sources.</p> <p>Aircraft: In various forms for thermal insulation, fireproofing, and personal protective equipment (PPE) in aircraft.</p> <p>Vehicles: Rare in standard vehicles but used in industrial or heavy-duty vehicles for heat insulation or in protective gear for operators.</p> <p>Machinery: Used for insulating machinery, protective clothing for operators, and thermal blankets for equipment maintenance.</p>
<b>Sealing and Friction Products</b>	Gaskets and washers.	<p>Trains: In locomotive engines, brake systems, and HVAC systems.</p> <p>Ships: In engines, pumps, valves, and piping systems to ensure leak-proof seals under high pressure and temperature.</p> <p>Aircraft: For sealing engine components, fuel systems, and exhaust systems in aircraft.</p> <p>Vehicles: In internal combustion engines, exhaust systems, and cooling systems.</p> <p>Machinery: In industrial equipment for sealing joints in pipes, engines, and hydraulic systems.</p>
	Strings for sealing hot water radiators.	<p>Trains: For sealing hot water radiators or other heated systems.</p> <p><b>Ships:</b> In older or specialized vessels with radiator systems for thermal management.</p> <p>Aircraft: For sealing radiator systems in aircraft (though not common).</p>

**Table 14-1: List of components documented to contain asbestos in transport modes and machinery<sup>400</sup>**

Category	Components/ materials	Likely utilisation*
		<p>Vehicles: In certain heavy-duty or older vehicle models with radiator systems requiring manual sealing solutions.</p> <p>Trains: In train heating systems, particularly in older models or where manual sealing of radiators is necessary.</p> <p>Machinery: In industrial heating systems where radiators require additional sealing to prevent leaks.</p>
	Friction products like resin-based materials in brakes and clutch plates.	<p>Trains: Used in train braking systems and clutches.</p> <p>Ships: Found in marine braking systems and winches to manage the significant mechanical loads of maritime operations.</p> <p>Aircraft: Used in aircraft braking systems, including brake pads, clutch plates, and friction materials</p> <p>Vehicles: A standard component in brakes and clutch plates across all types of motor vehicles.</p> <p>Trains: Widely used in train braking systems to provide reliable friction under heavy loads and at high speeds.</p> <p>Machinery: Commonly used in industrial equipment with braking systems, including cranes, lifts, and heavy machinery.</p>
<b>Belts and Composites</b>	Drive belts and conveyor belts.	<p>Trains: In mechanical systems, such as engines or conveyors in maintenance facilities.</p> <p>Ships: In auxiliary systems, such as pumps, generators, and compressors.</p> <p>Aircraft: In aircraft engines and other mechanical systems.</p> <p>Vehicles: In engines for alternators, air conditioning, and power steering systems. Conveyor belts are rare but may appear in specialized transport vehicles for materials handling.</p> <p>Trains: In locomotive auxiliary systems. Conveyor belts may be present in maintenance systems or specialized freight operations.</p> <p>Machinery: In industrial machinery for power transmission and materials transport in production lines.</p>
<b>Cement and Bituminous Products</b>	Cement products in flue pipes and extractor hoods.	<p>Trains: In certain train components for fireproofing, insulation, and sealing, especially around exhaust systems.</p> <p>Ships: In flue pipes of exhaust systems and extractor hoods in galleys to resist heat and corrosion.</p> <p>Aircraft: In some aircraft for fireproofing and insulation.</p> <p>Vehicles: Rarely used, but may appear in specialized vehicles (e.g., mobile kitchens or industrial vehicles) with heat-intensive operations.</p>

**Table 14-1: List of components documented to contain asbestos in transport modes and machinery<sup>400</sup>**

Category	Components/ materials	Likely utilisation*
		<p>Trains: In flue systems or extractor hoods of kitchen areas on passenger trains.</p> <p>Machinery: In industrial exhaust systems and extractor hoods where heat and chemical resistance are required.</p>
	Bituminous products used in underseals.	<p>Trains: For sealing and protecting train undercarriages and surfaces from moisture and damage.</p> <p>Ships: For corrosion protection in underwater hull areas and ballast tanks.</p> <p>Aircraft: In aircraft for sealing and protecting surfaces exposed to weather or stress.</p> <p>Vehicles: Widely used as underseals to prevent rust and protect the undercarriage from water, salt, and debris.</p> <p>Machinery: Applied to outdoor or exposed machinery to protect against corrosion and environmental damage.</p>

(\* ) The use of each component described here is a suggestion and does not imply the inevitable presence of MCA. However, the presence of asbestos in materials should be considered a potential risk in any location where its physical properties could offer an advantage.

3485 **14.3.2 Materials assessment of asbestos in ships, trains, and aircrafts**

3486 **14.3.2.1 Ships**

3487 For ships, asbestos removal activities should be supported by the Inventory of Hazardous Materials  
 3488 (IHM) as outlined in the Hong Kong Convention. Ships from EU Member States that are parties to the  
 3489 Hong Kong Convention must have the IHM onboard, which should be prepared in accordance with the  
 3490 IMO Resolution MEPC.379(80) 2023 Guidelines for the Development of the Inventory of Hazardous  
 3491 Materials. This document is essential for planning and executing the removal and management of  
 3492 asbestos onboard.<sup>401</sup>

3493 Additionally, the French Standardisation Association (AFNOR) has developed the document NF X46-  
 3494 101, which comprehensively outlines procedures for surveying asbestos in ships, boats, and other  
 3495 floating structures. This document (AFNOR, 2018) provides detailed instructions that can be  
 3496 followed<sup>402</sup>.

3497 **14.3.2.2 Trains**

3498 For a comprehensive guide on procedures for assessing the presence of asbestos in railway rolling  
 3499 stock, one can refer to the document NF F01-02, published by the Association Française de  
 3500 Normalisation (AFNOR) in 2019<sup>403</sup>.

<sup>401</sup> Resolution MEPC.196(62) 2011 Guidelines for The Development of The Ship Recycling Plan

<sup>402</sup> Association Française de Normalisation (AFNOR) (2018). NF X46-1012019-01. Asbestos detection - Detection of asbestos containing materials and products in ships, boats and other floating structures - Mission and methodology.

<sup>403</sup> Association Française de Normalisation (AFNOR) (2019). NF F01-0202019-10. Railway application – Asbestos detection – Identification of MCAs and products in railway rolling stock.

3501 **14.3.2.3 Aircraft**

3502 For comprehensive guidance on procedures for assessing the presence of asbestos in aircraft, one can  
3503 refer to the document NF L80-001, published by the Association Française de Normalisation (AFNOR)  
3504 in 2020.<sup>404</sup>

3505 **14.3.2.4 Machines**

3506 For comprehensive guidance on procedures for assessing the presence of asbestos in various  
3507 machinery, one can refer to the document NF X46-100, published by the Association Française de  
3508 Normalisation (AFNOR) in 2019.<sup>405</sup>

3509 **14.4 Air exposure assessment**

3510 No additional details are required for exposure assessment, therefore refer to the details provided in  
3511 Section 7.

3512 **14.5 Structured management of asbestos**

3513 As noted in Section 9, employers must ensure that the exposure of workers to dust arising from  
3514 asbestos or MCAs at the place of work is reduced to a minimum and in any case to as low a level as is  
3515 technically possible below the relevant limit value<sup>406</sup>. This should be achieved through a combination  
3516 of collective and individual measures. The removal of asbestos or MCAs must be prioritised over other  
3517 forms of handling.<sup>407</sup>

3518 **14.5.1 Collective measures (technical, organisational)**

3519 Examples of collective measures are provided below for five activities relevant to asbestos removal or  
3520 component replacement in means of transport. For a general description of control measures see  
3521 Section 9.

3522 **14.5.1.1 Removal of asbestos-containing flat gaskets**

3523 This section outlines procedures for removing flat gaskets containing asbestos from pipelines, hatches,  
3524 or flanges under static load ( $\rho > 1000 \text{ kg/m}^3$ ). These include:

- 3525
- Gaskets exposed to temperature loads up to DN 400 (over 200°C).
  - Gaskets without temperature loads (up to 200°C), such as transformer gaskets or gaskets in gas supply equipment.
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3528 In order to proceed with the removal of asbestos-containing flat gaskets, one should follow the  
3529 procedures set out in Table 14-2.<sup>408</sup>

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<sup>404</sup> Association Française de Normalisation (AFNOR) (2020). NF L80-0012020-03 Aerospace series - Pre-work asbestos detection in aircraft Mission and methodology.

<sup>405</sup> Association Française de Normalisation (AFNOR) (2019). NF X46-1002019-07 Asbestos identification - Identification of materials and products containing asbestos in installations, structures or equipment involved in the performance or implementation of an activity - Mission and methodology

<sup>406</sup> Directive 2009/148/EC, Article 6

<sup>407</sup> Directive 2009/148/EC, Article 3(2)

<sup>408</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.

**Table 14-2: Workflow for removal of asbestos-containing flat gaskets**

<b>Required tools</b>	<ul style="list-style-type: none"> <li>• Scraping and collecting tools such as a putty knife, scraper, durable foil or suitable containers for collecting gasket fragments</li> <li>• Industrial vacuum cleaner with a suction capacity of at least 30 m<sup>3</sup>/h (up to a maximum of 100 m<sup>3</sup>/h).</li> <li>• Sealed, labelled container or synthetic bag for securely packing asbestos-containing gaskets, gasket fragments, and tools contaminated with gasket residues (e.g., cloths, brushes).</li> <li>• Solvent such as rust remover or rust-dissolving oil, along with application tools (e.g., brushes or spray bottles).</li> <li>• Marking materials for delineating the work area (e.g., tape, prohibition signs).</li> <li>• Respiratory protective mask with a protection level of at least P3.</li> <li>• Adhesive tape.</li> </ul>
<b>Work procedure</b>	<ul style="list-style-type: none"> <li>• Delineate the work area to prevent unauthorized access.</li> <li>• Spread foil on the ground or place a waste collection container nearby.</li> <li>• Apply the solvent to flange edges and allow it to act.</li> <li>• Loosen flange bolts partially, reapply solvent to gasket edges, and allow it to act.</li> <li>• Fully unscrew and remove the flange bolts while simultaneously cleaning the area with the vacuum cleaner.</li> <li>• Open the flange connection.</li> <li>• Thoroughly moisten the exposed gasket with solvent and remove it.</li> <li>• For stuck or damaged gaskets, scrape them off using a scraper or putty knife while keeping the gasket moistened. Use the vacuum cleaner to remove smaller fragments.</li> <li>• Place the asbestos-containing gasket and fragments in a dustproof container or bag.</li> <li>• Clean tools and materials used, then pack them in a suitable container.</li> <li>• Conduct a visual inspection and, if necessary, clean the work area with a damp cloth or vacuum cleaner. Seal the vacuum cleaner nozzle tightly with adhesive tape afterward.</li> <li>• Install a new asbestos-free gasket and remove the area markings.</li> </ul>
<b>Handling Disruptions</b>	<ul style="list-style-type: none"> <li>• If issues arise during gasket removal (e.g., scraping difficulties), contact the responsible person.</li> <li>• If deviations from the prescribed method are necessary, stop work and consult with the responsible person before proceeding.</li> </ul>

3530 **14.5.1.2 Removal of asbestos-containing packing seals from pumps, valves, and other equipment**

3531 In order to proceed with the removal of asbestos-containing packing seals from pumps, valves, and  
 3532 other equipment, one should follow the procedures set out in Table 14-3.<sup>409</sup>

**Table 14-3: Workflow for removal of asbestos-containing packing seals from pumps, valves, and other equipment**

<b>Required tools</b>	<ul style="list-style-type: none"> <li>• Seal removal corkscrews, and tear-resistant plastic sheeting.</li> <li>• Industrial Vacuum Cleaner of category K1 or H with a suction capacity of at least 30 m<sup>3</sup>/h and a maximum of 100 m<sup>3</sup>/h.</li> </ul>
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<sup>409</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.

**Table 14-3: Workflow for removal of asbestos-containing packing seals from pumps, valves, and other equipment**

	<ul style="list-style-type: none"> <li>• Robust plastic bags or containers suitable for securely packaging asbestos-containing seals, seal fragments, and contaminated tools (e.g., cloths, brushes).</li> <li>• Rust solvents or rust-removal oils, along with suitable application tools (e.g., brushes, sprayers), and fibre-binding agents.</li> <li>• Wipes or other cleaning tools.</li> <li>• A respiratory mask with at least P3 protection level.</li> </ul>
<p><b>Work procedure</b></p>	<ul style="list-style-type: none"> <li>• Restrict the work area and ensure the area is marked and access is limited.</li> <li>• Protect adjacent surfaces by covering surfaces near the work area with tear-resistant plastic sheeting.</li> <li>• Carefully unscrew the packing seal.</li> <li>• Use a vacuum cleaner to remove any loosened seal debris.</li> <li>• Saturate the seal rings with a solvent and allow time for it to act.</li> <li>• Extract the packing material using a seal removal tool or carefully dislodge it. Clean the area with the vacuum cleaner during this process.</li> <li>• Package all asbestos-containing material in a suitable, sealed container.</li> <li>• Vacuum and wipe the seal housing with a damp cloth.</li> <li>• Clean the work area and protective sheeting using an H-class vacuum cleaner or damp cloth, or cover the sheeting with a fibre-binding agent.</li> <li>• Seal the vacuum cleaner nozzle securely after use.</li> <li>• Place seal debris, cleaning cloths, and protective sheeting into appropriate containers and seal them.</li> <li>• Replace the asbestos-containing seals with non-asbestos alternatives.</li> <li>• Remove barriers and ensure the area is safe for general use.</li> </ul>
<p><b>Notes</b></p>	<ul style="list-style-type: none"> <li>• Vacuum cleaners previously used in contaminated areas ("black zones") may only be reused if contamination (e.g., engine contamination via bypass cooling) is strictly prevented.</li> <li>• Drilling out seal rings is strictly prohibited!</li> </ul>

3533 **14.5.1.3 Replacement of asbestos-containing clutches in vehicles**

3534 In order to proceed with the replacement of asbestos-containing clutches in vehicles, one should  
 3535 follow the procedures described in Table 14-4.<sup>410</sup>

**Table 14-4: Workflow for replacement of asbestos-containing clutches in vehicles**

<p><b>Required tools</b></p>	<ul style="list-style-type: none"> <li>• All necessary tools for clutch replacement.</li> <li>• Robust, sealable containers or strong plastic bags for asbestos waste.</li> <li>• Cleaning cloths.</li> <li>• Suitable solutions, such as brake cleaner or water mixed with dishwashing detergent.</li> <li>• For applying wetting agents.</li> <li>• A respiratory mask with at least P3 protection level.</li> </ul>
<p><b>Work Procedure</b></p>	<ul style="list-style-type: none"> <li>• Access the clutch housing.</li> <li>• Generously spray the interior of the clutch housing with a wetting or soaking solution through the opening.</li> <li>• Dismantle the clutch housing, pressure plate, flywheel, and clutch disc.</li> <li>• Thoroughly clean the interior of the clutch housing using a cleaning cloth and a wetting or soaking solution.</li> </ul>

<sup>410</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.

**Table 14-4: Workflow for replacement of asbestos-containing clutches in vehicles**

	<ul style="list-style-type: none"> <li>• Carefully clean all dismantled clutch components and tools with a cleaning cloth and wetting solution.</li> <li>• Place the clutch disc, without damaging it, and all used cleaning cloths directly into a sealed container designated for asbestos waste.</li> <li>• Install a new, asbestos-free clutch disc and reassemble the clutch housing.</li> </ul>
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3536 **14.5.1.4 Replacement of asbestos-containing brake pads in vehicle disc brakes**

3537 In order to proceed with the replacement of asbestos-containing brake pads in vehicle disc brakes,  
 3538 one should follow the procedures as described in Table 14-5.<sup>411</sup>

**Table 14-5: Workflow for replacement of asbestos-containing brake pads in vehicle disc brake**

<b>Required tools</b>	<ul style="list-style-type: none"> <li>• Necessary tools for brake pad replacement.</li> <li>• Robust, sealable, and labelled containers or strong plastic bags for packaging waste.</li> <li>• Cleaning cloths.</li> <li>• Such as brake cleaner or water mixed with dishwashing detergent.</li> <li>• With a maximum pressure of 6 bar, and a basin or spray system with a spray hose for applying the wetting agent.</li> <li>• A respiratory mask with at least P3 protection level.</li> </ul>
<b>Work procedure</b>	<ul style="list-style-type: none"> <li>• Remove the wheel rim.</li> <li>• Wash the brakes and wheel hub with brake cleaner or thoroughly cover them with a wetting/soaking solution.</li> <li>• Carefully remove the brake pads.</li> <li>• Thoroughly clean the brakes, control arms, disassembled brake parts, and tools using a cleaning cloth and wetting solution.</li> <li>• Pour collected cleaning liquid into a sealed container and wipe the collection basin dry manually with a cleaning cloth.</li> <li>• Place the brake pads, without damaging them, and all used cleaning cloths directly into a sealed container designated for asbestos waste.</li> <li>• Install asbestos-free brake pads and reassemble the brakes.</li> </ul>

3539 **14.5.1.5 Replacement of asbestos-containing brake linings in vehicle drum brakes**

3540 In order to proceed with the replacement of asbestos-containing brake linings in vehicle drum brakes,  
 3541 one should follow as described in Table 14-6.<sup>412</sup>

**Table 14-6: Workflow for replacement of asbestos-containing brake linings in vehicle drum brakes**

<b>Required tools</b>	<ul style="list-style-type: none"> <li>• Required tools for disassembly and cleaning vehicle drum brakes.</li> <li>• Robust, sealable, and labelled containers for granular, fibrous, or bulky waste, such as strong plastic bags.</li> <li>• Cleaning cloths.</li> <li>• Brake cleaner or water mixed with dishwashing detergent.</li> <li>• Vacuum Cleaner suitable for contaminated zones and that contamination of internal components (e.g., motor bypass cooling).</li> <li>• A respiratory mask with at least P3 protection level.</li> </ul>
<b>Work procedure</b>	<ul style="list-style-type: none"> <li>• Dismantle the wheel rim.</li> </ul>

<sup>411</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.

<sup>412</sup> Estonian Health Development Institute (2011). Guidelines: Methods for Low-Risk Asbestos Work in Demolition, Renovation, and Maintenance Activities.



**Table 14-6: Workflow for replacement of asbestos-containing brake linings in vehicle drum brakes**

	<ul style="list-style-type: none"><li>• Open the brake drum until there is a small gap (approximately 2 cm) between the drum and the backing plate.</li><li>• Clean the Brake Drum:<ol style="list-style-type: none"><li>1. Vacuum the inside and outside of the drum or thoroughly wet it with brake cleaner or a wetting/soaking solution.</li><li>2. Clean the drum manually using a cleaning cloth and wetting/soaking agent.</li></ol></li><li>• Take apart the brake components.</li><li>• Thoroughly clean all disassembled parts, the backing plate, and tools using a cleaning cloth and wetting/soaking agent.</li><li>• Pour the collected cleaning liquid into a sealed container and manually dry the collection basin with a cleaning cloth.</li><li>• Place the brake pads and linings, without damaging them, along with used cleaning cloths, into a sealed asbestos waste container immediately.</li><li>• Install asbestos-free brake linings and reassemble the brakes.</li></ul>
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3542 **14.5.2 Individual measures (PPE)**

3543 No additional details are required for Individual measures (PPE), therefore refer to the details in  
3544 Section 11.5.

3545 **14.5.3 Passive and secondary exposure of workers**

3546 **14.5.3.1 Workers exposed to asbestos at shipyards**

3547 Asbestos fibres can remain suspended in the air for a long time after MCAs have been disturbed<sup>413</sup>.  
3548 Once disturbed, asbestos fibres can also be transported to other areas within the shipyard, where  
3549 exposure can reach levels not dissimilar to the areas where asbestos removal activities are carried out,  
3550 posing a significant risk of passive exposure.<sup>414</sup> Some estimates<sup>415</sup> suggest that the predicted number  
3551 of mesothelioma deaths among bystanders may exceed those among workers directly handling MCAs,  
3552 highlighting the vulnerability of workers in the vicinity of asbestos disturbances.

3553 No additional details are required for passive and secondary exposure of workers, therefore refer to  
3554 the details provided in passive exposure a secondary exposure see Section 8.

3555 **14.5.4 Incident management (emergencies)**

3556 No additional details are required for incident management, therefore refer to the details provided in  
3557 safe working environment see Section 4.

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<sup>413</sup> Wu, W. Te, Lin, Y.J., Li, C.Y., Tsai, P.J., Yang, C.Y., Liou, S.H., Wu, T.N., 2015. Cancer attributable to asbestos exposure in shipbreaking workers: A matched-cohort study. *PLoS One* 10, 1–12. <https://doi.org/10.1371/journal.pone.0133128>

<sup>414</sup> Singh, R., Cherrie, J.W., Rao, B., Asolekar, S.R., 2020. Assessment of the future mesothelioma disease burden from past exposure to asbestos in ship recycling yards in India. *Int. J. Hyg. Environ. Health* 225, 113478. <https://doi.org/10.1016/j.ijheh.2020.113478>

<sup>415</sup> Singh, R., Cherrie, J.W., Rao, B., Asolekar, S.R., 2020. Assessment of the future mesothelioma disease burden from past exposure to asbestos in ship recycling yards in India. *Int. J. Hyg. Environ. Health* 225, 113478. <https://doi.org/10.1016/j.ijheh.2020.113478>

## 3558 **14.6 Education and training**

3559 There are no specific training requirements for workers in ships, trains, aircraft, vehicles, and  
3560 machinery operation beyond those outlined in Section 10 on education and training. However, these  
3561 workers should be aware of the following:

- 3562 • The historical context of asbestos use in their professional field.
- 3563 • The risks associated with asbestos exposure, including its long-term health effects.
- 3564 • The importance of periodic health check-ups.
- 3565 • The appearance of asbestos, supplemented by photographs of materials likely to contain  
3566 asbestos and the typical locations where it may be found.
- 3567 • The appropriate actions to take if products suspected of containing asbestos are identified.

## 3568 **14.7 Health surveillance**

3569 No additional details are required for health surveillance, therefore refer to the details provided in the  
3570 health surveillance, see Section 11.

## 3571 **14.8 Waste management**

3572 No additional details are required for waste management in ships, trains, etc., therefore refer to the  
3573 details provided in Section 12.

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## 15 Mining and quarrying

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### 15.1 Scope

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Even where asbestos is not mined intentionally, worker exposure can occur during mining and quarrying activities involving other minerals that are naturally contaminated with asbestos. This section deals with preventing worker exposure to asbestos dust from naturally occurring asbestos (NOA) disturbed during mining and quarrying activities. This section builds on Sections 4 to 10 by providing additional information that is relevant to mining and quarrying operations.

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Please see section 15.3.2 on the identification of asbestos for further examples of minerals potentially contaminated with asbestos.

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As noted in Section 1, this guide applies to activities in which workers are or may be exposed to dust arising from asbestos, i.e. the six fibrous silicates within the scope of the AWD, as defined in Section 1.2.1. This also includes instances where workers are exposed to these fibrous silicates where these occur naturally.

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### 15.2 Risk assessment

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#### 15.2.1 Purpose of asbestos risk assessment

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Asbestos risk assessment must be undertaken for any activity likely to involve a risk of exposure to dust arising from asbestos or materials containing asbestos.<sup>416</sup> Therefore, a risk assessment must be elaborated before starting any mining or quarrying work<sup>417</sup> to assess any risk to the workers' health or safety in order to determine the preventive and control measures to be taken.<sup>418</sup> Removal of asbestos or materials containing asbestos must be prioritised over other forms of asbestos handling.<sup>419</sup> The risk assessment must determine the workers' nature, degree, and duration of exposure.<sup>420</sup> The risk assessment must be renewed regularly and updated if the activity changes.<sup>421</sup> The risk assessment for mining and quarrying activities should be a written document that takes into account the elements specified in Parts 1-4 below. The risk assessment should take into account the difficulty in reliably determining the geological composition of the relevant minerals prior to commencing mining and quarrying activities, the type of activity (underground work versus open cast mining or quarrying, tunnelling), and the implications for protecting workers from air exposure to asbestos.

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Although significant attention should be paid to assessing the risks stemming from asbestos exposure during mining and quarrying activities, it should be remembered that workers exposed to asbestos can also be subject to other types of risks and a risk assessment must take into account all carcinogens, mutagens and reprotoxic substances,<sup>422</sup> other hazardous substances,<sup>423</sup> and other types of risks.<sup>424</sup>

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<sup>416</sup> Directive 2009/148/EC, Article 3(2)

<sup>417</sup> Directive 2009/148/EC, Articles 3(2) and 6; see also Directive 2009/148/EC, Article 4(3)

<sup>418</sup> Directive 2009/148/EC, Articles 3(2) and 6; see Directive 2004/37/EC, Article 5 and Directive 89/391/EEC, Articles 6 and 9

<sup>419</sup> Directive 2009/148/EC, Article 3(2)

<sup>420</sup> Directive 2009/148/EC, Article 3(2)

<sup>421</sup> See Directive 2004/37/EC, Article 3(2) and Directive 89/391/EEC, Article 6

<sup>422</sup> Directive 2004/37/EC, Article 3(2)

<sup>423</sup> Directive 98/24/EC, Article 4

<sup>424</sup> Directive 89/391/EEC, Article 6

3605 Requirements on other types of risk in the mining sector where minerals are extracted through drilling  
3606 is provided in Directive 92/91/EEC. Advice on other types of risk in the mining and quarrying sector is  
3607 provided in EU OSHA's Online interactive Risk Assessment tools for the mining and quarrying sector.<sup>425</sup>

### 3608 **15.2.2 Responsibility for asbestos risk assessment**

3609 The employer of the personnel working in the mine or quarry is responsible for their occupational  
3610 health and safety and must undertake the risk assessment.<sup>426</sup>

3611 Mining and quarrying permits may include health and safety requirements. Workplaces in the minerals  
3612 extracting industry are specifically covered by Directive 92/91/EEC minimum requirements for  
3613 improving the safety and health protection of workers in the mineral-extracting industries through  
3614 drilling<sup>427</sup> and Directive 92/104/EEC which establishes rules on the minimum requirements for  
3615 improving the safety and health protection of workers in surface and underground mineral-extracting  
3616 industries<sup>428</sup>.

3617 Where permits are required, specific health and safety requirements for permit issuance may have  
3618 been laid down in Member State law.

### 3619 **15.2.3 Conducting a risk assessment for Naturally Occurring Asbestos (NOA)**

3620 Risk assessment of NOA for a new mine or quarry should involve the three steps below (Figure 15-1).  
3621 Repeated risk assessments can involve an update to some or all or some of the three steps, as  
3622 required.

3623 These three steps are explained more fully below, but for further information, other sources are more  
3624 comprehensive, such as:

- 3625 • BRGM (2021) Asbestos in the natural environment: Elements of understanding and help with  
3626 identification and characterisation - Part 1. Final report. BRGM/RP-70343-EM, September  
3627 2021.

3628 It is important to note that, even after following all of these three steps, it cannot be definitively  
3629 determined that asbestos is not present, only that 'no asbestos has been detected'. For this reason,  
3630 specific criteria and frequency for repeating the risk assessment should be determined for each mine  
3631 or quarry.

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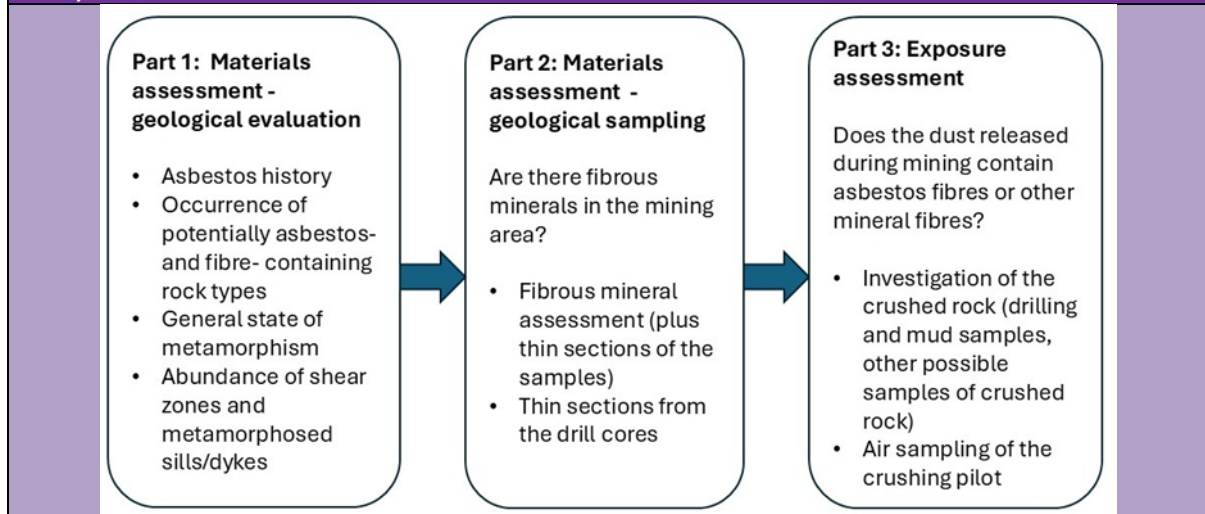
<sup>425</sup> See EU OSHA's Online interactive Risk Assessment tools for the mining and quarrying sector:  
<https://osha.europa.eu/en/oshnews/ensuring-safety-mining-and-quarrying-introducing-oira-tools>

<sup>426</sup> See Directive 89/391/EEC, Article 6

<sup>427</sup> As defined in Article 2 (a), Directive 92/91/EEC covers extraction, in the strict sense of the word, of minerals through drilling by boreholes, and/or prospection with a view to such extraction, and/or preparation of extracted materials for sale, excluding the activities of processing the materials extracted.

<sup>428</sup> As defined in Article 2 (a), Directive 92/104/EEC covers surface or underground extraction of minerals; prospecting for extraction; preparation of extracted materials for sale excluding processing of materials; but excludes mineral-extracting industries defined in Article 2 (a) of Directive 92/91/EEC.

Figure 15-1: Flow chart of the three steps in risk assessment for a mine or quarry (adapted from FIOSH, 2019).



3632 **15.2.3.1 Part 1: Geological evaluation**

3633 For a new quarry or mine, the employer should undertake a geological evaluation of the site and  
 3634 extraction area through a review of literature and maps. Maps of scale 1:50 000 or more detailed  
 3635 should be used.<sup>429</sup> The geological evaluation should also include a review of the history and occurrence  
 3636 of asbestos; a review of the state of metamorphism<sup>430</sup> of the rock to assess the likelihood of asbestos  
 3637 presence; and estimation of the abundance of shear zones and sills or dikes.

3638 Typical rock types which would indicate the possible presence of asbestos include<sup>431</sup>:

- 3639 • **Ultrabasite** or **peridotite** (for example dunite, iherzolite, harzburgite).
- 3640 • **Basic effusives** (for example basalt, spilite, basanite, tephrite, phonolite).
- 3641 • **Basic intrusives** (for example gabbro, norite, diabase).
- 3642 • **Metamorphic** and **metasomatically influenced rocks** (for example metasomatic talc  
 3643 occurrences, green schist, chlorite and amphibole schist or bedrock such as nephrite,  
 3644 serpentile and amphibolite).

3645 A good understanding of the geological circumstances that lead to production of these fibrous  
 3646 minerals can help differentiate the particles produced and improve interpretation of the results of  
 3647 [laboratory] analysis<sup>432</sup>. It is therefore important to employ the services of professional geologists to  
 3648 undertake geological evaluations and use insights gained to inform the lab analysis.

3649 Further detail on rock types that potentially contain asbestos can be found in the sources in Box 15-1.

<sup>429</sup> NF EN ISO 22475-1: 2006 (P94-510-1) Geotechnical investigation and testing - Sampling methods and groundwater measurements - Part 1: Technical principles for execution. ISO copyright office, Geneva, Switzerland, 2006

<sup>430</sup> A change to the bedrock caused by temperature, pressure and compressive and tractive forces (FIOSH, 2019)

<sup>431</sup> TRGS, 517

<sup>432</sup> Misseri, M (2023) Nucleation of naturally occurring calcic amphibole asbestos, *Environmental Research* Volume 230, 2023, 114940. <https://doi.org/10.1016/j.envres.2022.114940>

**Box 15.1: Examples of Member State sources listing the types of rocks potentially contaminated with asbestos**

Annex 1 to the German TRGS 517: Activities with potentially asbestos-containing minerals and mixtures and products manufactured from same. Technical Rules and Hazardous Substances. February 2013 (under revision at the time of writing). <https://www.baua.de/DE/Angebote/Regelwerk/TRGS/TRGS-517>

Appendix A of the French national standard NF P94-001 on Environmental asbestos survey – Geological investigation of in-place soils and rocks – Mission and methodology. November 2021, Afnor publishing. This can be purchased from Afnor: <https://www.boutique.afnor.org/>

Appendix of BRGM/RP-70343-EN: Shows the “typical” types of Asbestos occurrences in Mainland France.

3650 **15.2.3.2 Part 2: Geological sampling and analysis**

3651 After the above geological evaluation, the next step for a new mine or quarry should involve geological  
3652 sampling and analysis, which could include<sup>433</sup>:

- 3653 • A conventional geological bedrock survey;
- 3654 • Drill hole samples for determination of the occurrence of fibrous minerals;
  - 3655 ○ For fibrous minerals – determination of the mineralogical composition based on
  - 3656 samples.
- 3657 • Analysis of thin sections of rocks under a polarised light optical microscope<sup>434</sup>; and
- 3658 • Analysis of rock samples by electron microscopy to identify the finest fibres.

3659 However, it is important to note that NOA is often concentrated in veins within rocks, rather than  
3660 occurring in a uniform manner across rock so sampling may miss it. Standards can be used to  
3661 determine the size of the sample that is needed for quarrying. It is also important to note that taking  
3662 samples can be hazardous as it increases the chance of worker exposure to asbestos in dust from  
3663 drilling or cutting rock<sup>435</sup>.

3664 If an asbestos deposit is found in a gangue<sup>436</sup> area, mining or quarrying in that area should be avoided  
3665 as far as possible<sup>437</sup>. For example, if the asbestos vein is located in one direction of exploitation, a  
3666 different direction should be exploited instead<sup>438</sup>.

3667 Even in the absence of suspected asbestos, samples of the ore body should be collected and tested  
3668 for the possible presence of asbestos minerals in the matrix<sup>439</sup>. One sampling technique that could be  
3669 used is collection of samples for analysis on a metre-by-metre basis from a horizontal channel at mid-  
3670 height at the working face.

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<sup>433</sup> FIOSH, 2019 unless otherwise stated.

<sup>434</sup> Afnor (2021) Standard NF P94-001 Environmental asbestos survey - Geological investigation of in-situ soils and rocks - Mission and methodology. November 2021.

<sup>435</sup> Discussion during workshop on mining and quarrying, 27 November 2024.

<sup>436</sup> Shaw (2013) Gangue usually means the worthless substances in a vein. [https://www.namho.org/research/GANGUE\\_and\\_PIGMENTS\\_Assessment\\_20130205.pdf](https://www.namho.org/research/GANGUE_and_PIGMENTS_Assessment_20130205.pdf)

<sup>437</sup> This may not always be possible, for example when mining or quarrying high value minerals, or when tunnelling when the route cannot be changed.

<sup>438</sup> From discussion during the workshop on mining and quarrying on 27 November 2024.

<sup>439</sup> TVA, 2018.



3671 For existing sites, the working area should be visually examined for the potential presence of  
3672 suspected asbestos minerals<sup>440</sup>, before and during mining or quarrying activities with immediate  
3673 collection of samples for identification when necessary.

3674 The bedrock being mined or quarried should be continuously monitored<sup>441</sup>. All routine surveys should  
3675 include checking for asbestos and other fibrous minerals<sup>442</sup>. The product stream should be sampled  
3676 regularly to check for the presence of asbestos<sup>443</sup>. Procedures for the quantification of asbestos mass  
3677 fractions less than 5% by weight and quantitative determination of asbestos in vermiculite, other  
3678 industrial minerals and commercial products that incorporate these minerals are described in the  
3679 standard ISO 22262<sup>444</sup> and in a review of the analytical techniques<sup>445</sup>. Testing and certification (i.e.  
3680 secondary testing) of representative samples of the final product should be undertaken<sup>446</sup>. Replicate  
3681 samples of dispatched batches should be stored for future reference. If stockpiles of crude ore are  
3682 maintained for blending prior to processing, then these should be inspected on a regular basis for the  
3683 possible presence of asbestos fibres, sampled and tested as necessary while new material is added to  
3684 a stockpile. Auditable records should be kept for a specified time period.

3685 The laboratory methods for detecting asbestos fibres are described in Section 15.3.

#### 3686 **15.2.4 Notification**

3687 A notification must be submitted to the responsible authority of the Member State before work  
3688 commences on any activity likely to involve a risk of exposure to asbestos dust unless their Member  
3689 States has derogated certain activities from the notification requirement<sup>447</sup>, see Section 5.

#### 3690 **15.2.5 Planning the work**

3691 Refer to your national legislation to establish whether a plan of work is required for mining and  
3692 quarrying activities.

##### 3693 **15.2.5.1 Part 3: Exposure assessment**

3694 It is important that the risk assessment takes account of all the features and activities of a particular  
3695 site and includes a sufficient basis for an assessment of possible exposure. This includes the following  
3696 aspects:

- 3697 • Depending on the results of the initial risk assessment, air exposure measurements must be  
3698 carried out to ensure compliance with the OEL and exposure minimisation requirements in  
3699 the AWD<sup>448</sup>. See Section 15.4 for the methods of air exposure measurements in the mining  
3700 and quarrying sector.

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<sup>440</sup> FIOSH, 2019.

<sup>441</sup> TVA, 2018.

<sup>442</sup> FIOSH, 2019.

<sup>443</sup> TVA, 2018.

<sup>444</sup> ISO 22262-2(en) Air quality – Bulk materials – Part 2: Quantitative determination of asbestos by gravimetric and microscopical methods. Draft Second edition at the enquiry phase with ISO members, due to be published soon at the time of writing, revised to replace ISO 22262-2: 2014.

<sup>445</sup> IMA, 2024. IMA – Europe Determination of asbestos in industrial minerals: Review of state-of-the-art technologies and their statistical evaluation. Industrial Minerals Association, Brussels, Belgium, 2024.

<sup>446</sup> TVA, 2018.

<sup>447</sup> Directive 2009/148/EC, Article 4(3)

<sup>448</sup> Directive 2009/148/EC, Articles 6 and 7.



- 3701 • When determining the exposure of the relevant workers, the control measures in place should  
3702 be taken into account, including taking into account the protection factors afforded by RPE.  
3703 In addition, where vehicles are used in mining or quarrying, a worker may be inside a sealed  
3704 cabin with filtered air which prevents exposure to asbestos dust. See Section 15.8.3 for an  
3705 overview of possible control measures in the mining and quarrying sector.
- 3706 • Continuous air monitoring to ensure that a system is in place to detect accidental asbestos  
3707 exposure, taking into account the limitations of geological evaluation and sampling (see Parts  
3708 1 and 2). Even if asbestos minerals have not been detected, continuous monitoring of air  
3709 concentrations should be used to detect asbestos during operations in mines and quarries.
- 3710 • If fibrous minerals are detected in rock samples, mud samples or other samples of rock should  
3711 be collected during production hole drilling; with air sampling of the crushing pilot<sup>449</sup> (Figure  
3712 15-1 above). When undertaking underground work in rock likely to contain asbestos  
3713 geological precursory indicators (also known as PLM indicator minerals) such as development  
3714 subgrains (DSG)<sup>450</sup> could be tested for at regular intervals. For example, samples of crushed  
3715 rock could be taken from the conveyor from a Tunnel Boring Machine every 30 to 100 cm for  
3716 milling before analysis using electron microscopy<sup>451</sup>.

### 3717 15.3 Identifying asbestos

3718 Naturally occurring asbestos (NOA) is present in soil or rock, and may be present as veins in different  
3719 colours: blue (crocidolite); brown (amosite); green (anthophyllite, tremolite and actinolite); and white  
3720 (chrysotile, tremolite and actinolite)<sup>452</sup>. However, it is important to note that NOA in rock is not always  
3721 visible to the naked eye. NOA is often found as deposits in ultramafic rock<sup>453</sup>, such as serpentine rock  
3722 and near fault zones. Tremolite asbestos may occur in deposits of chrysotile, vermiculite and talc<sup>454</sup>.

3723 A deposit of NOA may contain one or more fibre orientation veins. The three types of asbestos fibre  
3724 orientation veins include<sup>455</sup>:

- 3725 • Cross-fibre asbestos, in which fibres are crosswise in the sill/dike, nearly at a right angle to the  
3726 sill/dike wall.
- 3727 • Slip-fibre asbestos, in which fibres are in sill-/dike-like formations in shear zones.
- 3728 • Mass-fibre asbestos, in which bundles of fibres are mixed in mass-like rock.

3729 The ability of an asbestos-containing rock to release fibres is influenced by various independent  
3730 factors, including amongst others: the fibre content in the rock, fracture density, friability of the rock,  
3731 nature of human activities and extent of disturbance<sup>456</sup>. Furthermore, the ability for the rock to release  
3732 asbestos fibres can change over time, depending upon changes in the environment.

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<sup>449</sup> FIOSH, 2019.

<sup>450</sup> Misseri (2021) Nucleation of naturally occurring calcic amphibole asbestos, *Environmental Research*, Vol 230, 1 August 2023, 114940. <https://www.sciencedirect.com/science/article/abs/pii/S0013935122022678>

<sup>451</sup> Discussion during workshop on mining and quarrying, 27 November 2024.

<sup>452</sup> <https://www.ncbi.nlm.nih.gov/books/NBK304374/> (a non-EU source).

<sup>453</sup> Ultramafic rocks are igneous or metamorphic rock with a very low silica content and more than 18% magnesium oxide. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/ultramafic-rock> and <https://geologybase.com/ultramafic/>.

<sup>454</sup> <https://www.cdc.gov/TSP/PHS/PHS.aspx?phsid=28&toxid=4> (a non-EU source).

<sup>455</sup> Aurola and Vesansalo, 1954 in Kähkönen et al, 2019.

<sup>456</sup> INRS (2020) Travaux en terrain amiantifere: Operations de genie civil de batiment et de travaux publics. Guide de prevention. INRS, 2020. <https://www.inrs.fr/media.html?refINRS=ED%206142>

3733 In cases where the relevant stakeholders wish to analyse the presence of asbestiform and non-  
3734 asbestiform fibres, a flowchart or decision tree to understand the steps involved in determining the  
3735 different types of asbestos fibres. Potentially useful flow charts or decisions trees can be found in:

- 3736 • Annex 10 of the French opinion of the Agence nationale de sécurité sanitaire de l'alimentation,  
3737 de l'environnement et du travail (ANSES) (National Agency for Food, Environmental and OSH)  
3738 (2015) Effets sanitaires et identification des fragments de clivage d'amphiboles issus des  
3739 matériaux de carrière: Avis de l'Anses - Rapport d'expertise collective. Décembre 2015, Édition  
3740 scientifique. <https://www.anses.fr/en/system/files/AIR2014sa0196Ra.pdf>
- 3741 • Fig.1 Determination of the asbestiform habit [through use of PLM and TEM] of Maxime  
3742 Misseri, Marie Annick Billon-Galland. Established Cases of the Development of Asbestos  
3743 Related Lung Diseases in Miners at the Salau Tungsten Mine in France Due to Exposure to  
3744 Asbestos Actinolite and Asbestos Ferro-Actinolite. Asbestos and Other Elongate Mineral  
3745 Particles New and Continuing Challenges in the 21st Century, ASTM International, pp.31-61,  
3746 2021, <https://hal.science/hal-04162701/document>
- 3747 • ISO 22261-1 contains a methodology to differentiate between altered amphibole cleavage  
3748 fragments and asbestiform amphiboles for the NOAs actinolite, tremolite and anthophyllite  
3749 (paragraph 7.2.3.7.1). The criteria provided are applicable to PLM, TEM and SEM.

## 3750 **15.4 Air exposure assessment**

3751 No additional details are required for air exposure assessment in mining, therefore refer to the details  
3752 provided in Section 7.

## 3753 **15.5 Structured management of asbestos**

### 3754 **15.5.1 Control measures**

3755 For an overview of control measures, see Section 9. This section is not exhaustive and should be read  
3756 in conjunction with Section 9.

#### 3757 **15.5.1.1 Collective measures – technical measures**

3758 Disturbance to NOA should be limited to the lowest possible amount, and for mining or quarrying in  
3759 asbestos areas to be avoided if possible<sup>457</sup>. Fibrous material should be rejected in the mine or pit to  
3760 prevent the fibres being spread<sup>458</sup>. If NOA is present, in some circumstances it may be possible to  
3761 segregate a section of the ore body and exclude it from mining activity<sup>459</sup>. Alternatively, if NOA is  
3762 present it may be possible to remove the ore body containing asbestos and transport it to a safe  
3763 disposal site away from the ore body<sup>460</sup>. If the employer deems that mining or quarrying or tunnelling  
3764 is necessary despite the presence of NOA, for example due to the presence of valuable minerals or for  
3765 a tunnel which cannot be re-routed, then preventive measures described in the AWD must be taken  
3766 and the advice in this guide should be followed (section 15.5). In general terms, **dust control measures**  
3767 and measures to reduce exposure to silica<sup>461</sup> will help to minimise worker exposure to asbestos in air.

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<sup>457</sup> FIOSH, 2019

<sup>458</sup> TVA, 2018

<sup>459</sup> TVA, 2018

<sup>460</sup> TVA, 2018

<sup>461</sup> EU Good Practice Guide developed by the European Network on Silica (Nepsi), <https://guide.nepsi.eu/>.

3768 Buildings and equipment should be capable of being cleaned and effectively cleaned and  
3769 maintained<sup>462</sup>. Permanent workstations in rooms (such as guidance and control stations) should be air  
3770 conditioned and supplied with filtered air, with filter equipment being operated under negative  
3771 pressure so that dust is removed from the air (TRGS 517). Filters should be changed regularly<sup>463</sup>.  
3772 Changing areas should be kept clean.

3773 Measures should be taken to prevent the spread of ore from stockpiles and in the plant (TVA, 2018).  
3774 Material should be stored in closed silos (0-2mm fraction) or at least in three-sided enclosed material  
3775 boxes (>2mm fraction) (TRGS 517).

3776 Roadways used for the preparation and loading of extracted minerals should be sealed with a road  
3777 surface for example asphalt or concrete. Sealed surfaces should be regularly cleaned (for example  
3778 weekly) depending upon the degree of contamination. Roadways should be moistened regularly as a  
3779 dust control measure (TRGS 517).

#### 3780 *15.5.1.1.1 Mining machinery and vehicles*

3781 The free fall height when loading finished material onto transport vehicles should be minimised as a  
3782 dust control measure (TRGS 517). In addition, the truck-loading device should be equipped with dust  
3783 extraction and/or a water sprinkler or jet (TRGS 517). Aggregate should be moistened before loading  
3784 onto trucks or trains, as a dust prevention measure<sup>464</sup>.

3785 When using **vehicles with cabins**, during operation, cabin doors and windows should be kept closed  
3786 even in warm weather, with the cabin under positive air pressure and supplied with filtered air<sup>465</sup>. Air  
3787 filters should be maintained regularly<sup>466</sup>. If necessary, dedicated equipment for the hygienic provision  
3788 of fluids to the worker should be provided<sup>467</sup>. The above measures should be overseen by supervisors  
3789 to ensure compliance by workers<sup>468</sup>.

#### 3790 *15.5.1.1.2 Extraction and processing*

3791 For drill rigs, extraction equipment to separate drilling dust should be used<sup>469</sup>. For crushing and screen  
3792 plants, encapsulation should be used, if this is not possible then extraction and air filtering of exhaust  
3793 air should be used to remove dust. Filter dusts should be discharged into a dust collection system.  
3794 Deposited dusts should be permanently bound and collected in a dust-free manner.

3795 In the case of conveyors, the following should be used: encapsulation, an extraction system, a water  
3796 sprinkler or jet, a discharge height adjusted to the height of the dust spoil heap, and use of a water  
3797 sprinkler or jet and aprons installed in the drop-off area (TRGS, 517).

#### 3798 **15.5.1.2 Collective measures – organisational measures**

3799 The number of workers exposed or likely to be exposed to asbestos dust must be limited to the lowest  
3800 possible figure.<sup>470</sup> In order to do this, access to the exposure area must be limited to authorised

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<sup>462</sup> TRGS 517.

<sup>463</sup> Discussion during workshop on mining and quarrying, November 2024.

<sup>464</sup> Discussion during workshop on mining and quarrying, November 2024.

<sup>465</sup> TRGS 517 and FIOSH, 2019.

<sup>466</sup> FIOSH, 2019.

<sup>467</sup> FIOSH, 2019.

<sup>468</sup> Discussion during workshop on mining and quarrying, November 2024.

<sup>469</sup> TRGS 517.

<sup>470</sup> Directive 2009/148/EC, Article 6

3801 workers for whom it is necessary.<sup>471</sup> The exposure area must be demarcated using warning signs<sup>472</sup>;  
3802 the warning signs can include, for example, 'asbestos hazard', 'use of RPE and protective clothing',  
3803 'smoking prohibited' (see collective measures in 17.5.1) .

3804 The design of the changing room should be optimal, to include a 'dirty area' for washing or cleaning  
3805 and removal of clothing; shower rooms; and a 'clean area' for storing and changing into clean  
3806 clothes.<sup>473</sup> The number of equipment and footwear washing places should be sufficient for the size of  
3807 the workforce using them.

3808 The employer should dispose of workwear and protective clothing or send these in closed containers  
3809 to a specialised laundry facility<sup>474</sup>

3810 In terms of hygiene measures, eating, and drinking in the exposure areas should be prohibited.  
3811 Hygiene procedures should be followed before meals, coffee breaks and smoking<sup>475</sup>. Workers must be  
3812 provided with a place where they can eat or drink without being exposed to asbestos dust.<sup>476</sup>

3813 Vehicle cabins should be regularly cleaned to remove dust<sup>477</sup>, the frequency of cleaning will depend  
3814 upon the level of contamination during use.

3815 Regular sampling and analysis of settled dust in areas used by workers should be carried out to check  
3816 whether dust control procedures are adequate<sup>478</sup>

3817 Underground work requires a specific risk assessment, for example if using a Tunnel Boring Machine  
3818 (TBM). In some cases, the risk of accidents due to rock falls is more likely than the risk of exposure to  
3819 asbestos, so masks (which can restrict the vision of a worker) could only be worn in areas where the  
3820 asbestos hazard has been identified.

3821 RPE for workers directly exposed to mining or quarrying dust<sup>479</sup> should be a P3 filter mask or filter  
3822 respirator with a fan<sup>480</sup> and a particle filter. Passive and secondary exposure of workers

## 3823 **15.5.2 Incident management (emergencies)**

3824 No additional details are required for incident management, therefore refer to the details provided in  
3825 safe working environment see Section 4.

## 3826 **15.6 Education and training**

3827 Refer to the general section on training requirements, see Section 10.

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<sup>471</sup> Directive 2009/148/EC, Article 16

<sup>472</sup> Directive 2009/148/EC, Article 16

<sup>473</sup> FIOSH, 2019

<sup>474</sup> FIOSH, 2019

<sup>475</sup> FIOSH, 2019

<sup>476</sup> Directive 2009/148/EC, Article 16 (subject to a potential derogation under Article 3(3) of Directive 2009/148/EC)

<sup>477</sup> TRGS 517

<sup>478</sup> TVA, 2018

<sup>479</sup> Some workers may be sitting inside sealed vehicles with filtered air, in which case RPE is not needed as long as the worker protection systems (seals and filters) are working effectively to keep the air exposure levels below the OEL.

<sup>480</sup> If necessary with heating of the breathing air (TRGS 517).

## 3828 15.7 Health surveillance

3829 No additional details are required for health surveillance in mining and quarries, therefore refer to the  
3830 details provided in Section 11.

## 3831 15.8 Waste management

3832 General guidance on the management of  
3833 waste containing asbestos in terms of  
3834 collection, removal and transport is  
3835 discussed in Section 12.

3836 However, it must be noted that waste  
3837 arising from mining activities is exempt  
3838 from the waste requirements under  
3839 Article 6(e) of the AWD (see Box 15.2).

### Box 15.2: Article 6(e) of Directive 2009/148/EC (AWD)

Article 6(e) of Directive 2009/148/EC (AWD):

waste, **other than waste arising from mining activities**, shall be collected and removed from the place of work as soon as possible in suitable sealed packing with labels indicating that it contains asbestos and shall then be dealt with in accordance with Directive 2008/98/EC of the European Parliament and of the Council

3840 Management of waste from prospecting, extraction, treatment and storage of mineral resources and  
3841 the working of quarries i.e. “extractive waste” is covered by the Mining Waste Directive (MWD)  
3842 (Directive 2006/21/EC). The operator must draw up a waste management plan for the minimisation,  
3843 treatment, recovery and disposal of extractive waste, taking account of the principle of sustainable  
3844 development.<sup>481</sup> In the case of surface and underground mineral-extracting industries (other than  
3845 drilling), overburden dumps, spoil heaps and other tips must be designed, constructed, operated and  
3846 maintained to ensure the safety and health of workers.<sup>482</sup>

3847 Furthermore, asbestos-containing “soil and stones containing hazardous substances” is classified as a  
3848 ‘mirror’ hazardous entry under European Waste Code 17 06 03\*<sup>483</sup> if it contains hazardous substances  
3849 (such as asbestos) above a specified threshold concentration (0.1% for asbestos; see waste  
3850 management section 17.8) (Hazardous Waste Directive 91/689/EEC).

3851 Waste which is generated by mineral extraction and processing but which does not directly result from  
3852 those operations is excluded from the MWD (Article 2(a), 2006/21/EC)<sup>484</sup>.

3853 Waste from mining or quarrying which potentially contains asbestos includes:

3854 Smaller volumes of waste (not directly a result of operations, so not covered by the MWD  
3855 2006/21/EC):

- 3856
- disposable or damaged or end of life contaminated PPE and RPE;
  - 3857 • reusable PPE which is being laundered off-site;
  - 3858 • used air filters;
  - 3859 • HEPA filters from vacuum cleaners used on site and other used materials used during cleaning
  - 3860 which may be contaminated; and
  - 3861 • extracted dust in a dust collection system.

<sup>481</sup> Directive 2006/21/EC, Article 5

<sup>482</sup> Directive 92/104/EEC, Annex, Part A, Paragraph 15

<sup>483</sup> Construction and demolition wastes (including excavated soil from contaminated sites)/soil (including excavated soil from contaminated sites), stones and dredging spoil.

<sup>484</sup> Waste from offshore mineral extraction is also excluded from the MWD (Article 2(b), 2006/21/EC).

3862 Larger volumes of waste (**directly** a result of operations, so covered by the MWD 2006/21/EC):

- 3863 • waste minerals in a spoil heap, overburden dump, tip or landfill on site;
- 3864 • extracted minerals stored on site which are later used as backfill for restoration or reclamation
- 3865 of a quarry or mine<sup>485</sup>.

3866 In addition to the above legal requirements for managing waste from the mineral extraction industries  
3867 (Directive 2006/21/EC and Directive 92/104/EEC), practice for managing waste from mining or  
3868 quarrying which potentially contains asbestos that should be followed includes the following<sup>486</sup>:

- 3869 • dust prevention measures should be used during the collection of waste such as moistening,  
3870 covering or storage in closed containers;
- 3871 • wastes must be prepared in accordance with national legislation;
- 3872 • transportation of smaller volumes of waste (as defined above) material containing asbestos  
3873 should be in suitable packaging even though there is an exemption in the AWD;
- 3874 • dumps and landfills on site should be protected by earthworks, windbreak planning,  
3875 windbreak fences or by keeping them moist.

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<sup>485</sup>If inert waste is reused for backfilling on the same site, it is not considered waste under the Landfill Waste Directive (Article 3.2 1999/31/EC). Excess spoil removed from the site area is classified as hazardous waste in some Member States such as France (INRS, 2020).

<sup>486</sup> TRGS 517.



## 3876 **16 Civil engineering**

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### 3877 **16.1 Scope**

#### 3878 **16.1.1 General**

3879 Examples of civil engineering works where exposure to asbestos of materials containing asbestos  
3880 (MCA's) may occur, include transport infrastructure (roads, railways, harbours and airports), civil  
3881 engineering structures (such as bridges, tunnels, locks, and dams) and networks (pipelines). They  
3882 broadly fall into the following categories:

- 3883 • Road construction — Asbestos may be present in road<sup>487</sup> construction materials, such as  
3884 asphalt, hardcore (see below) and cement. When road surfaces degrade or are cut, drilled, or  
3885 otherwise disturbed, asbestos fibres may be released into the air. Asbestos was used to  
3886 reinforce road paving to increase its resistance to wear in areas that were subject to severe  
3887 deterioration. Tremolite group minerals were used as filler in the mixed asphalt floor of the  
3888 road surfaces.
- 3889 • Rail ballast — crushed stone or aggregate beneath railway tracks, which may sometimes  
3890 include materials sourced from sites where asbestos-containing rock was present.  
3891 Disturbance of ballast during railway maintenance may release asbestos fibres, particularly if  
3892 the ballast includes crushed Naturally Occurring Asbestos (NOA).  
3893 Rail ballast is made of crushed stone with good mechanical properties of a 30-60 mm grain  
3894 size. Basalts, porphyries orthogneisses and so-called 'green rocks' (such as serpentinites,  
3895 prasinites, and amphibolites) have been typically used for such groundwork. Green rocks  
3896 often contain asbestos minerals, such as chrysotile and amphibole asbestos.<sup>488</sup>
- 3897 • Hardcore — Hardcore refers to coarse, dense aggregate material used in construction as a  
3898 base layer for roads, pavements, or foundations. It often consists of crushed stone, bricks,  
3899 concrete, or other rubble. Asbestos-contaminated demolition waste may unintentionally be  
3900 included in hardcore. This is particularly an issue when materials from older buildings, which  
3901 may have used MCAs, were recycled without thorough screening a few decades ago, and are  
3902 now being dug up. When hardcore containing asbestos is moved, compacted, or broken up,  
3903 asbestos fibres may become airborne.  
3904 In the past, some asbestos-processing companies made rejected products (such as broken  
3905 asbestos cement sheets) available to citizens, farmers and other businesses to raise and pave  
3906 the driveways or yards. Sometimes, this rejected material was also used to pave roads, cycle  
3907 tracks and footpaths.
- 3908 • Made ground – land where the natural land surface is raised by man-made or artificial deposits

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<sup>487</sup> The term road refers to a thoroughfare, route, or way on land that is specifically designed, constructed, and maintained to allow the movement of people, goods, and vehicles.

<sup>488</sup> Malinconico, S., Conestabile della Staffa, B., Guercio, A., Paglietti, F., and Rimoldi, B. (2020). Natural Occurring Asbestos (NOA) in Italy: Workers' potential exposure risks and prevention and protection measures. EGU General Assembly, Online, 4–8 May 2020, EGU2020-4918. <https://doi.org/10.5194/egusphere-egu2020-4918>



- 3909 • Other civil engineered structures and networks — asbestos may be present in the rock or soil  
3910 being excavated during the construction of roads, railways, airports, bridges, harbours,  
3911 tunnels, locks, dams and pipelines<sup>489</sup>.

### 3912 **16.1.2 Naturally occurring asbestos (NOA)**

3913 Naturally occurring asbestos (NOA) may be present in soil or rock and may be present as veins in  
3914 different colours: blue (crocidolite); brown (amosite); green (anthophyllite, tremolite and actinolite);  
3915 and white (chrysotile, tremolite and actinolite).

3916 The term NOA typically applies to the natural geologic occurrence of six regulated types of asbestos  
3917 minerals that can be disturbed by natural weathering or human activities and as a result of asbestos  
3918 release becomes a threat for human exposure. The following activities potentially expose workers to  
3919 NOA<sup>490</sup>:

- 3920 • Extraction and processing of ornamental stones and inert gravel
- 3921 • Remediation of NOA-contaminated sites, slope rearrangement and restoration works of  
3922 hydrogeological instability
- 3923 • Excavations for civil engineering works such as roads, railways, airports, harbours, bridges,  
3924 tunnels, locks, dams and pipelines
- 3925 • Excavations and urbanisation at different scales
- 3926 • Farming
- 3927 • Railway ballast removal and disposal/remediation

### 3928 **16.2 Risk assessment**

3929 A risk assessment must be undertaken for any activity likely to involve a risk of exposure to dust arising  
3930 from asbestos or materials containing asbestos<sup>491</sup>, see section 5: this applies to any civil engineering  
3931 work or other situations with NOA, hardcore or made ground where asbestos could be present. It will  
3932 determine the nature and degree of workers' exposure and the potential risk it poses to health to  
3933 enable prevention, mitigation and management of risks. For more detail on the specifics of risk  
3934 assessment of NOA, see sections 15.2 and 15.3. Additionally, the document NF X46-1022020-11 (2020)  
3935 from the French Standardisation Association (AFNOR)<sup>492</sup> provides a comprehensive document on  
3936 methods and procedures for assessing asbestos risks before and during infrastructure work. This  
3937 document covers risk assessment methodologies, procedures for conducting assessments, reporting  
3938 requirements, and ensuring traceability and mapping of asbestos-containing materials within  
3939 transport infrastructure, network structures (such as pipes and cables), and civil engineering  
3940 structures (such as bridges and tunnels).

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<sup>489</sup> NF X46-102 Asbestos survey - Survey of materials and products containing asbestos in civil engineering structures, transportation infrastructures and diverse networks - Mission and methodology

<sup>490</sup> Malinconico, S., Conestabile della Staffa, B., Guercio, A., Paglietti, F., and Rimoldi, B. (2020). Natural Occurring Asbestos (NOA) in Italy: Workers' potential exposure risks and prevention and protection measures. EGU General Assembly, Online, 4–8 May 2020, EGU2020-4918. <https://doi.org/10.5194/egusphere-egu2020-4918>

<sup>491</sup> Directive (EU)2023/2668, Article 3(2)

<sup>492</sup> Association Française de Normalisation (AFNOR) (2020).NF X46-1022020-11. Asbestos spotting - Spotting asbestos-containing materials and products in civil engineering structures and transport infrastructures and miscellaneous networks - Mission and methodology

3941 **16.2.1 Identifying asbestos and ground assessment**

3942 Identification of asbestos and MCA's is covered in section 6. For more detail on the specifics of  
3943 identification of NOA, see section 15.3.

3944 **16.2.1.1 Ground assessment**

3945 Before any civil engineering work commences, the employer must establish if there is risk of asbestos  
3946 in the ground being excavated. There are three broad steps:

- 3947
- Assessing whether there is any indication of asbestos being present in the ground
  - If there is a risk of asbestos being present, sampling the ground
  - If the samples indicate the presence of asbestos, measuring the dust during construction.
- 3948
- 3949

3950 The assessment of the ground is primarily a desktop study and could include assessing<sup>493</sup>:

- 3951
- Local knowledge from near the site such as previous assessments, site history information, local historic maps and records.
  - Information from the owner or other source on any known existing asbestos contamination
  - Likely presence and condition of MCAs in existing hardcore or made ground.
  - Likely presence and condition of NOAs in existing rock or soil, through geological research and surveys.
  - Any available data about asbestos being used in the area for in road construction, landfill or hardcore
  - Any available data about ballast in the area containing NOAs was used in rail tracks, for above and underground railways
  - Any available data about ballast being contaminated by fire or other incidents
  - Any available data about past asbestos industrial use such as asbestos product manufacturing, high-temperature industrial processes, heavy manufacturing industries, nuclear and chemical plants, power stations, shipyards, waste storage, transfer and landfill sites, demolition waste
  - Any available data about soil being contaminated by illegal dumping, fly-tipping and the remnants of underground/basement boiler rooms from demolished structures
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3967 If there is a risk that asbestos could be present, a site visit or examination of recent photographs may  
3968 enable any visible contamination to be identified.

3969 Where there is a reasonable expectation that MCAs or NOAs could be present in existing rock or soil  
3970 and could present a risk, samples should be taken

3971 This process could involve<sup>494</sup>:

- 3972
- A reconnaissance visit to gather information/details.
  - Determination of areas with similar composition leading to the adoption of references. These references are resources that are representative of similar structures (and the identification of similar materials and their parts)
- 3973
- 3974
- 3975

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<sup>493</sup> HSG 248 - HSE 2021 - Asbestos: The Analysts' Guide <https://www.hse.gov.uk/pubns/priced/hsg248.pdf>

<sup>494</sup> French standard NF X46-102 X46-102 Asbestos survey - Survey of materials and products containing asbestos in civil engineering structures, transportation infrastructures and diverse networks - Mission and methodology

- 3976 • Visual inspection
- 3977 • Sampling and analysis of materials or products likely to contain asbestos (where several layers are involved, a layer-by-layer analysis is to be done).
- 3979 • Determining quantities of materials or products likely to contain asbestos.
- 3980 • Reporting.

### 3981 **16.2.2 Risks other than asbestos**

3982 The risk assessment for civil engineering should cover all risks and not only asbestos or MCA, such as  
3983 other health and safety risks, such as noise and machine safety, and from other substances such as  
3984 dust and silica.

### 3985 **16.2.3 Notification**

3986 A notification must be submitted to the responsible authority of the Member State before work  
3987 commences on any activity likely to involve a risk of exposure to asbestos dust unless their Member  
3988 States has derogated certain activities from the notification requirement<sup>495</sup>, see section 5.

### 3989 **16.2.4 Plan of work**

3990 A plan of work must be drawn up before work involving asbestos commences<sup>496</sup>, see section 5.

## 3991 **16.3 Air exposure measurements**

3992 No additional details are required for air exposure assessments, therefore refer to the details  
3993 provided in the section on air exposure assessment, section 7.

## 3994 **16.4 Passive and secondary exposure of workers**

3995 No additional details are required for passive and secondary exposure of workers, therefore refer to  
3996 the details provided in the section on passive and secondary exposure of workers, section 8.

## 3997 **16.5 Structured management of asbestos**

### 3998 **16.5.1 Control measures**

3999 No additional details are required for control measures, therefore refer to the details provided in the  
4000 section on control measures, section 9.

### 4001 **16.5.2 Incident management**

4002 For information about incident management, see section 13.5.5.

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<sup>495</sup> Directive 2009/148/EC, Article 4(3)

<sup>496</sup> Directive 2009/148/EC, Article 13

4003 **16.6 Education and training**

4004 Workers must be informed about the dangers of asbestos and the protective measures to be taken,  
4005 see section 10.

4006 **16.7 Health surveillance**

4007 No additional details are required for health surveillance, therefore refer to the details provided in the  
4008 section on health surveillance, section 11.

4009 **16.8 Waste management**

4010 No additional details are required for waste management, therefore refer to the details provided in  
4011 the section on waste management, section 12.

DRAFT

## 4012 17 Emergency services

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### 4013 17.1 Scope

#### 4014 17.1.1 Who is at risk?

4015 Those at risk of asbestos exposure after  
4016 an emergency situation such as a natural  
4017 disaster, building fire or war include<sup>497</sup>:

- 4018 • Emergency responders (including  
4019 paramedics, firefighters, charity  
4020 workers)
- 4021 • Military and police
- 4022 • Private contractors involved in clean-up and waste removal
- 4023 • Insurance loss adjusters

#### Box 17-1 : Emergency workers – scope of the AWD

Article 3(1) of Directive 2009/148/EC:

This Directive shall apply to activities in which workers are or may be exposed in the course of their work to dust arising from asbestos or materials containing asbestos.

4024 Some of these occupations may be covered by different laws (e.g. military) and subsequently may not  
4025 be covered within the definition of “worker”. Therefore, it is important to consider national legislation  
4026 in your Member State.

4027 Local residents and volunteers do not fall under the definition of workers but are still important groups  
4028 to consider when preparing a risk assessment or any communications, as provisions can be included  
4029 to ensure their exposure to asbestos is controlled.

#### 4030 17.1.2 First response

4031 In an emergency, the first response relates to the action taken to control the situation. This is often  
4032 extremely time sensitive and has the primary aim of saving life. First responders typically include police  
4033 officers, medical services (e.g. paramedics), fire service, and search and rescue service. During the  
4034 first response situation, for example a fire involving asbestos, air concentrations of asbestos fibres can  
4035 be high (0.05 fibres/cm<sup>3</sup>).<sup>498</sup> Regardless of where first emergency responders are positioned in respect  
4036 to the incident (for example, those working directly within the incident zone or those assisting from  
4037 outside the incident zone), all are at risk of exposure to asbestos if the incident involves asbestos  
4038 containing materials, either from direct exposure or from secondary exposure, see Section 17.5 for  
4039 control measures.

#### 4040 17.1.3 Secondary exposure

4041 During the development of any risk assessments or working procedures, care should be taken to  
4042 consider all possible at-risk groups to prevent any secondary exposure, see section 8.1.2. The control  
4043 measures described in section 8.3.2 should be taken as a guide to prevent secondary exposure.

4044 During first response, workers positioned outside of the incident zone may be at risk of secondary  
4045 exposure if they come into contact with contaminated equipment or other first responders who have  
4046 been in contact with asbestos materials. It is also possible for workers who did not attend the scene  
4047 to be at risk of secondary exposure if workwear has not been properly decontaminated and instead

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<sup>497</sup> Directive 2009/148/EC, Article 3(1)

<sup>498</sup> Source: discussion at a workshop organised in the framework of the development of this guide.

4048 hung up to be worn again back at the workstation. Secondary exposure can also occur when first  
4049 responders have not followed proper hygiene and decontamination procedures after attending an  
4050 emergency and subsequently take asbestos fibres home on their clothes, skin and hair.

## 4051 **17.2 Risk assessment**

### 4052 **17.2.1 Risk assessment**

4053 A risk assessment must be carried out where an activity is likely to involve risk of exposure to dust  
4054 arising from asbestos or materials containing asbestos,<sup>499</sup> see Section 5. If possible, the risk  
4055 assessment should be site-specific and created for emergency services.

4056 However, to provide efficient emergency first response, a general risk assessment form may be  
4057 created to cover sites where specific information is not available or time-pressure makes it impractical  
4058 to prepare a site-specific risk assessment. This general risk assessment form should provide  
4059 recommendations based on a worst-case scenario to ensure emergency workers are sufficiently  
4060 protected in all possible exposure situations. The risk assessment should consider all those working at  
4061 the incident: both those who are working within the incident zone and those assisting from outside  
4062 the incident zone.

4063 For remedial action on sites where there is asbestos, a site-specific risk assessment must be made,  
4064 see section 17.3.2.

4065 Box 17-2 gives an example of a categorisation system used in the Netherlands for fire events involving  
4066 MCAs has been implemented, which could be used for all emergency situations. This classification  
4067 system determines the response measures and safety protocols during such incidents.

#### **Box 17-2: Example of categorisation of asbestos incidents<sup>500</sup>**

In the Netherlands, a categorisation system for fire events involving MCAs has been implemented, which could be used for all emergency situations. This classification system determines the response measures and safety protocols during such incidents.

The emergency services' response is essentially the same for all three categories, focusing primarily on dealing with the issue such as fire, flooding, earth, damage and immediate safety. However, the categorization is more relevant for other agencies, such as environmental services, public health and safety departments, and the police. Categories II and III, with their larger impacted areas and higher potential for harm, require additional measures and resources from these services.

Those in charge with making decisions on how to categorise incidents involving asbestos should be trained appropriately, as assigning the wrong category will have a serious impact on workers and the general public positioned within the contamination area.

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<sup>499</sup> Directive 2009/148/EC, Article 3(2) and Directive 2004/37/EC, Article 3(2)

<sup>500</sup> <https://nipv.nl/wp-content/uploads/2022/04/201811-BRWNL-Brancherichtlijn-en-publicatie-Brandweeroptreden-bij-asbestincidenten-1.pdf>

#### Box 17-2: Example of categorisation of asbestos incidents<sup>500</sup>

Incidents involving asbestos are divided into three categories based on the extent and location of asbestos release:

- **Category I:** Release of asbestos is confined to the building or site of origin -the impact is limited to the immediate premises, and the contamination is contained within the building or site, minimizing the potential risk to surrounding areas
- **Category II:** Asbestos is released outside the premises or site but not in areas where people live, work, or recreate such as an industrial area or construction site with no residential or office buildings -asbestos contamination extends beyond the site, but the affected areas are not occupied spaces, which may still require containment but have a lower risk to public health compared to Category III.
- **Category III:** Asbestos is released outside the premises or site into residential, work, or recreational areas such as areas with houses, offices, or schools - asbestos contamination affects areas where people live or work, which increases the need for containment, evacuation, and public health intervention. This category involves the most significant risk and requires extensive emergency measures

### 4068 17.2.2 Risk communication

4069 The risk assessment should indicate how key information is communicated to the emergency services'  
4070 workers.

4071 Following a disaster or emergency, if there is suspected MCAs in the damaged buildings and debris, a  
4072 public awareness campaign disseminated with the support of local and regional authorities may be  
4073 required to help raise awareness of the issue. The campaign should be aimed at relevant  
4074 representatives of the general population and provide simple and easy to understand information that  
4075 describes:

- What asbestos is
- Where it might be found
- What the hazards are
- That only trained personnel with adequate protective equipment should access suspect sites and/or handle asbestos-containing material

### 4081 17.3 Identifying asbestos - aftermath and remedial action

4082 Information on the presence of asbestos for both a general or site-specific risk assessment can be  
4083 obtained from asbestos notifications, asbestos registers, risk assessments available on-site or  
4084 assumed from the age of the building.

4085 Additional causes of asbestos release and spread, such as explosions, collapses, improper handling,  
4086 illegal dumping, or storms, have unique risk profiles. Each requires a distinct risk assessment, as their  
4087 diffusion mechanisms differ in both immediate and long-term impacts.

4088 The following table describes details of the asbestos materials that may occur in different asbestos  
4089 exposure situations and may be encountered by emergency services. Asbestos may not be the only  
4090 hazardous material released during such an exposure situation.



**Table 17-1 Types of asbestos exposure for different emergency services' exposure situations**

Exposure situation	Brief description
Explosion <sup>501</sup>	<ul style="list-style-type: none"> <li>• Asbestos may be dispersed by the pressure wave</li> <li>• Explosion fragments of asbestos cement are typically solid and therefore, less likely to crumble and be transported easily by wind or on clothing/footwear</li> <li>• Explosion near insulation materials, such as those from storage tanks or pipelines, typically leads to a high fraction of respirable asbestos fibres in the air and a risk of exceeding exposure limits and an increased risk of passive exposure, see section 8.1.1</li> <li>• Explosions involving fire require two separate risk assessments, see section 5: both the fire and explosion need independent evaluation.</li> </ul>
Fire <sup>502</sup>	<ul style="list-style-type: none"> <li>• Sheet materials containing asbestos, such as those found in roofs, facades, and walls, can be released during a fire. This occurs due to rapid temperature rises and the intense heat of the fire. This effect is exacerbated when the materials are weathered and contain moisture. As the sheets break apart, large debris and small shards are created</li> <li>• During a fire, asbestos cement can delaminate, causing its layers to separate and fragment into thin flakes. These loose fibres become airborne and move freely, carried by air currents (such as the plume rising from the fire and wind)</li> <li>• Mechanical impacts, such as trampling or running over the debris, can break up the material, producing larger quantities of respirable asbestos fibres</li> </ul>
Structural collapses <sup>503</sup>	<ul style="list-style-type: none"> <li>• The scattered asbestos pieces tend to be larger, with little thinning or flaking but the release of respirable fibres is still possible</li> <li>• While a pressure wave may accompany a collapse, it is less intense than in an explosion, and solid pieces are less likely to adhere to footwear. However, any activity on the debris, such as rescue work, may cause the breakdown of pieces leading to respirable fibres in the air</li> <li>• Structural collapses might not result in the formation of flakes, as the total fracture area is usually smaller than that produced by a fire (which may release flakes)</li> </ul>
Natural events <sup>504</sup>	<ul style="list-style-type: none"> <li>• Severe weather events can damage asbestos cement roofs, facade panels, or roof slates, creating fracture surfaces that release fibres. While the fragments are generally large and wind dispersion is limited to the immediate area, additional risks arise if asbestos contaminates animal feed or manure</li> </ul>
Materials containing asbestos	See list in Annex 3

<sup>501</sup> <https://nipv.nl/wp-content/uploads/2022/05/20181212-IFV-lenW-Handreiking-aanpak-Asbestincidenten-werkversie-1-1.pdf>

<sup>502</sup> <https://nipv.nl/wp-content/uploads/2022/04/201811-BRWNL-Brancherichtlijn-en-publicatie-Brandweeroptreden-bij-asbestincidenten-1.pdf>

<sup>503</sup> <https://nipv.nl/wp-content/uploads/2022/05/20181212-IFV-lenW-Handreiking-aanpak-Asbestincidenten-werkversie-1-1.pdf>

<sup>504</sup> <https://nipv.nl/wp-content/uploads/2022/05/20181212-IFV-lenW-Handreiking-aanpak-Asbestincidenten-werkversie-1-1.pdf>

4091 **17.3.1 Aftermath**

4092 After a disaster such as tsunami, earthquake, floods, fires, or hurricanes or after a war, materials  
4093 containing asbestos (MCAs) can be damaged and there may be a need to handle, break up and dispose  
4094 of asbestos-containing building and insulation materials. Much of this work may be undertaken by  
4095 volunteers and local residents who are unaware of the hazards of asbestos and who may be unable to  
4096 identify asbestos-containing material.

4097 To minimise the risk:

- 4098 • Identify the locations of MCAs and carry out a risk assessment, see Section 5
- 4099 • Ensure that people involved in clear-up work are adequately informed of the risks and the  
4100 methods of best practice
- 4101 • Minimize the disturbance of asbestos containing materials by following safe working  
4102 practices

4103 Some issues that are not immediately obvious are:

- 4104 • Due to the “snowflake effect,” asbestos flakes can accumulate in unexpected places, such as  
4105 in gutters and under roof tiles.
- 4106 • Most asbestos flakes will settle only on the surface without penetrating deeper into the soil.
- 4107 • In the source area, however, where large equipment is used for remediation, asbestos  
4108 residues may be pushed deeper into the soil.
- 4109 • If windows were left open in homes or buildings located within the smoke plume of a fire, or  
4110 explosion pressure wave, indoor contamination may have occurred, in which case an indoor  
4111 risk assessment may be required.<sup>505</sup>

4112 Inspection of the area/facility for the presence of MCAs is carried out after the completion of rescue  
4113 and other urgent work aimed at eliminating dangerous factors, saving lives and preserving people’s  
4114 health, and localizing emergency zones.

4115 The normal procedure for asbestos identification in clean-up operations is for trained personnel to  
4116 inspect and test the materials and to determine the hazard and best course of action. This, however,  
4117 may not always be possible in a disaster or conflict situation given the lack of facilities, shortage of  
4118 trained personnel and the scale of the damage.

4119 The safest step is to seek information on local construction practices and, if in doubt, to assume that  
4120 the debris does contain asbestos. This is normally the case in urban settings, given the prevalent  
4121 international use of asbestos.

4122 **17.3.2 Remedial action**

4123 Remedial action following an emergency typically involves the clean-up operation to remove risks  
4124 posed to human health (e.g. from collapsed building materials). For remedial action on sites where  
4125 there is asbestos, a site-specific risk assessment must be made,<sup>506</sup> see Section 5 and a notification  
4126 must be submitted to the responsible authority of the Member State before work commences on any

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<sup>505</sup> NEN 2991 <https://www.nen.nl/en/nen-2991-2015-nl-207667>

<sup>506</sup> Directive 2009/148/EC, Articles 3 and 4

4127 activity likely to involve a risk of exposure to asbestos dust unless their Member States has derogated  
4128 certain activities from the notification requirement,<sup>507</sup> see section 5.2.1.

4129 The person in charge of the emergency should contact the relevant municipal authorities,  
4130 environmental services, the relevant national authority for asbestos-related incidents and relevant  
4131 water authorities, if asbestos-containing material enters surface water or sewers.

4132 Based on the mapping of the area contaminated by asbestos, a plan of work must be developed to  
4133 remove or contain the asbestos.<sup>508</sup>

4134 The final inspection should be performed by an accredited inspection body.<sup>509</sup> Accurate  
4135 documentation of inspection results, including mapped areas, is essential for establishing a realistic  
4136 boundary of the distribution area and evaluating the remediation's effectiveness.

4137 The inspection area for the final check corresponds to the distribution area identified in the mapping.  
4138 This final inspection is formally independent of previous steps, and findings may reveal that the  
4139 dispersion area has shifted due to factors like contamination from remediation activities or changes  
4140 in wind direction.

## 4141 **17.4 Air exposure assessment**

4142 Depending on the results of the initial risk assessment, and to ensure compliance with the relevant  
4143 limit value,<sup>510</sup> the measurement of the concentration of asbestos fibres in the air at the place of work  
4144 must be carried out at regular intervals during specific operational phases,<sup>511</sup> see Section 5.

4145 It is unlikely that air sampling would be conducted during the first response. However, it may be  
4146 required throughout the subsequent remedial action to ensure safe removal and demolition works.

## 4147 **17.5 Control measures**

### 4148 **17.5.1 Collective measures**

4149 The exposure of workers to dust arising from asbestos or MCAs at the place of work must be reduced  
4150 to a minimum and in any case to as low a level as is technically possible below the relevant limit  
4151 value.<sup>512</sup> The following examples of suitable control measures are aimed at emergency incidents such  
4152 as first response. These include<sup>513</sup>:

- 4153 • Cordon off potentially contaminated areas
- 4154 • Quickly sealing off areas that may be contaminated with asbestos will prevent secondary and  
4155 passive exposure

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<sup>507</sup> Directive 2009/148/EC, Article 4(2)

<sup>508</sup> Directive 2009/148/EC, Article 13

<sup>509</sup> <https://nipv.nl/wp-content/uploads/2022/05/20181212-IFV-lenW-Handreiking-aanpak-Asbestincidenten-werkversie-1-1.pdf>

<sup>510</sup> Directive 2009/148/EC, Article 8

<sup>511</sup> Directive 2009/148/EC, Article 7

<sup>512</sup> Directive 2009/148/EC, Article 6

<sup>513</sup> <https://nipv.nl/wp-content/uploads/2022/04/201811-BRWNL-Brancherichtlijn-en-publicatie-Brandweeroptreden-bij-asbestincidenten-1.pdf>

- 4156 • Closing windows and doors, and turning off ventilation systems can reduce the entry of  
4157 asbestos fibres into nearby premises
- 4158 • Signage should be used to inform others of the risks within the cordoned area
- 4159 • Eating and drinking are allowed only in the clean zone to prevent contamination
- 4160 • Keep nearby vehicle windows closed and set ventilation to internal circulation
- 4161 • Movement between dirty areas and any vehicles should be limited
- 4162 • Set up a decontamination site
  - 4163 ○ This should be upwind from the transition between clean and dirty areas
  - 4164 ○ Establish marked walking routes from the decontamination site to the incident and  
4165 keep them wet to prevent asbestos spread
- 4166 • Wetting asbestos-containing debris can help prevent the dispersion of fibres into the air.  
4167 However, this should only be done if it does not pose a risk to victims still trapped in the area,  
4168 such as the danger of hypothermia, drowning, or structural collapse due to water washing  
4169 away soil
- 4170 • Urgent removal of MCAs:
  - 4171 ○ In certain emergency situations, such as rescuing people or animals from a difficult-  
4172 to-reach location such as an old stable, shaft or slurry pit, it may be necessary to  
4173 urgently remove MCAs like corrugated sheets
  - 4174 ○ Before removal, these materials should be wetted to minimize fibre release.  
4175 Additionally, independent (tight-fitting) respiratory protection must be worn along  
4176 with regular protective clothing during the removal process,<sup>514</sup> see Section 9.5.1
- 4177 • Decontamination of area by specialist company
- 4178 • If possible, a specialist company should be deployed to clear the area of asbestos debris to  
4179 prevent further breakdown of the material

4180 For any subsequent remedial action, the collective measures described in Section 9 should be followed  
4181 as far as is practicable. If there is limited supplies or significant damage, consider the collective  
4182 measures described above.

### 4183 **17.5.2 Personal protective equipment (PPE)**

4184 The level of PPE required will be outlined in the risk assessment and should be followed by all workers.  
4185 As a minimum, workers should be provided with gloves, goggles, disposable clothing or replacement  
4186 clothing and dust masks.<sup>515</sup>

4187 For first responders, disposable clothing should be worn when practicable. For examples where this is  
4188 not possible, for example, firefighters, all workwear, skin and hair should be thoroughly  
4189 decontaminated as soon as possible after attending the fire, see Section 17.5.4.

### 4190 **17.5.3 Respiratory protective equipment (RPE)**

4191 During firefighting operations, full face respirator masks with breathing air is standard equipment for  
4192 workers. This protects workers optimally from asbestos exposure, provided they undergo proper  
4193 decontamination before removing their breathing apparatus. Breathing air bottles should be changed

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<sup>514</sup> Directive 2009/148/EC, Articles 12<sup>a</sup> and 16

<sup>515</sup> <https://gifs.ngo/resource/a-brief-guide-to-asbestos-in-emergencies-safer-handling-and-breaking-the-cycle/>

4194 next to the decontamination site. Clean the bottle and clamp band with a wet cloth if there is visible  
4195 contamination.

4196 For remedial action, RPE should be chosen, see Section 11.5.1.

#### 4197 **17.5.4 Decontamination**

4198 This prevents the spread of asbestos fibres and minimizes exposure risks to others. Workers must be  
4199 subject to an appropriate decontamination procedure when leaving the contaminated (dirty) area<sup>516</sup>,  
4200 see Section 9.3.2.

4201 The Skellefteå Model<sup>517</sup> emphasises the need for good routines and flow to ensure effective  
4202 decontamination following an accident or fire. For firefighters, disposable PPE is not an option,  
4203 therefore simple and effective decontamination is required. This model describes packing all  
4204 decontaminated clothing, breathing apparatus and equipment, such as hoses, into airtight cases for  
4205 washing back at the workstation. Firefighters should then change into clean dry clothes. Whenever  
4206 dirty clothes or equipment are handled, proper hygiene practices should be followed to prevent  
4207 contamination with asbestos fibres or other contaminants. Only after thorough decontamination has  
4208 taken place should workers and equipment return to vehicles. This ensures that any asbestos fibres  
4209 are not transported back to the workstation. Once back at the workstation, contaminated items  
4210 should enter by one route, and any clean items enter by a different route. When washing dirty items,  
4211 safe practices should be followed, including wearing suitable PPE and RPE, washing and drying  
4212 contaminated items separately from other items, and using purpose-built machines with sufficient  
4213 capacity.

4214 For all other personnel involved in both the first response and remedial action, the personal  
4215 decontamination processes are explained in section 9.3.2. If during emergency situations, disposable  
4216 PPE is not available, all contaminated clothing should be removed and handled as asbestos waste.  
4217 Affected persons should wash skin and hair with copious amounts of water within the assigned  
4218 decontamination area.

4219 A summary of advice for decontamination of equipment and vehicles includes:<sup>518</sup>

- 4220 • Equipment
- 4221 ○ Rinse any equipment (such as hoses, nozzles) used in the contaminated area with
- 4222 water and soap if necessary.
- 4223 ○ Establish a decontamination procedure if the equipment cannot be rinsed clean.
- 4224 • Vehicles:
- 4225 ○ If a vehicle is contaminated with asbestos, it should be cleaned with water and soap
- 4226 on-site, focusing on areas like the roof, wheel arches, and tyres.
- 4227 ○ Discard used cleaning cloths in a sealed plastic bag as asbestos waste.
- 4228 ○ Determine if air filters need to be replaced in vehicles after exposure to asbestos.

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<sup>516</sup> Directive 2009/148/EC, Article 6 (ba)

<sup>517</sup> <https://www.msb.se/siteassets/dokument/publikationer/english-publications/healthy-firefighters-the-skelleftea-model-improves-the-work-environment.pdf>

<sup>518</sup> <https://nipv.nl/wp-content/uploads/2022/04/201811-BRWNL-Brancherichtlijn-en-publicatie-Brandweeroptreden-bij-asbestincidenten-1.pdf>

## 4229 **17.6 Education and training**

4230 Workers must be informed about the dangers of asbestos and the protective measures to be taken  
4231 and emergency services' workers who might be exposed to asbestos must receive specialised  
4232 training,<sup>519</sup> see section 10.

4233 The Skellefteå Model<sup>520</sup> outlines the importance of educating firefighters about the risk of exposure  
4234 to hazardous substances, such as asbestos. This model emphasizes that training should be given to all  
4235 personnel within all levels of the organisation to be able to facilitate positive change in the culture.  
4236 This is also important for other workers involved as first responders and as part of the remedial action.

4237 Training content should include:<sup>521</sup>

- 4238 • Recognising signs of asbestos presence at a fire or emergency incident
- 4239 • Understanding and applying procedures for asbestos-related incidents
- 4240 • Knowing and applying the decontamination procedure for asbestos
- 4241 • Handling occupational hygiene issues during asbestos incidents
- 4242 • Recognising asbestos-suspect material
- 4243 • Knowledge and application of the asbestos procedures in their region (e.g., quick line-up,  
4244 decontamination methods, personnel registration)
- 4245 • Communication of suspected asbestos to partners on-site

## 4246 **17.7 Health surveillance**

4247 For the health surveillance requirements, see Section 11.

## 4248 **17.8 Waste management**

4249 All asbestos waste must be collected and removed from the place of work as soon as possible in  
4250 suitable sealed packing with labels indicating that it contains asbestos and must then be dealt with in  
4251 accordance with Directive 2008/98/EC Waste Framework.<sup>522 523</sup> Waste should be stored as follows:

- 4252 • Store asbestos-containing waste in sealable containers until it can be disposed of safely
- 4253 • Use metal or plastic drums or strong polyethylene bags.
- 4254 • If using bags put one bag inside another and seal with strong tape.
- 4255 • Label the containers in the local language and must include a warning sign before disposal<sup>524</sup>

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<sup>519</sup> Directive 2009/148/EC, Article 14

<sup>520</sup> <https://www.msb.se/siteassets/dokument/publikationer/english-publications/healthy-firefighters-the-skelleftea-model-improves-the-work-environment.pdf>

<sup>521</sup> <https://nipv.nl/wp-content/uploads/2022/04/201811-BRWNL-Brancherichtlijn-en-publicatie-Brandweeroptreden-bij-asbestincidenten-1.pdf>

<sup>522</sup> Directive 2008/98/EC Waste Framework <https://eur-lex.europa.eu/eli/dir/2008/98> Directive 2008/98/EC

<sup>523</sup> Directive 2009/148/EC, Article 6(e)

<sup>524</sup> Directive 92/58/EEC, Annexes 2 and 3

4256 If special facilities are unavailable, asbestos waste should be sealed in triple lined bags and disposed  
4257 of at a secured waste site and kept separate from other types of waste. Work with the local authorities  
4258 to identify a suitable and safe site and ensure that a record is kept of the location.<sup>525</sup>

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<sup>525</sup> <https://gifs.ngo/resource/a-brief-guide-to-asbestos-in-emergencies-safer-handling-and-breaking-the-cycle/>



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## Annex 1 Glossary

Term	Definition
Carcinogens	Substances and preparations that may cause cancer or increase its incidence
Carers	Patient's family members/friends/volunteers providing care and support for the patient.
CLP	Classification, Packaging and Labelling Regulation (1272/2008/EC)  Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
CMR	Carcinogenic, Mutagenic or Reprotoxic
CMRD	Carcinogens, Mutagens and Reprotoxic substances Directive (2004/37/EC)  Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) of Council Directive 89/391/EEC)
Employer	Any natural or legal person who has an employment relationship with the worker and has responsibility for the undertaking and/ or establishment
Engineering control	A type of control measure which uses technological means to isolate or remove hazards
EU	European Union
EU-OSHA	European Agency for Safety and Health at Work
EWC	European Waste Catalogue
Exposed	A person is exposed to a hazardous chemical if they are in a situation where they absorb or are likely to absorb the substance by ingestion, inhalation or through the skin or mucous membrane – exposure may also occur as a result of percutaneous injuries.
FFP1	Filtering face pieces (FFP) for protection against particles. Low filter performance (80% efficiency)

Term	Definition
FFP2	Filtering face pieces (FFP) for protection against particles. Medium filter performance (94% efficiency)
FFP3	Filtering face pieces (FFP) for protection against particles. High filter performance (99.97% efficiency)
GP	General Practitioner
Hazard	A hazard is the potential for a substance to adversely affect the health and safety of people in the workplace
Hazard statement	Means a statement assigned to a hazard class or hazard category describing the nature of the hazards of a hazardous chemical including, if appropriate, the degree of hazard.
Hazardous substance	A substance or mixture with hazardous properties including physical hazards, health hazards or environmental hazards.
Health surveillance	Assessment of an individual worker to determine the state of health of that individual, as related to exposure to specific asbestos at work
HEPA	High-efficiency particulate air
HEPA filter	High-efficiency particulate air filter that removes at least 99.97% of dust, pollen, mould, bacteria, and any airborne particles with a size of 0.3 microns ( $\mu\text{m}$ )
HR	Human resources
HSE	Health, safety and environment
HVAC	Heating, ventilation and air-conditioning
Inhalation	A route of exposure – breathing in asbestos fibres
LEV	Local exhaust ventilation
Limit value	Limit of the time-weighted average of the concentration for a carcinogen, mutagen or reprotoxic substance in the air within the breathing zone of a worker in relation to a specified reference period as set out in Annex III of the CMRD
Mutagens	Substances and preparations that may cause hereditary genetic effects or increase their incidence.
NIOSH	National Institute for Occupational Safety and Health
Occupational disease	Disease contracted as a result of work performed as a worker during their employment.

Term	Definition
Occupational exposure	Exposure to asbestos during a work activity
OEL	Occupational Exposure Limit
OSH	Occupational Safety and Health
OSH FD	Occupational safety and health framework directive (89/391/EEC)  Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC)
Personal protective equipment (PPE)	Any equipment intended to be carried or held by the worker to protect him or her from one or more risks likely to threaten his or her safety or health, and any attachment or accessory intended for that purpose. Personal protective equipment includes gloves, gowns, respiratory protective equipment, and eye protection equipment.
PPE	Personal protective equipment.
PPED	Personal protective equipment directive (89/656/EEC)
PPER	Personal Protective Equipment Regulation  Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC
Prevention	All the steps or measures taken or planned at all stages of work in the undertaking to prevent or reduce occupational risks
Pregnant worker	A pregnant worker who informs her employer of her condition, in accordance with national legislation and/or national practice
PWD	Pregnant workers' directive (92/85/EEC)  Council Directive 92/85/EEC of 19 October 1992 on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (Regulation (EC) No 1907/2006)  Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals

Term	Definition
	Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC
Respiratory protective equipment (RPE)	Equipment that is designed to prevent inhalation of contaminated air.
Risk	The likelihood that an asbestos hazard will cause illness or injury in the conditions of its use.
Risk assessment	Evaluation of the probability that an adverse health effect may occur under the conditions that are likely to develop. Risk assessment of asbestos will take account of its toxicity, the frequency and duration of exposure, control measures in use (engineering, administrative, or personal protective equipment) and their effectiveness, and conditions of use.
Risk control	Control of factors associated with an increase in the probability of a toxic effect occurring. There is a hierarchy of risk controls for asbestos which ranked from the most to least desirable is: elimination, substitution, isolation, engineering controls (such as local exhaust ventilation), administrative controls, personal protective equipment (PPE).
Risk management	Analysis and judgment that uses the results of risk assessments to produce decisions about actions to be initiated to avert risks.
RPE	Respiratory protective equipment
Standard operating procedure(s)	A set of instructions or steps to be followed to complete a job safely and in accordance with legal, operational and company or institutional requirements. SOPs should be written for any processes an individual or group performs.
UN Number	In relation to dangerous goods: the number assigned to the dangerous goods by the UN Committee of Experts on the Transport of Dangerous Goods; the chemical identification serial number shown in the list of dangerous goods mentioned in the ADG Code (for example: asbestos that meet the classification criteria of Class 6.1 are listed in the ADG Code as UN Number 2810 or UN Number 2811).
WHO	World Health Organisation
Worker	Any person employed by an employer, including trainees and apprentices. In this guide, also includes contractors, agency

Term	Definition
	workers, volunteers and another person providing the services.
Workers' representative (with specific responsibility for the safety and health of workers)	Any person elected, chosen or designated in accordance with national laws and/ or practices to represent workers where problems arise relating to the safety and health protection of workers at work
Worker who has recently given birth	A worker who has recently given birth within the meaning of national legislation and/or national practice and who informs her employer of her condition, in accordance with that legislation and/or practice
Worker who is breastfeeding	A worker who is breastfeeding within the meaning of national legislation and/or national practice and who informs her employer of her condition, in accordance with that legislation and/or practice
Young person	Any person under 18 years of age
YWD	Young Workers' Directive (Council Directive 94/33/EC)  Council Directive 94/33/EC of 22 June 1994 on the protection of young people at work



## Annex 2 Guides identified by literature review

The guides identified reviewed as part of the literature review are listed below. Those documents that were specifically used to help write the guide are indicated as Yes in the Checklist column.

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
<b>Australia</b>				
AU01	2018	Safe Work Australia	How to manage and control asbestos in the workplace Code of Practice	
AU02	2014	Work Cover NSW	Managing asbestos on or on soil	
AU03	2021	Asbestos Awareness & the Asbestos Education Committee	ASBESTOS management handbook FOR COMMERCIAL & NON-RESIDENTIAL PROPERTIES	
AU04	2021	Asbestos Awareness & the Asbestos Education Committee	A TRADIE'S GUIDE TO SAFE PRACTICES IN MANAGING ASBESTOS IN RESIDENTIAL PROPERTIES	
AU05	2020	Safe Work Australia	Model Code of Practice: How to manage and control asbestos in the workplace	Yes
AU06	2021	WA Gov Department of Health	Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia	
AU07	2019	WorkSafe Victoria	Compliance code - Managing asbestos in workplaces	Yes
AU08	2019	WorkSafe Victoria	Compliance code - Removing asbestos in workplaces	Yes
AU09	2020	Safe Work Australia	HOW TO SAFELY REMOVE ASBESTOS Code of Practice	Yes
AU10	2020	The Asbestos Safety and Eradication Agency (ASEA)	Action on illegal disposal of asbestos - A Guide for Local Government	
<b>Austria</b>				
AT01	2015	Bundesinnungsgruppe Baunebengewerbe_Asbestzement-Leitfaden zum Umgang		
AT02	2015	Bundesinnungsgruppe Baunebengewerbe_Arbeitsplan Umgang mit Asbest		
AT03	2007	Umweltbundesamt_Asbest_Materialienband		
AT04	2021	Die Umweltberatung_Sicherer Umgang mit Asbest		
AT05	2013	Land Tirol_Umgang mit Asbestzementplatten		
AT06	2023	Amt der NO LReg Abteilung_Handlungsleitfaden_Asbest		
AT07	2014	AUVA_Asbest - Richtiger Umgang M367		Yes
<b>Bulgaria</b>				
BG01	2018	Occupational medicine service LTM Ltd Instructions for working with asbestos		
BG02	No Year	zbut.eu Instructions for safe work with materials that contain asbestos		

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
BG03	2020	Recommendations for protecting the health of workers at exposure to asbestos		
BG04	2016	METHODOLOGICAL GUIDELINES FOR ASSESSING EXPOSURE TO ASBESTOS FIBERS DURING REMOVAL AND REPAIR OF ASBESTOS MATERIALS		
BG05	2017	Identification and risk evaluation of asbestos exposure in the disposal of asbestos containing materials		
BG06	2013	Risk assessment of exposition to asbestos		
BG07	2014	Identification of activities associated with incidental and low intensity asbestos exposure		
<b>Switzerland</b>				
CH01	2016	Office for Public Health	Asbestos in houses	
CH02	2006	Office for Public Health	Warning for certain construction materials	
<b>Cyprus</b>				
CY01	2011	Labour Inspection Office, Ministry of Labour and Social Security	Asbestos: What you need to know	Yes
CY02	2020	Labour Inspection Office, Ministry of Labour and Social Security	Special terms for the performance of works with asbestos or MCAs	Yes
<b>Czechia</b>				
CZ01	2018	MZP	Methodological guidance for the management and disposal of asbestos-containing waste during construction and demolition	Yes
CZ02	nd	SZU	Handling Asbestos Containing Waste	
CZ03	2022	SZU	Health/working with asbestos	
<b>Germany</b>				
DE01	2018	Bayerisches Landesamt für Umwelt_Asbest		
DE02	2017	__Stiftung Warentest_Asbest Tipps		
DE03	2012	__Stadt Oberhausen_Asbest Merkblatt		
DE04	2020	__BAuA_Leitlinie für Asbesterkundung		Yes
DE05	2019	__BG RCI_Asbesthaltige Bodenbeläge-Was ist zu tun		
DE06	2022	__LAGA_Vollzugshilfe zur Entsorgung asbesthaltiger Abfälle		
DE07	nd	D_Landesamt für Umwelt- und Arbeitsschutz Saarland_Asbest		
DE08		Ministerium für Umwelt Klima und Energiewirtschaft B-W_Asbest in Gebäuden-Sachgerechte Vorgehensweise		
DE09	2022	__Ausschuss für Gefahrenstoffe_TRGS 519		Yes
DE10	2015	__Ausschuss für Gefahrenstoffe_TRGS 517		Yes
DE11	2023	__Ausschuss für Gefahrenstoffe_TRGS 910		

Table A2-1 Guides identified to date			
Code	Year	Title	Checklist?
DE12	2019	__MAGS_Asbest im Haus	
DE13	nd	__BG Verkehr_Asbest an Bord-Was tun	Yes
DE14	2019	__NGS_Merkblatt_asbesthaltige_Abfaelle	
DE15	2021	__BG Bau_Branchenlösung Asbest beim Bauen im Bestand	
DE16	nd	__BIA_Arbeitsumweltdossier Asbest	
DE17	2009	__OHAS-Good-practice-award-Risk-assessment-2008-09_asbestos_page 21_22	
DE18	2023	__SUVA_Asbest erkennen - richtig handeln_Switzerland (possibly delete)	
DE19	2023	__BMDV_Asbest-PAK-PCB-Blei-Leitfaden_2023	Yes
DE20	2021	__Verband der Feuerwehren NRW_Umgang mit Asbestverdachtsfaellen	Yes
DE21	2021	__Freistaat Sachsen_Gefahrstoff Asbest-Informationen fuer Bauherren und Unternehmer	
DE22	2023	__BG Verkehr_Seeschiffahrt_Asbest-an-Bord-von-Seeschiffen_Leitfaden fuer Reedereien	Yes
DE23	2010	__BBSR_Gefahrstoff Asbest	
DE24	2015	__VDI_Handlungsfehler Asbesthaltige Putze Spachtelmasse und Fliesenkleber_discussion paper	
DE25	2016	__DGUV IFA_Leitfaden fuer Expositionsmessungen im Antragsverfahren	
DE26	2017	__WSV_Asbest_Entschichtung_Schiffahrt	
DE27	2020	__Land Niedersachsen_Handreicherung Qualifizierter Umgang mit mineralischen Abfaellen im Strassenbau	
DE28	2021	__Feuerwehrunfallkasse_Asbest in der Feuerwehr	
DE29	2018	__LASI_LV 45_Leitlinien zur Gefahrstoffverordnung_Abschnitt I Asbest	
DE30	2021	__DGUV_Emissionsarme Verfahren nach TRGS 519 für Tätigkeiten mit asbesthaltigen Materialien	
DE31	2024	BAuA_Asbestos_RoC_dateApril_2024_shared by Clever (BAuA)_WORK IN PROGRESS	
<b>Denmark</b>			
DK01	2019	Danish Industry-Asbestosguide	Yes
DK02	2010	Industriens branchemiljøråd asbestos in ships	Yes
<b>Estonia</b>			

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
EE01	2011	Tervise Arengu Instituut / Maie Kangur	Low-risk asbestos work methods for demolition, renovation and for maintenance work; Guidelines	Yes
EE02	2003	Töötervishoiu Keskus/ Occupational Health Centre	Methodical guide CHEMICAL SAFETY IN THE FIELD OF CONSTRUCTION	
<b>Greece</b>				
EL01	2007	Spiros Drivas	Asbestos Diseases	Yes
EL02	2024	Medicines Sans Frontieres	Protection from Asbestos	Yes
EL03	2003	Christos Gandas	Asbestos – Safe Removal Methods	Yes
<b>Spain</b>				
ES01	2021	INSST	Assessment and prevention of risks related to asbestos exposure	Yes
ES02	2013	Health Ministry	Protocols for specific health surveillance - Asbestos	Yes
ES03	2016	INVASSAT	Guidelines for the management of asbestos working plans	Yes
ES04	2013	Community of Madrid	Jobs in the presence of asbestos	Yes
ES05	2016	INSHT	Asbestos waste from the producer to the manager	Yes
ES06	2024	INSST	Guidelines for the removal of installed asbestos	Yes
ES07	2019	Construction Labor Foundation	Jobs that may have asbestos exposure in construction	Yes
<b>Europe and International</b>				
n/a	n/a	n/a	n/a	n/a
<b>Finland</b>				
FI 01	2019	Työturvallisuuskeskus	Toimiva asbestipurku	Yes
FI 02	2019	Hengitysliitto	Opas asbestista ja sille altistumisesta	Yes
FI 03	2019	Työterveyslaitos	Asbestipurkutyön turvallisuuden kehittäminen	Yes
FI 04	2016	Työterveyslaitos	Asbestikuitujen löytyminen työtiloista	Yes
FI 05	2016	Työterveyslaitos	Asbestiriskien hallintaohjeet kaivoksille	Yes
FI 06	2022	Työsuojeluhallinto	Asbestiasetuksen soveltamisohje	Yes
FI 07	2016	Kiinteistöliitto & Isännöintiiliitto	Asbestin kartoitusvelvollisuus osakkaan huoneistoremontissa	Yes
<b>France</b>				
FR01	2014	French Health Ministry	Asbestos in buildings	
FR02	2023	French professional associations	Abestos guide	
FR03	2020	INRS	Choice and use of breathing apparatus	Yes
FR04	2021	French Justice Ministry	Guide to Asbestos	
FR05	2014	French Education Ministry	Asbestos- What to know	
FR06	2020	Social Housing Union	Asbestos	
FR07	2017	SNCF	Technical document Asbestos	Yes

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
FR08	2022	SNCF	Safety plan	
FR09	2022	INRS	Asbestos risks	Yes
FR10	2022	French Interior Ministry	Firemen- Operational guide to prevent asbestos risk	
FR11	2021	French Economy Ministry	Guide on asbestos in managing buildings	
FR12	2014	INRS	The products and suppliers	
FR13	2021	French Ministry for the Ecological Transition	Asbestos in the natural environment	
FR14	2012	INRS	Work situations exposed to asbestos	
FR15	2017	OPPBTP	Prevention of Asbestos risk	
FR16	2019	afnor	Standards on asbestos in ships, boats and other floating structures	Yes
FR17	2020	afnor	Standards on asbestos in civil engineering structures	
FR18		Various	Fundamentals in preventing asbestos risk in buildings	Yes
<b>Croatia</b>				
HR01	2018	Nastavni zavod za javno zdravstvo „Dr. Andrija Štampar“	HR_01_2018_NZJZ Stampar_Brosura-azbest-smjernice	Yes
<b>Hungary</b>				
HU01	n.d	MASZ Asbestos handling guidelines notebook 1.0		Yes
HU02	n.d	Asbestos demolition guide		Yes
<b>Ireland</b>				
IE01	2023	Local Government Ireland	Best Practice Guidance for Handling Asbestos	Yes
IE02	2013	Health and Safety Authority	Practical Guidelines on ACM Management and Abatement	Yes
IE03	2013	Health and Safety Authority	Abestos flyer	
IE04	2020	Ireland Brownfield Network	Management of Asbestos in Soils- An All-Ireland Guidance Document	
<b>Italy</b>				
IT01	2020	National Institute for Insurance against Accidents at Work (Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro (INAIL)	Asbestos Remediation: Procedural Processes and Professional Figures Involved	Yes
IT02	2023	Regional authority (Friuli Venezia Giulia)	Guidelines for reporting, traceability and method of assessing the state of conservation and dangerousness of artefacts containing asbestos - rev.2023	Yes
IT03	2013	Regional authority (Abruzzo)	Regional Guidelines: Asbestos Risk Management Procedures to Protect Public Health; Procedures for the Application of Legislative Decree 81/08 Title IX Chapter III to Protect Workers and the Community from Asbestos Risk	Yes
IT04	2002	Assoamianto	Micro-Collection of Waste Containing Asbestos - Guidelines for the removal, transport and temporary storage of small quantities of materials containing asbestos	Yes
IT05	2020	National System for Environmental Protection (Sistema Nazionale per la Protezione dell'Ambiente (SNPA)	Guideline document for the assessment of asbestos risk in the SNPA	Yes

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
IT06	2019	Regional authority (Emilia Romagna)	How to Work Protected from the Risk of Asbestos - Prevention Manual Intended for Construction Site Workers Employed in Contact with Materials Containing Asbestos	Yes
IT07	2017	The Italian Labour Union (Unione Italiana del Lavoro (UIL)	Health and safety at work - asbestos	Yes
IT08	2023	Civil Protection Department of the Italian Government	Operational Indications for the Management of Rubble Following a Seismic Event	Yes
IT09	2024	AssoAmbiente	Operating procedures relating to asbestos waste	Yes
<b>Lithuania</b>				
LT01	2011	Institute of Hygiene	Practical recommendations for identification, detection and exposure prevention of asbestos fibres / Asbesto plaušelių identifikavimo, nustatymo ir poveikio prevencijos praktinės rekomendacijos	Yes
LT02	2020	State Labour Inspectorate	Repair and disassembling (demolition) buildings and equipment containing asbestos / Statinių ir įrenginių, kuriose yra asbesto, taisymas ir ardymas (griovimas)	Yes
LT03	2023	State Labour Inspectorate	Personal protective equipment in asbestos removal work / Asmeninės apsaugos priemonės vykdant asbesto šalinimo darbus	Yes
LT04	2008	Institute of Hygiene	Detection of accidental or low-intensity employee asbestos exposure: practical recommendations / Atsitiktinio ir mažo intensyvumo asbesto veikimo darbuotojams nustatymas: praktinės rekomendacijos	Yes
LT05	2012	State Labour Inspectorate	How to safely replace asbestos cement roofs: advice for employees / Kaip saugiai pakeisti asbestcemenčio dangų stogus: patarimai darbuotojams	Yes
LT06	2012	State Labour Inspectorate	How to safely replace asbestos cement roofs: advice for employers / Kaip saugiai pakeisti asbestcemenčio dangų stogus: patarimai darbdaviams	Yes
<b>Luxembourg</b>				
LU01	2018	Mines Inspectorate	Asbestos cement practical guide	
LU02	2023	Chamber of Trade	Asbestos	
LU03	2013	Various	Asbestos in buildings Prevention of Risks	
<b>Latvia</b>				
LV01	2023	The Ministry of Smart Administration and Regional Development of the Republic of Latvia	Manual on handling asbestos-containing waste	Yes
LV02	2014	Riga Stradins University, Institute of Occupational Safety and Environmental Health	Occupational health and safety requirements when working with asbestos	Yes
LV03	2015	Riga Stradins University, Laboratory of Hygiene and Occupational Diseases	Inventory, recognition and identification of MCAs in buildings	Yes
<b>Malta</b>				
n.a	n.a	n.a	n.a	n.a
<b>Netherlands</b>				
NL01	2018	Brandweer academie	Brancherichtlijn en publicatie Brandweeroptreden bij Asbestincidenten	Yes

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
NL02	2018	Instituut Fysieke Veiligheid	Handreiking aanpak asbestincidenten werkversie 1.1	Yes
NL03	2014	GGD	Gezondheidsrisico van asbest in woningen en publieke gebouwen	Yes
NL04	2016	Aedes	Handboek Asbest	Yes
NL05	2022	Milieu Centraal	Handleiding verwijderen asbest (schuur)dak	Yes
NL06	2021	Ascert	Examenreglement Ascert voor examens. Deskundig Inventariseerder, Asbestdeskundige, Deskundig Asbest Acceptant.	
NL07	2024	Ascert	Nadere interpretaties certificatieschema's SCA 100	
NL08	2023	Ascert	Sci Eisen aan arbeidsmiddelen	
NL09	2022	Ascert	Sci- directe decontaminatieprocedure	
NL10	2022	Ascert	Sci- indirecte decontaminatieprocedure	
NL11	2024	Netwerkbedrijven	Arbocatalogus Netwerkbedrijven	Yes
NL12	2024	Xerio	Asbestkeuringen	
NL13	2015	NEN	Lucht - Bepaling van de asbestconcentraties in de lucht en risicobeoordeling in en rondom bouwwerken, constructies of objecten waarbij asbesthoudende materialen zijn verwerkt.	Yes
<b>Poland</b>				
PL01	2018	Dariusz Koba	PORADNIK DLA ZAMAWIAJĄCYCH USUWANIE AZBESTU (Guidance for customers procuring asbestos removal)	Yes
PL02	N.D.	N.A.	POSTĘPOWANIE Z AZBESTEM W SYTUACJACH NADZWYCZAJNYCH (WYSTĄPIENIE KLĘSK ŻYWIŁOWYCH) (HANDLING ASBESTOS IN EMERGENCY SITUATIONS (IN THE EVENT OF NATURAL DISASTERS))	Yes
PL03	2016	Ministry of Funds and Regional Policy	Ocena użytkowania wyrobów zawierających azbest (Assessment of the use of products containing asbestos) + Annex 1 OCENA stanu i możliwości bezpiecznego użytkowania wyrobów zawierających azbest (ASSESSMENT of the condition and possibilities of safe use of products containing asbestos)	
PL04	2008	Ministry of Economy, Department of Support Instruments	PORADNIK DLA UŻYTKOWNIKÓW WYROBÓW AZBESTOWYCH (GUIDE FOR USERS OF ASBESTOS PRODUCTS)	
PL05	N.D.	Główny Instytut Górnictwa (Central Mining Institute)	E-learning modules, 4 modules: I. Szkolenie dla Państwowej Inspekcji Sanitarnej (Training for the State Sanitary Inspectorate) II. Szkolenie dla Państwowej Inspekcji Pracy (Training for the State Labour Inspectorate) III. Szkolenie dla organów Nadzoru Budowlanego (Training for Building Supervision Authorities) IV. Szkolenie dla Jednostek Samorządu Terytorialnego (Training for Local Government Units)	



Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
PL06	2019	Sylvia Oziembło-Brzykczy, Państwowa Inspekcja Pracy (National Labour Inspectorate)	Niebezpieczny azbest (Dangerous asbestos)	
PL07	N.D.	Państwowa Inspekcja Pracy (National Labour Inspectorate)	Rolnictwo. Uwaga azbest! (Agriculture. Beware of asbestos!)	
PL08	2008	Jerzy Dyczek et al.	Bezpieczne postępowanie z azbestem i materiałami zawierającymi azbest (Safe handling of asbestos and MCAs)	
PL09	2014	Halina Wojciechowska-Piskorska	AZBEST – PORADNIK DLA PRACODAWCY I PRACOWNIKÓW. ASPEKTY TECHNICZNE I PRAWNE W ZAKRESIE ZABEZPIECZANIA I USUWANIA WYROBÓW ORAZ MATERIAŁÓW ZAWIERAJĄCYCH AZBEST (ASBESTOS – GUIDE FOR EMPLOYERS AND EMPLOYEES. TECHNICAL AND LEGAL ASPECTS IN THE FIELD OF PROTECTION AND REMOVAL OF PRODUCTS AND MATERIALS CONTAINING ASBESTOS)	
PL10	2004	Jerzy Dyczek	Surface of Asbestos-cement (AC) Roof Sheets and Assessment of the Risk of Asbestos Release	
<b>Portugal</b>				
		There are unnumbered documents in Portuguese (I presume) inside the folder. Otherwise, n.a.		
RO01	2013	Anca Antonov, coordinator	Ghid de sănătate și securitate în muncă privind riscurile datorate expunerii la azbest (Occupational health and safety guidance on the risks from exposure to asbestos)	Yes
RO02	2012	Dana Mateș	Ghid de supraveghere a riscului de expunere profesională la azbest (Occupational health and safety guidelines on the risks due to occupational exposure to asbestos)	Yes
RO03	2012	Grigorița Năpar, coordinator	Ghid metodologic pentru prevenirea riscurilor legate de expunerea la azbest (Methodological guide for the prevention of risks related to asbestos exposure)	Yes
RO04	2010	Grigorița Năpar, coordinator	Ghid metodologic pentru prevenirea riscurilor legate de expunerea la agenți cancerigeni, mutageni și toxici pentru reproducere	
RO05	2013	Elena Nisipeanu, Elena Ruxandra Chiurtu, Maria Haiducu, Iuliana Pamela Scarlat, Roxana Avram	Ghid de sănătate și securitate în muncă privind utilizarea valorilor limită de expunere profesională pentru agenți chimici, cancerigeni și mutageni (Occupational health and safety guidance on the use of occupational exposure limit values for chemical agents, carcinogens and mutagens)	
<b>Sweden</b>				
SE01	2006	Arbetsmiljovärdet asbest		Yes
SE02	2007	Prevent Asbestos		Yes
SE03	2023	Prevent asbestarbejde		Yes
<b>Slovenia</b>				
SI01	2006	Committee of Senior Labour Inspector (SLIC)	A practical guide on best practice to prevent or minimise asbestos risks	Yes
<b>Slovakia</b>				

Table A2-1 Guides identified to date				
Code	Year	Title		Checklist?
SK01	nd	Public Health Authority of the Slovak Republic	Asbestos removal from buildings (information)	Yes
<b>United Kingdom</b>				
UK01	2014	Ciria	Asbestos in soil and made ground: a guide to understanding and managing risks (C733D)	
UK02	2012	Health and Safety Executive	L143 Managing and working with asbestos - Control of Asbestos Regulations 2012	Yes
UK03	2006	Health and Safety Executive	HSG247 Asbestos: The licensed contractors' guide	Yes
UK04	2019	National Federation of Demolition Contractors (NFDC)	Notifiable Non Licensed Work (NNLW):ASBESTOS GUIDANCE NOTES	Yes
UK05	2012	Health and Safety Executive	HSG264 Asbestos: The survey guide	Yes
UK06	2021	Health and Safety Executive	HSG248 (2nd Edition) Asbestos: The Analysts' Guide	Yes
UK07	2002	Health and Safety Executive	HSG227 A comprehensive guide to Managing Asbestos in premises	Yes
UK08	2022	Welsh Government	Asbestos management in schools	Yes
UK09	2024	UK Health Security Agency	Asbestos Incident management	Yes
UK10	2023	National Fire Chiefs Council	Guidance Hazardous Materials - Health Hazards	Yes
UK11	2012	Chief Fire & Rescue Adviser	Fire and Rescue Service Operational Guidance – Incidents involving hazardous material	Yes
UK12	2006 ?	Senior Labour Inspectors Committee (SLIC)	A practical guide on best practice to prevent or minimise asbestos risks in work that involves (or may involve) asbestos: for the employer, the workers and the labour inspector.	
UK13	2018	Health and Safety Executive	HSG210 Asbestos Essentials: A Task Manual for Building, Maintenance and Allied Trades of Non-licensed Asbestos Work	Yes
<b>United States</b>				
USA01	2024	Occupational Safety and Health Administration (OSHA)	Asbestos Standard for the Construction Industry	
USA02	2024	Occupational Safety and Health Administration (OSHA)	1910.1001 - Asbestos Standard for the General Industry	
USA03	2024	Occupational Safety and Health Administration (OSHA)	1915 - Asbestos Standard for Shipyard Employment	
USA04	1985	U.S. Environmental Protection Agency	Guidance for Controlling MCAs in Buildings,	
USA05	2011	U.S. Environmental Protection Agency	CFR-2011The National Emission Standards for Hazardous Air Pollutants (NESHAP)	
USA06	2011	U.S. Environmental Protection Agency	Asbestos Model Accreditation Plan Enforcement Response Policy	
USA07	1986	U.S. Congress	Asbestos Hazard Emergency Response Act (AHERA)	
USA08	1985	U.S. Environmental Protection Agency	Asbestos Waste Management Guidance	
USA09	2024	Code of Federal Regulations	173.216 Transportation Asbestos blue brown or white	
USA10	2024	Code of Federal Regulations	61.150 Standard for waste disposal for manufacturing, fabricating, demolition, renovation, and spraying operations.	

## Annex 3 Examples of materials containing asbestos (MCAs)

Table A3 1: Non-exhaustive overview of different products that contain asbestos

Type	Product	Indoor/Outdoor Use <sup>526, 527</sup>	Residential/Industrial Use <sup>528, 529</sup>	Ease of Fibre Release <sup>530</sup>
<b>Technical installations</b>	Waste chutes	Indoor	Industrial	Moderate
	Pressure pipes	Indoor/Outdoor	Both	Low
	Cover over pipe channels	Outdoor	Industrial	Low
	Elevator brakes	Indoor	Industrial	Moderate
	Gaskets	Indoor	Both	High (during maintenance)
<b>Electrical installations</b>	Heat insulating cables	Indoor	Industrial	Low
	Boards and paper	Indoor	Both	Moderate
	Fireproof cables	Indoor	Both	Low
	Sockets	Indoor	Residential	Low
<b>Ventilation components</b>	Exhaust and ventilation ducts	Indoor	Industrial	Moderate
	Fire dampers	Indoor	Industrial	Moderate
	Heat exchangers	Indoor	Industrial	Moderate
	Flexible connections	Indoor	Industrial	Moderate
	Air heating systems	Indoor	Both	Moderate
<b>Interior surface materials and chemicals</b>	Thin wall panels	Indoor	Both	Moderate
	Vinyl for floors	Indoor	Both	Low
	Vinyl for floors and walls	Indoor	Both	Low
	Cast floors	Indoor	Both	Low
	Plasters and sealants	Indoor	Both	Moderate
	Paints and textured coatings	Indoor	Both	Moderate
	Tile adhesives, Mastics	Indoor	Both	Low
<b>Roof products</b>	Fillers and sealants	Outdoor	Both	Low
	Eternit slate	Outdoor	Both	Low
	Corrugated sheet profiles	Outdoor	Both	Low
	Special elements, Eternit products	Outdoor	Both	Low
	Asphalt products	Outdoor	Both	Low
	Roofing membranes	Outdoor	Both	Low
	Roofing felt	Outdoor	Both	Low
	Roof underlay	Outdoor	Both	Low
<b>Façade elements</b>	Eternit cladding boards	Outdoor	Both	Low
	Eternit facade board type A	Outdoor	Both	Low
	Eternit "Glasal"	Outdoor	Both	Low
	Eternit structure	Outdoor	Both	Low

<sup>526</sup> 2023, Local Government Ireland, Best Practice Guidance for Handling Asbestos (<https://www.epa.ie/publications/monitoring-assessment/waste/hazardous-waste/best-practice-guidance-for-handling-asbestos.php>)

<sup>527</sup> 2012, Health and Safety Executive, HSG264 - Asbestos: The survey guide (<https://www.hse.gov.uk/pubns/books/hsg264.htm>)

<sup>528</sup> 2023, Local Government Ireland, Best Practice Guidance for Handling Asbestos (<https://www.epa.ie/publications/monitoring-assessment/waste/hazardous-waste/best-practice-guidance-for-handling-asbestos.php>)

<sup>529</sup> 2012, Health and Safety Executive, HSG264 - Asbestos: The survey guide (<https://www.hse.gov.uk/pubns/books/hsg264.htm>)

<sup>530</sup> 2012, Health and Safety Executive, HSG264 - Asbestos: The survey guide (<https://www.hse.gov.uk/pubns/books/hsg264.htm>)

	Duraform	Outdoor	Both	Low
	Steel plates	Outdoor	Both	Low
	Wall capping	Outdoor	Both	Low
	Sills	Outdoor	Both	Low
	Natural stone with asbestos	Outdoor	Both	Low
<b>Insulation and fire protection</b>	Building insulation	Indoor	Both	High (if disturbed)
	Loose fill insulation	Indoor	Residential	High
	Asbestos insulating ceiling tiles	Indoor	Residential	High
	Asbestos insulating board (AIB) in fire doors	Indoor	Residential	High
	Paper and cardboard	Indoor	Both	Moderate (if disturbed)
	Technical insulation	Indoor	Industrial	Moderate
	Spray asbestos	Indoor	Both	High (if disturbed)
	Fire insulating elevator top	Indoor	Industrial	Moderate
	Fire Insulation of ventilation systems	Indoor	Both	Moderate
	Fire doors	Indoor	Both	Moderate
Fire blankets	Indoor	Both	High	
<b>Panels and boards</b>	Wood fibreboard (with asbestos cardboard on one side)	Indoor	Both	Moderate
	Asbestos cement boards with metal cover	Indoor	Both	Moderate
	Asbestos Insulation Board (AIB), e.g. Asbestolux	Indoor	Both	Moderate
	Asbestos boards, type A	Indoor	Both	Moderate
	Dæmpasbest	Indoor	Both	Moderate
	Dæmpa-Deck	Indoor	Both	Moderate
	Dæmpa-Z	Indoor	Both	Moderate
	Ikasbest	Indoor	Both	Moderate
	Perforit, Internit	Indoor	Both	Moderate
	Navilite	Indoor	Both	Moderate
Polished or glazed Eternit	Indoor	Both	Moderate	
<b>Special components and equipment</b>	Spacers in concrete	Outdoor	Industrial	Low
	Spacers for wall panels	Indoor	Both	Low
	Asbestos cement tiles	Outdoor	Both	Low
	Wall plugs	Both	Both	Low
	Pigsty elements (separation wall elements)	Indoor	Industrial	Low
	Motor vehicle components, Brake pads	- (Motor vehicle)	-	Moderate
	Motor vehicle components, Clutches	- (Motor vehicle)	-	Moderate
	Safes and security devices	Indoor	Both	

	Textiles	Both	Both	High (if disturbed)
	Asbestos rope and string	Both	Both	High (if disturbed)

DRAFT

## Annex 4 Transport of asbestos containing waste

All dangerous goods, including waste containing asbestos (WCA), must be classified prior to transport by road or any other mode of transport. If shipping WCA by air, sea, road or rail, the appropriate modal classification requirements must be applied.

The two primary classifications are:

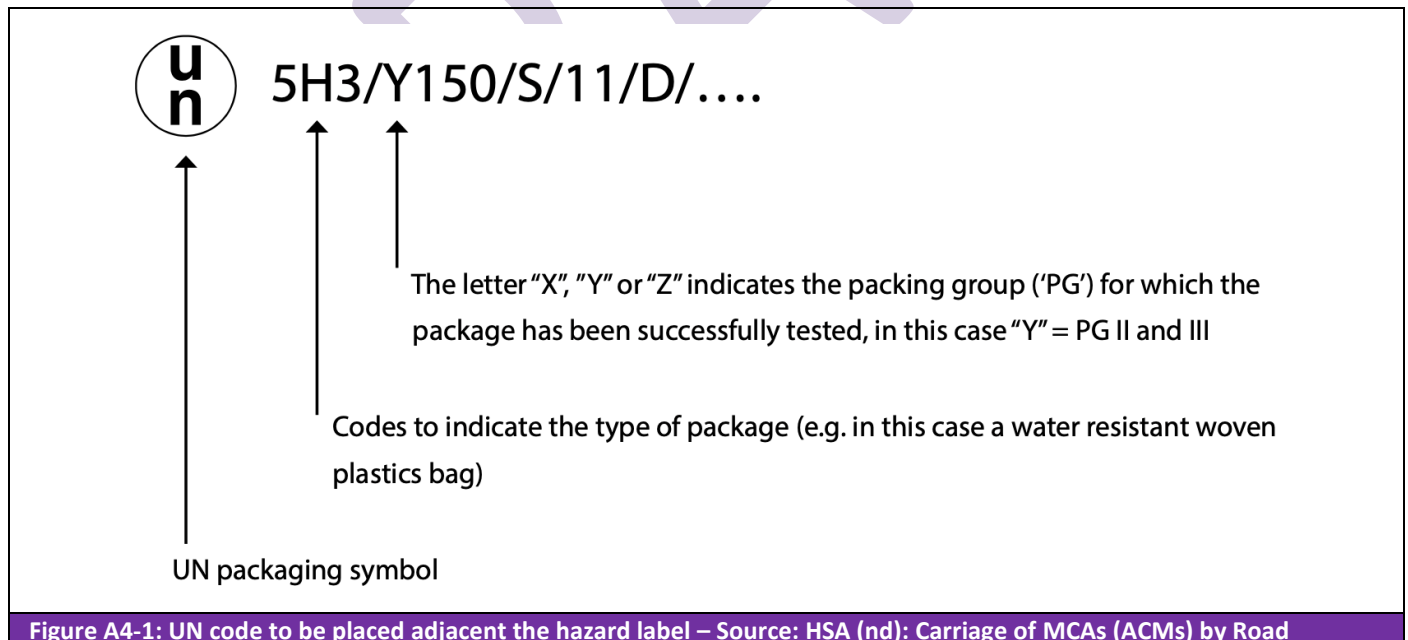
- UN2212 (Asbestos, Amphibole): Packing Group II (medium danger), representing the most hazardous asbestos varieties (e.g., amosite, tremolite, actinolite, anthophyllite, crocidolite).
- UN2590 (Asbestos, Chrysotile): Packing Group III (low danger).

WCA cannot be transported in 'bulk', as loose, unpackaged material. WCA must be placed in UN-certified packaging. Typically, it is double bagged in certified red inner and clear outer polythene bags. However, WCA can be packaged in a wide variety of UN approved packaging types such as boxes, bags, drums and intermediate bulk containers (IBCs). Full details are provided in ADR Chapter 4.1, and specifically in packing instructions P002 and IBC08 (and R001 for UN No. 2590).

When bags are used to package WCA, multiwall paper bag 5M1 must be used (ADR PP37).

If flexible, fibreboard or wooden IBCs are used (under packing instruction ADR IBC08), they must be sift-proof and water-resistant or alternatively must be fitted with a sift-proof and water-resistant liner (special packing provision B4). All IBCs made of materials other than metal or rigid plastics must be carried in closed or sheeted vehicles or closed or sheeted containers.

Each package must bear the Class 9 hazard label (Figure 12-2) and be marked with a code preceded by the UN packaging symbol (Figure A4-1).



Intermediate bulk containers of more than 450L capacity and large packaging must be marked on two opposite sides. WCA cannot be transported through tunnels category E<sup>531</sup>.

<sup>531</sup> Tunnels category E are considered of very high risk and are restricted to the carriage of dangerous good, including WCA.

Special handling is required for large MCAs that cannot fit into standard UN packaging. These must be securely wrapped in heavy-gauge polythene, labelled, and transported in a manner that ensures the integrity of the wrapping is not compromised. ADR-compliant vehicles or containers must be used for transporting such waste, typically in enclosed skips or vans, depending on the load size.

Vehicles carrying WCA must display orange plates<sup>532</sup> (Figure A4-2) at the front and rear, with the hazard identification number (90 “Environmentally hazardous material, miscellaneous hazardous materials”) and the UN number (either 2212 or 2590).

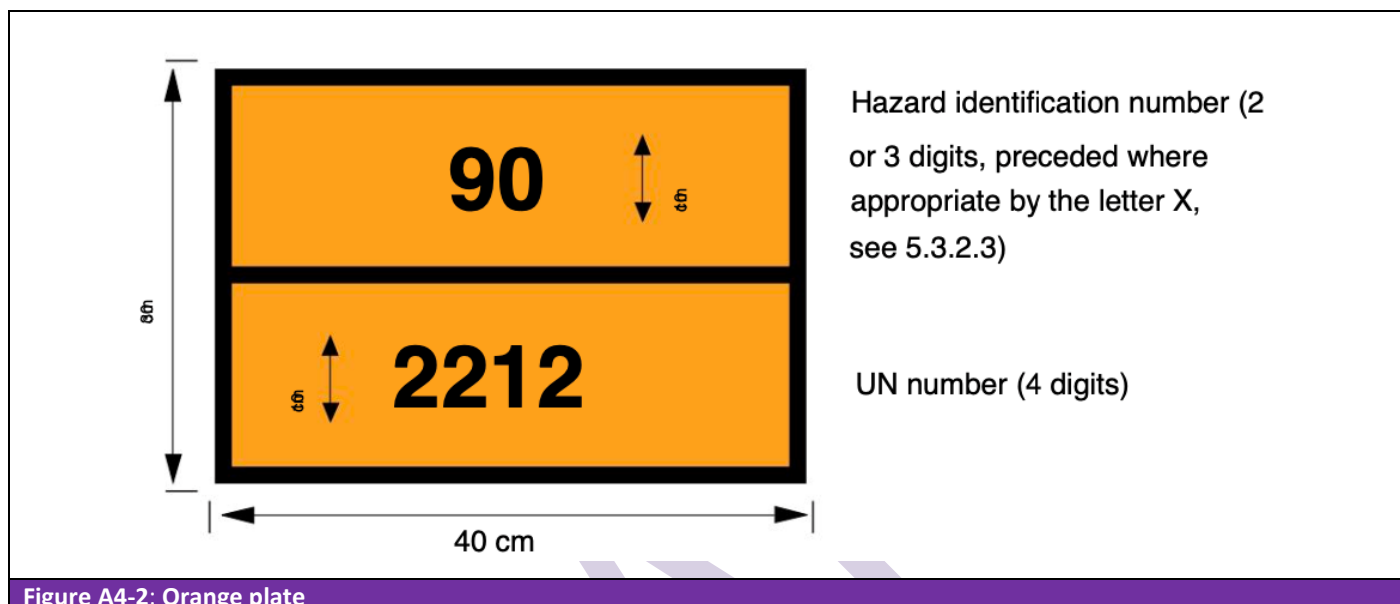


Figure A4-2: Orange plate

Freight containers must be marked with placards, on all four sides, reporting the hazard label (Figure 12-2).

Road or rail vehicles undertaking a sea crossing must be marked with placards.

Carriers must ensure that vehicles are equipped with:

- Suitable wheel chocks
- Two self-standing warning signs
- Eye wash
- Warning vest, torch, protective gloves and safety glasses for each vehicle crew member
- A shovel, drain seal and plastic collecting container
- First aid kit and any other safety items identified in the risk assessment
- Fire extinguisher

Drivers must hold an ADR driver training certificate, while all personnel involved in handling asbestos, including drivers of smaller loads, must receive dangerous goods awareness training as required by ADR.

Before loading and unloading WCA on any vehicle, checks of the documentation, the vehicle and its load, and safety equipment must be carried out. If any non-compliance is found, loading must not commence. Loading and unloading in a public place is prohibited in a built-up area unless a special permission is granted by the competent authorities, and elsewhere than a built-area without prior notification to the competent authorities [ADR 7.5.11].

WCA must be accompanied by a transport document provided by the waste holder (consignor), containing:

<sup>532</sup> Plate size: 400 mm x 300 mm, border line 15 mm x 15 mm. For small vehicles, plate may be reduced in size to 300 mm x 120 mm and a 10 mm border line.



- The word “waste”
- The UN number preceded by the letter “UN”
- The proper shipping name supplemented, when applicable with the technical name in brackets
- The hazard label model 9
- The packing group (PG): “PG II” for Asbestos, Amphibole and “PG III” for Asbestos, Chrysotile
- The number and description of the packages
- The total quantity
- The name and address of the waste holder
- The name and address of the waste treatment or waste disposal facility
- A declaration as required by the terms of any special agreement
- The tunnel restriction code (E), unless it is known that the carriage will not pass any tunnel with restrictions for carriage of dangerous goods.

The table below provides an example of a transport document for WCA.

Table A4-1: Example of a transport document for WCA		
<b>ADR Transport document</b>		
Waste consignor: Demolition company ABC		
Address: ABC street 2, ZIP ABCtown		
Date: dd/mm/yyyy		
Dangerous goods description	No. of packages / type	Total quantity
WASTE, UN2590, ASBESTOS, CHRYSOTILE, 9, PGIII, (E)	100 x 20 kg bags	2,000 kg
Consignee: Disposal facility XYZ		
Address: XYZ street 4, ZIP XYZville		

Transport documents must be kept by the waste holder (consignor) and the carrier for three months.

The carrier must provide instructions in writing (so called transport emergency card or TREMc card) to the vehicle crew in a language understood by the driver and crew. The TREMc card sets out the actions to be carried out by the crew in emergency situations, the hazard characteristics of the WCA, additional guidance and a list of safety equipment to be carried on the vehicle. The vehicle crew must familiarise with the TREMc card before the start of the journey.<sup>533</sup>

Any vehicle or container where WCA has been spilled must not be re-used before decontamination.

Vehicles carrying over 5,000 kg of WCA must be supervised at all times or may be parked, unsupervised, in a secure depot or secure factory premises. If such facilities are not available, the vehicle can be parked in a parking supervised by an attendant who has been informed of the nature of the load and the whereabouts of the driver. If also this option is not available, the vehicle can be parked in a private or public parking where the vehicle is not likely to suffer damage from other vehicles. If also this option is not available, the vehicle can be parked in a suitable open space where the public does not normally pass or assemble [ADR Chapter 8.4].

### Exemptions

#### Small load

Transport of WCA in small loads (ADR 1.1.3.6) is exempted from some ADR requirements. The thresholds are:

- UN2212 (Transport Category 2): 333 kg.
- UN2590 (Transport Category 3): 1,000 kg.

<sup>533</sup> Instructions in writing in different languages are available for download free of charge at: <https://unece.org/linguistic-versions-adr-instructions-writing>

For mixed loads, the weight of Category 2 material is multiplied by three and added to the weight of Category 3 material. If the total exceeds 1,000 kg, carriage documents are mandatory. The documents must include key details such as the UN number, proper shipping name (preceded by “WASTE”), class, and packing group in the exact format specified by ADR.

Under the small load exemption, packaged WCA may be carried without the application of the following provisions:

- Security provisions
- Placarding and marking (i.e. vehicles do not require orange plates and containers do not require placards)
- Instructions in writing
- Packing provisions are reduced
- Restrictions in public places are reduced
- Fewer requirements for vehicle crews, equipment, operation and documentation
- Vehicle certification
- Driver training certification
- Tunnel restrictions

However, the following ADR requirements still apply:

- Transport document must be carried in the vehicle and must indicate the total quantity of WCA for each transport category
- Vehicle must be equipped with a suitable 2 kg fire extinguisher
- Driver and crew must have received appropriate general training
- Driver and crew must not open dangerous goods packages
- No smoking during handling in or around the vehicle
- Any torch carried must be non-sparking

#### Limited quantities

Transport of WCA in limited packaged quantities — 1 kg for Asbestos, Amphibole and 5 kg for Asbestos, Chrysotile — is also exempted from some ADR requirements. Each inner package must be placed in suitable outer packaging with a gross mass limit of 30 kg (inner packages and outer packaging total weight not to exceed 30 Kg). Shrink wrapped trays may also be used as outer packaging, but a package limit of 20 Kg is imposed. The packaging specified does not need to be UN approved but must be suitable and of good quality. Provided these limits and requirements are met, no limit applies to the total quantity per shipment.

Packages containing WCA in limited quantities must bear the marking in Figure A4-3 (mark shall be 100mm x 100mm, diamond outline of at least 2 mm). When transporting goods in accordance with air requirements and the air mark is applied, this mark is accepted for the other modes of transport.

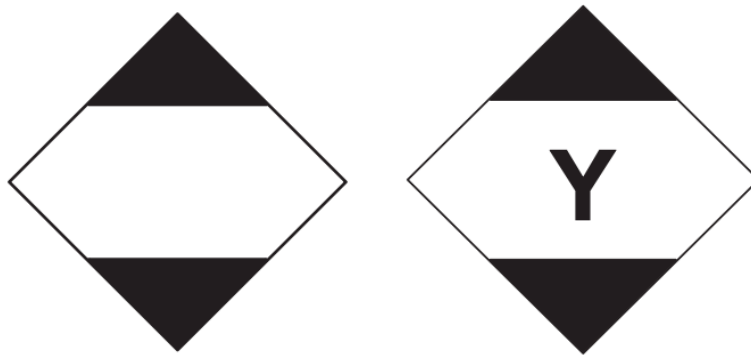


Figure A4-3: Road / rail / sea marking on the left and air marking on the right for dangerous goods in limited quantities

Once packaged and labelled for carriage in accordance with all limited quantity provisions the main exemptions are:

- No orange plates required on vehicles
- No vehicle marking for consignments under 8 tonnes (over 8 tonnes vehicle must be marked with same mark as packages, front and rear of vehicle, in the form of a placard – dimensions of 250 mm x 250 mm)
- Drivers are not required to hold an ADR driver training certificate
- No other hazard labels or UN number marking
- No vehicle safety equipment or PPE
- No fire extinguishers
- No instructions in writing
- No transport documents (except for sea shipment where a container packing certificate is required)

Some provisions do still apply, such as the relevant provisions for orientation marks and use of overpacks.

#### Special Provision 168

Some WCA may fall under ADR Special Provision 168, i.e. may not be subject to the requirements of ADR, provided asbestos is bound in materials like cement or plastic that prevent fibre release during transport:

*'Asbestos which is immersed or fixed in a natural or artificial binder (such as cement, plastics, asphalt, resins or mineral ore) in such a way that no escape of hazardous quantities of respirable asbestos fibres can occur during carriage is not subject to the requirements of ADR. Manufactured articles containing asbestos and not meeting this provision are nevertheless not subject to the requirements of ADR when packed so that no escape of hazardous quantities of respirable asbestos fibres can occur during carriage.'*

WCA falling under this special provision may be subdivided into friable and non-friable materials. Friable WCA must be carried out with UN approved packaging suitable for the transport of asbestos, as provided in ADR 4.1.4, packing instructions P002, IBC08, PP37, B4 (and for UN No. 2590 only, packing instruction R001 also applies), or packaging of an equivalent standard.

Examples of friable materials:

- Thermal insulation on pipe work and vessels (composite and pre-formed, glass fibre with asbestos paper)
- Asbestos insulating board (density 700 kg/m<sup>3</sup>)
- Mill board (density less than 500 kg/m<sup>3</sup>)
- Textiles, ropes and paper.

Non-friable WCA should be double-bagged or double wrapped in heavy duty plastic. All openings should be sealed with suitable adhesive tape or an alternative closure method. The package must be able to withstand normal handling and transport operations without opening or failing. When these requirements are met, no other ADR requirements apply. However, if the packaging fails or is torn open, the WCA must be examined for potential damage. If there are unbound fibres, WCA must be classified as UN No. 2212 or UN No. 2590 as appropriate, and ADR provisions apply in full.

Examples of non-friable material:

- Asbestos cement products in good condition
- 'Galbestos', which is bitumen layer on corrugated galvanized sheets
- Damp proof course
- Roofing felt
- Thermoplastic floor tiles
- Bitumen products (acoustic sink pads)
- Toilet cisterns
- Compressed gaskets in good condition
- Enclosed electrical fittings
- Putties, mastic and sealants
- Cellulose wood based board with trace amounts of chrysotile