

# WHITE PAPER ON A METHODOLOGY FOR HANDLING OF ASBESTOS CONTAINING MATERIALS IN LINE WITH THE NEW LEGISLATION IN UKRAINE



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*This document has been prepared based on the current legislation governing asbestos abatement practices in Ukraine as of 18<sup>th</sup> of January 2024. It is intended to provide relevant information and guidelines for asbestos abatement procedures in accordance with the existing legal framework.*

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## **FOREWORD**

This white paper has attempted to underscore the strides that have been made and the remaining axes of progress in addressing the challenges associated with asbestos exposure and its impact on public health and the environment. Concerted efforts to raise awareness, the enhancement of existing or new legislation and improved monitoring and enforcement mechanisms will certainly contribute to a positive trajectory in asbestos handling and management in Ukraine.

In addition to providing a comprehensive risk assessment, proposed rules and abatement in real-life situations, and practical information on protective measures, this document has also highlighted the gaps between Ukrainian and international regulatory frameworks. This acknowledges that although improvements have been made, there is still vital work to be done, including the need for more stringent enforcement of current regulations, continued investment in asbestos removal projects, and the development of safe disposal methods to achieve a comprehensive, coherent, and sustainable asbestos management system across the country.

Additionally, ongoing training, monitoring and research are crucial to understanding the long-term effects of past asbestos exposure and informing future mitigation strategies. This group believes that moving forward, all stakeholders must be committed to collaborative efforts, drawing on the lessons learned from successful interventions internationally to address the required improvements in asbestos management in Ukraine. It is hoped that Ukraine will continue its journey towards a robust and effective asbestos management framework and, by doing so, can contribute to safeguarding public health and the environment from the persistent and significant challenges posed by asbestos.

After several years of implementing asbestos abatement works in Ukraine without clear national regulations, the Government released a degree to ban asbestos containing materials (ACM) from the Ukraine market and rules and principles on how to handle the abatement/removal of ACM during reconstruction and demolition works in in September 2022.

The new regulation provides a framework that is aligned with international regulations and defines general targets for protecting workers and the civil society from the risks of the non- professional handling of ACM.

However, the regulation does not provide details on how to achieve these targets and is open to wide interpretation for consultants, construction companies, financing institutions and Ukrainian authorities. Considering the large number of investments that are currently financed by international organisations, international best practice must be applied throughout the entire asbestos removal process, from screening and identification, throughout the entire removal and treatment process up until the final disposal of ACM.

This **“WHITE PAPER FOR HANDLING OF ASBESTOS CONTAINING MATERIALS”** is aligned with the new Ukrainian legislation and provides details and practical advice for the implementation of asbestos abatement works to all stakeholders responsible for handling ACM (including designers, supervisors, construction companies, transport companies, landfill operators, financing institutions, municipal and governmental authorities) and working for the reconstruction of a better Ukraine.

The authors of this white paper are senior experts in the field of asbestos abatement and fully understand the needs in Ukraine and the limits for applying international best practices considering the current situation there.

With our initiative, we would furthermore like to support national authorities to further develop specific norms and regulations that gives national and international stakeholders clear rules of working.

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## 1. INTRODUCTION

Asbestos containing materials (ACM for the purposes of this document) are materials that contain asbestos fibres (including all types of asbestos fibres such as Amphibole and Chrysotile). Due to the cancerogenic characteristics of asbestos fibres, ACM are considered as hazardous waste as soon as they are removed or destroyed. Therefore, the handling of ACM is regulated by international standards and laws.

Due to its fire-protective and insulating characteristics, ACM has been used for fire protection and heat insulation, as well as sound insulation across the building construction sector and industry.

In the absence of alternative products providing similar characteristics to asbestos, the use of ACMs was widespread in Central Europe from the early sixties up until the late eighties. The asbestos ban in the European Union as well as the legislative developments in European countries over the last 40 years has raised awareness among stakeholders on how to safely handle ACMs.

Changes in the legislative framework in Ukraine in 2022 and the ban of the import and usage of ACM requires the establishment of specific methods and processes for safely managing these materials.

As with other countries in Central and Eastern Europe, Ukraine is characterised by a large number of products containing asbestos in varying forms and with different volume percentages.

It is considered that more than 70% of the **residential and public buildings roofs** in Ukraine are covered with chrysotile corrugated asbestos-cement plates, composed of 10-15% chrysotile asbestos. Moreover, this material has also been widely used in the industrial and infrastructure sector such as poultry houses, cowsheds and airducts.

ACM is also widely used in the **district heating sector and in power plants** for the thermal insulation of pipes, boilers, and chimneys as well as for fire protection zoning.

In the **water and wastewater sector** (utility companies and the private sector), ACM was used up until the amendment to the State Construction Norms (Design and rehabilitation / amendment by the Ministry of Regional Development in 2019) on excluding asbestos-cement pipes from the list of allowed materials.

To support the new legislative framework of 2022 on asbestos management in Ukraine, this subject white paper describes four crucial steps in the asbestos management process in detail and in consideration of new Ukrainian national legislation and international best practices. The steps are as follows:

- Screening and risk assessment
- Laboratory analysis and Asbestos Management Plan
- Abatement works and Verification
- Transport and Disposal

## **2. LEGISLATIVE FRAMEWORK ON ACM ABATEMENT WORKS IN UKRAINE**

Ukrainian legislation in the field of asbestos management has been significantly improved and aligned with EU legislation over the last several years. This is mostly due to the rapid harmonization between Ukrainian and EU legislation overall.

One of the key actions taken by the Ukrainian government was the final ban of asbestos use in October 2023. The law "On Public Health System" states that *"The production and use of asbestos in technological processes and during construction and installation works at any facilities, regardless of type, as well as asbestos-containing products and materials is prohibited. Safety measures and protection against the harmful effects of asbestos and asbestos-containing products and materials are determined by state medical and sanitary rules."*

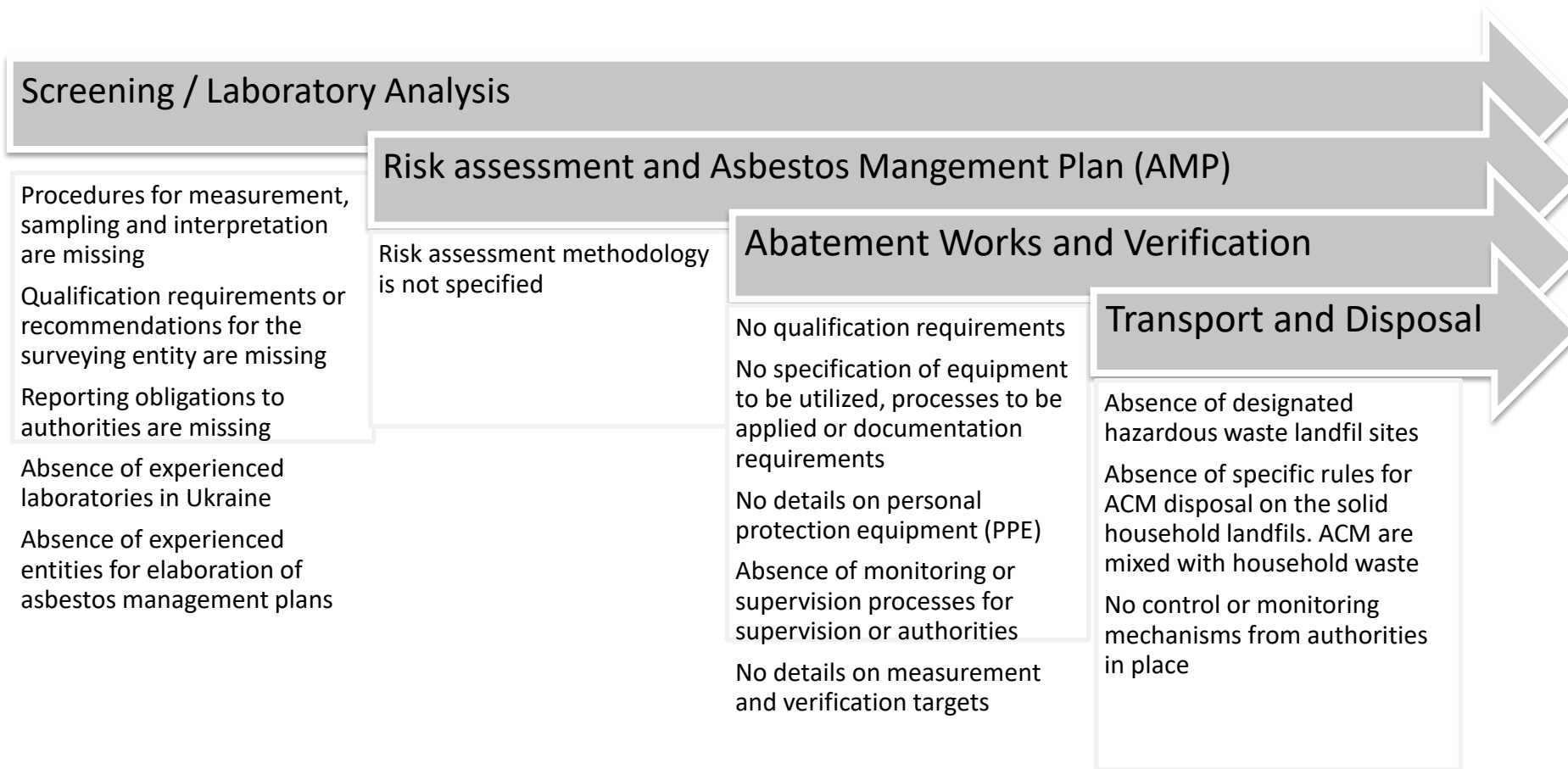
The Order of the Ministry of Health of Ukraine #1013 "On the Approval of the State Sanitary Norms and Rules "On Safety and Protection of Workers from the Harmful Effects of Asbestos and Materials and Products Containing Asbestos", supplements the asbestos ban, and establishes the guidelines for mitigating risks related to asbestos negative health effects on employees in all types of workplace activities where workers are or could be exposed to asbestos dust or dust emitted from products and materials containing asbestos.

In addition, in the field of asbestos management, Order #1073 "On the approval of the Procedure for handling waste generated in connection with the damage (destruction) of buildings and structures as a result of hostilities, acts of terrorism, sabotage or carrying out work to eliminate their consequences and amendments to some resolutions of the Cabinet of Ministers of Ukraine" defines the rules that must be followed in case construction waste is mixed with any asbestos-containing materials (ACM) clearly states that Construction and Demolition Waste contaminated with asbestos. Specifically, it cannot be further recycled or re-used and must be disposed of. In parallel, the Order continues to make some exceptions for insulation with asbestos-containing materials.

The gap analysis between the existing Ukrainian ACM abatement legal framework and best industry practice is presented in Annex 1: GAP Analysis of Ukrainian Legislation in the ACM Abatement Field. Potential risks and suggested enhancement measures are also identified in this same Annex.

Given that the existing Ukrainian legislative norms and laws only represent the framework to be respected by all stakeholders in the Ukrainian market, the identified gaps and the range for interpretation runs a significant implementation risk.

The following figure summarises the risks throughout the entire handling process of ACM. This white paper intends to specifically address the identified gaps and to mitigate associated risks.



### **3. HOW TO MAKE THE LAW APPLICABLE AND AVOID MIS-INTERPRETATION**

The current legislative framework relies on the availability of experienced stakeholders in the sound handling of asbestos containing materials (ACM). In fact, the current building and reconstruction sector is not characterized by an elevated level of know-how in the field of ACM abatement.

Awareness among all stakeholders including authorities, surveyors, designers, construction companies, supervisors, transport companies and landfill operators is very limited. The awareness is comparable with that of Central European countries such as Austria and Germany in the mid to late 1980's.

This limited awareness and experience among stakeholders carries the risk that the new legislative framework could be mis-interpreted and in fact not implemented, thus leading to the establishment of non-compliant rules in the market.

The ongoing hostilities and level of destruction in Ukraine coupled with the immense requirement for reconstruction provides the opportunity to *build back better* and to establish mechanisms to enforce laws that are created for this purpose from the very beginning.

Based on the experience of development in other countries, we would like to recommend mechanisms that would support the sound application of new laws.

#### **Suggested Mechanisms:**

- Improve the quality of technical specifications in tender documents by describing asbestos abatement works in more detail (Please refer to the specific note later in this chapter)
- Requirement for training of site supervisors, construction managers and construction/abatement workers. Suggestion: Establishment of a 40- hour (minimum) training course on asbestos abatement
- Establishment of hand over certificates for hazardous waste. The process for handing over hazardous waste from the owner to the construction/abatement company, to the transportation company and finally to the landfill operator should be documented
- Increase the value of a licensed abatement company (a Register exists already with the Ministry of the Environment)

#### **Suggestions:**

- Licensed companies need to have a minimum set of equipment
- The license should contain a detailed description of how asbestos abatement works have to be performed and which equipment must be used
- The management of a licensed company has performed a 40-hour minimum training course on asbestos abatement
- The construction manager or supervisor on the abatement site has performed a 40-hour minimum training course on asbestos abatement
- Requirement for the independent supervision of works:  
Suggestion: With regard to asbestos abatement works of more than seven working days, an independent supervisor should certify the sound implementation of asbestos abatement works and prepare specific documentation of a description of the work, type and volume of asbestos, name and address of transportation company and landfill site, waste hand over certificates, photo documentation at measurement and verification protocols at a minimum.
- Define the requirement that municipal authorities be informed about the intention to perform asbestos abatement works by delivering minimum information about the location, the type and location of asbestos to be removed, the estimated amounts of asbestos, the asbestos management plan and the supervision entity involved.
- Define the requirement for informing municipal authorities about performance

- Establishment of grievance mechanisms on national and municipal levels with the departments responsible for implementing sanitary and environmental norms and regulations.

The mechanisms/processes described are easy to establish and would reduce the risks associated with the improper handling of asbestos abatement works.

***Special note on the improvement of tender documents to raise awareness among stakeholders involved in asbestos abatement projects:***

ACM abatement measures should be clearly defined within tender documentation and reflected in the contract for works execution to oblige a construction company to implement ACM abatement works in line with Best International Practices (BIP) and national legislation.

Some of the key issues to be reflected in the documents are as follows:

- **Requirements of the contractor: Scope of work**

Within the E&S chapter or separately, general requirements about hazardous materials/ACM abatement works should be provided.

It must be clearly stated that any use of ACMs is prohibited, and the reduction of any presence of ACMs, identified or discovered in the further project phases, must be treated in line with national and BIP standards (whichever is more stringent in the tender process).

This chapter should also provide requirements of the client/object owner in terms of documentation and management plans, supervision and monitoring activity, reporting and so on to be managed and delivered by the contractor.

Here, it is recommended to specify that the contractor must develop an Asbestos Management Plan (AMP) as part of the general Waste Management Plan or even an Environmental And Social Management Plan (depending on the project scope of work) and to define the minimum required content it must contain.

- **Price schedules**

It is recommended in the price schedule to state “Asbestos abatement works” as a separate unit/service and to divide the main work components into several different lines. The more specific requirements provided, the more accurate the cost estimations in a proposal will be.

Example wording: *The demounting and disposal of asbestos-cement roof sheets (m<sup>2</sup>), cleaning of contaminated surfaces with asbestos dust (m<sup>2</sup>), and the removal of crashed ACM from the attic floor (10-15 cm deep, or x tons/m<sup>3</sup>).*

- **Implementation timeline**

The requirement to state the timeline for the ACM abatement works within the overall project implementation schedule would help the contractor to understand and plan construction works precisely with the consideration that unless ACM abatement works are performed, no other construction works can be started within the contaminated space/area.

- **Qualification requirements**

It would be advisable to add qualification requirements to the tender documentation, requesting contractors to present evidence on performed abatement projects with similar scope of works and to request proof of training/certificates of staff for working with ACM.

However, the request for a contractor's qualification might lead to low interest from the participant's side and put the whole project at risk of re-tender, as currently, only a few companies may provide evidence of similar works in Ukraine. That said, the state does not require certification, and the presence of the license for abatement works is not clearly defined.

- **Pre-tender meetings**

In addition, it is recommended to arrange a pre-tender meeting for all interested bidders and to explain the ACM abatement scope of work and the requirements expected to be covered in their offers.

#### **4. SCREENING AND LABORATORY ANALYSIS**

##### **4.1. SCREENING PROCESS FOR ACM IN BUILDINGS, INFRASTRUCTURE AND FACILITIES**

The screening should be performed by entities with experience in visually identifying asbestos containing materials (ACM), sampling and interpretation of laboratory results.

The screening of buildings, infrastructure and facilities should commence with preliminary preparation, encompassing the identification of the building type and purpose (such as residential, social, or industrial), current status (whether it is in use, user categories and/or average length of stay), the year of construction and any technical information available (such as projects, drawings, and other documentation).

In some cases, conducting interviews or surveys with building users or maintenance personnel could provide insights into past renovations and the materials used.

During the survey, a visual inspection of premises and structural elements would be crucial, covering areas like attics, basements, cellars, technical spaces, doors, windows, engineering communication infrastructure (including water, wastewater, and heating systems), insulating materials, ventilation ducts, underfloor coverings, false ceilings and so forth.

Annex 2: Templates for Risks assessment and Screening Checklists includes examples of a (non-exhaustive) checklist of premises and equipment subject to mandatory inspection, as they are likely to contain asbestos-containing materials. Using a checklist ensures a structured examination to avoid overlooking essential locations.

Accurate plans or drawings of the building(s) are useful for the survey. The location and quantity (including area and weight) should be specified and recorded for suspected ACM. Materials suspected of containing asbestos must be sampled in compliance with safety regulations. The sampling place must be labelled, and the samples must be sent for laboratory testing.

Samples from each type of suspected ACM should be collected and analysed. If asbestos is found in a sampled material, one can reliably presume that other similar materials used in the same way in the building may contain asbestos. Less homogeneous materials (for example, different surfaces, coatings, or evidence of repair) will require additional samples.

The screening process should include a hazard assessment of ACM, considering their type and ability to release fibres and the danger they pose to users of the building. This assessment is conducted after obtaining laboratory results because information about asbestos type and conditions is required. This would clarify the necessity and sequence of further action, determine action priorities, and assess whether there is a direct risk to building users between the survey and reconstruction phases.

Parameters determining the number of fibres released from ACM during disturbance include product type, the extent of damage or deterioration, surface treatment, and asbestos type. Other parameters to consider are the building's purpose, the number of users, and the location of ACM.

##### **4.2. SCREENING PROCESS FOR CONTAMINATED DEMOLITION WASTE**

There are two different types of contaminated demolition waste, which can be found either inside or outside in a dump.

In an exterior dump area, all waste should be considered as contaminated and as such, it is nearly impossible to treat as there is no visual historical data available. In essence, contaminated demolition waste in a dump area without inventory should all be considered as ACM.

However, if we consider a site such as a school or house, we can obtain its historical data and see from the external site and by comparing the date of construction of the building and old visuals, we can see and estimate the likelihood, especially of the roofing, insulation material pump houses, if there is the chance of ACM being present.

This leads us to the possibility of quantifying in m<sup>3</sup> or in tonnage, the quantity of asbestos to be removed from the site before the rest of the sorting process of contaminated demolition waste proceeds as follows:

**Step 1:** Carry-out an inventory of ACM and use best efforts to remove it. For example, if a roof is made of *Schiffer* plates, which is a typical material containing asbestos, and we see the date and previous photographs, it could be concluded that this roofing will in all probability contain asbestos. In this instance, we would not recommend sending samples to the laboratory for tests but consider it as de facto ACM. Even in bombed buildings, the maximum amount of material should be removed either manually or mechanically to compare actual volumes with the calculated amount to see to what extent (again in m<sup>3</sup> or in tonnage), ACM has been collected. It is our understanding that the majority of this material will be roofing (insulation and pump house are slightly more complicated).

**Step 2:** The remaining material is processed as if not containing ACM. When it is subsequently crushed and screened, this material can be used for road construction or concrete as it is in a binded state. In the case of concrete, we would recommend its usage in basements as opposed to floors and walls.

#### 4.3. TYPICAL ACM PRODUCTS USED IN UKRAINE

The primary use of asbestos is found in the production of composite materials. The main component of this group is a type of cement (i.e. asbestos cement). Other products of value include friction materials, such as insulating cardboard and paper, reinforced plastics, polyvinyl tiles, and sheets. Asbestos-manufactured textiles may be further processed into friction materials or used as insulating fabrics, protective clothing, flame retardants, and insulation materials.

The use of asbestos is based on the application of its properties:

- Fibrous structure and weak aggregate connectivity of fibres
- The ability to withstand (without a change in properties) very high temperatures (heat resistance)
- High mechanical strength and fibre elasticity
- Long length fibres
- Weather resistance

**Asbestos-textile industry.** Asbestos textile materials include fire-retardant fabrics and suits, brake straps, seals and gaskets, electrical insulation tapes and cords, and woven clutch discs. The bulk of asbestos textile products is made from high-grade chrysotile asbestos.

**Asbestos-cement industry.** This industry mainly applies the mechanical properties of asbestos fibres and exclusively chrysotile asbestos. Asbestos-cement is typically used to manufacture roofing and wall tiles, sheets, plates, and shaped details, facing and finishing sheets and plates, ventilation ducts, garbage pipes, water supply pipes, sewage and gas pipelines, electrical insulation boards and other details.

**Asbestos cardboard and asbestos-paper industry.** This sector produces asbestos cardboard, paper, clutch discs, acid-resistant filters, and gaskets using chrysotile asbestos.

**Asbestos-rubber industry.** This segment produces asbestos-rubber sheet sealing gaskets by applying chrysotile asbestos to solid and semi-rigid structures.

**Asbestos thermal insulation materials and products.** This type of material is divided into two groups: Pure asbestos and asbestos mixture with other materials, such as cement or gypsum. Pure asbestos materials are corrugated asbestos down the cord, cardboard, and segments. Composite asbestos materials include asbestos-cement magnesium and asbestos-cement dolomite materials (5, 6, and 7<sup>th</sup> grades of asbestos used) and semi-brittle chrysotile-asbestos soft texture.

**Pure asbestos materials** are asbestos cord, corrugated asbestos cardboard and segments. Composite asbestos materials include asbestos-cement magnesium, asbestos-cement dolomite, and semi-brittle chrysotile asbestos soft texture.

**Asbestos-cement bitumen materials** include roofing, road surfaces, and asphalt tiles. The introduction of weakly bounded asbestos into the bitumen increases its softening temperature and its viscosity and reduces brittleness at low temperatures.

**Asbestos-cement Bakelite products and materials.** Plastic products made of asbestos and Bakelite are produced as two options: Acid-resistant and heat-resistant (Acid-resistant gaskets, material for acid-resistant equipment, and pressed brake pads).

Asbestos is used in industry and construction as:

- Roofing materials: Corrugated plates;
- Facade plates: Foam concrete chrysotile cement;
- Materials for insulation and protective layers;
- Brake straps, filters, and other technical details;
- Gaskets and asphalt-concrete composites;
- Bricks.

Examples of the most widely used ACM products in Ukraine are presented in Annex 3: Catalogue of the most widely used ACM Products in Ukraine.

#### **4.4. LABORATORY ANALYSIS**

It is tricky, questionable, and often impossible to confirm the presence of asbestos fibres in material or even in dust and air through a visual investigation only. Therefore, the only possible option is to perform a laboratory analysis of a sample of the suspicious material.

The analysis of samples must be performed in line with existing Best international Practice (BIP) and methodologies, which are explained in the following sub-chapters.

##### **4.4.1. Overview of Existing Detection Methods**

Asbestos detection is a crucial aspect of environmental health and safety, predominantly conducted through Light Microscopy (LM) and Electron Microscopy (EM).

Phase-Contrast Light Microscopy (PCM) and Scanning Electron Microscopy (SEM) are the most widely applied due to their distinct capabilities and operational nuances.

PCM, a subtype of LM, is extensively used for measuring asbestos levels in air. It operates on the principle of optical analysis, identifying the fibrous form and optical properties of asbestos.

However, this method has limitations in its detection capabilities. It primarily focuses on all fibres wider than 0.25 µm in diameter and longer than 5 µm. PCM's strength lies in its ability to provide a quick, cheap, and relatively simple analysis, making it suitable for routine air quality assessments. Its effectiveness is recognised by the World Health Organization, which recommends PCM for workplace monitoring.

Despite its utility, PCM cannot precisely identify individual asbestos fibres, posing a limitation in environments with a significant non-asbestos fraction.

In contrast, SEM, a form of EM, offers a more detailed analysis. It uses electrons instead of light to create high-resolution images of fibres. SEM's capability to conduct elemental analysis through energy-dispersive X-ray spectroscopy enhances its utility in identifying specifically asbestos fibres. It can detect much smaller fibres than LM and is particularly effective in imaging fibres over 0.2 µm in diameter.

This precision makes SEM an invaluable tool in scenarios where detailed compositional analysis and high-resolution imaging are essential, such as with complex environmental samples or for research purposes.



The choice between these methods often depends on the specific requirements of the analysis, balancing factors such as detail, complexity, and resource availability.

#### **4.4.2. Laboratory Capacities in Ukraine**

In Ukraine, approximately 10-15 institutions with SEM and/or phase contrast microscopes do not appear to understand the topic and methodology to be applied for asbestos fibre identification in depth.

However, despite numerous locations where the scanning electronic microscope is used, no additional equipment is available nor needed for the sample preparation to comply with all the stages in ISO methodology. Moreover, most institutions have little to no experience running such tests and are unfamiliar with the standards described in the method.

One of the most relevant laboratories available in Ukraine that might be used for the laboratory analysis of samples on asbestos presence is the Y.I. Kundiev Institute of Occupational Medicine (Kyiv), which has a phase contrast microscope available.

The Kundiev Institute has solid knowledge of asbestos topics and related health issues in Ukraine among all state-owned institutions, and its experts are very familiar with local and international standards. However, the experts from this institute do not have experience in the laboratory assessment of asbestos material, nor dust and air samples using an electron scanning microscope.

Currently, no laboratory has a full range of required ISO equipment necessary for the professional analysis of air, dust, and material samples.

#### **4.4.3. Certification of Laboratories**

The need for the laboratory to be certified was also investigated, and it was concluded that currently, under Ukrainian legislation (in particular, under the Law of Ukraine on Metrology), laboratory certification and accreditation are not obligatory.

It is worth mentioning that on the contrary, the Kundiev Institute does have a certificate issued by “UkrMetrTestStandard” on the 10<sup>th</sup> December 2020, and assures the quality of the measuring capacities of asbestos air samples. This latter point combined with the fact that the institute possesses an optic microscope make it a viable option for conducting a phase-contrast analysis of samples.

**In the EU, there are no requirements for specific laboratory certification criteria. Thus, the statutes in the WHO Guideline (1997) are applicable.**

#### **4.4.4. Conclusion**

With its advanced imaging and analytical capabilities, SEM is the most comprehensive technique for determining the asbestos content of a product known to contain asbestos. It provides a more comprehensive understanding of asbestos samples, especially when detailed information on fibre size, texture, and composition is required.

However, most EM and SEM require specialised training. Additional further disadvantages include the cost of equipment, time requirements, equipment maintenance and the specialist training required.

In the absence of laboratories in Ukraine that are either currently offering and/or are experienced in SEM for asbestos analytics, the following is recommended:

- Use light microscopy (LM) in line with international standards specifically for the screening process and in combination with a risk assessment methodology as described in later sections.
- Use SEM for the verification of the successful implementation of asbestos abatement works considering the higher costs for laboratory analysis outside of Ukraine and longer time periods for measurement.
- Identify suitably equipped laboratories in Ukraine and provide specific training on asbestos analytics through SEM.

## 5. **RISK ASSESSMENT AND ASBESTOS MANAGEMENT PLAN (AMP)**

### 5.1. **RISK ASSESSMENT FOR BUILDINGS, INFRASTRUCTURE AND FACILITIES WITH ACM**

Based on the results of the screening process, a risk assessment is performed. This risk assessment is relevant to understand if the ACM has an impact on the users of the facilities through a potential fibre release into the air.

This risk assessment considers the status quo in the facility and provides an indication if immediate action for removal of the ACM product is required or if a regular inspection of the ACM is necessary.

This risk assessment does not provide advice on the asbestos abatement method to be applied.

We recommend a risk assessment methodology that evaluates risk criteria considering the location and characteristics of the asbestos containing material, the level of destruction and the use/users of the premises where the ACM is located.

An overview of the criteria applied is presented below. The full assessment matrix is provided in **Annex 2: Templates for Risks assessment and Screening Checklists**

I		Type of asbestos use		5-20
II		Asbestos type		0-2
III		Surface condition of the asbestos-containing material - Structure		0-10
IV		Surface condition of the asbestos-containing material - Damage		0-6
V		Impairment of the asbestos-containing material from the outside		0-10
VI		Room affected by the asbestos-containing material – Use of room		8-25
VII		Room affected by the asbestos-containing material - Location of the material		0-25
		The sum of the valuation figures		
		Measures		
	31	High: Immediate measures	0	80 or above
	32	Medium: Monitoring interval two years	0	70 to 79
	33	Low: Monitoring interval five years	0	Under 70

The risk assessment indicates three risks levels: High, medium, and low. The levels describe the urgency of setting measures. The monitoring intervals are required as ACM can change their characteristics as can the use of the facilities.

### 5.2. **RISK ASSESSMENT FOR CONTAMINATED DEMOLITION WASTE**

(Please refer to Section 4.2 for additional information on this topic)

In brief, dumped contaminated demolition waste without historical data should be considered as contaminated and therefore dangerous to recycle. This waste should be transported to a dedicated area for ACM which is developed in another section.

However, for an existing building which needs to be demolished, please refer to section 4.2 for the proposed process which centres on quantifying the amount of asbestos present in order to proceed.

An additional element to be considered is that once this material is processed (crushed and screened), samples should be taken depending on volume, which will define the sample rate. For example, if the annual capacity is 500, 000 tons per year, a daily sample should be taken. However, if the capacity is 50, 000 tons per year, then two to three sample in total should sufficient. The objective of this dry-material

analysis to aim for lower than 0.1 g of asbestos fibre per ton of material. If this figure is lower, the material should be deemed as uncontaminated, if higher, the material should be considered as contaminated. Contaminated material can still be used to make concrete but for underground use only. If the material is uncontaminated, it can be used as explained in Section 4.2.

### **5.3. RISK ASSESSMENT FOR THE REMOVAL OF ASBESTOS CONTAINING MATERIAL (ACM) AND RELATED ASBESTOS ABATEMENT METHOD**

During the reconstruction and rehabilitation of buildings, infrastructures, and facilities, the removal of asbestos containing materials might be required. During the screening process, products containing asbestos should have been identified and should now be categorized to identify the asbestos abatement method to be applied.

According to their capability to release inhalable carcinogenic asbestos fibres, two different kinds of asbestos products can be defined:

- Strongly Bound Asbestos product / Non-friable Asbestos
- Weakly Bound Asbestos product / Friable Asbestos

During our work in Ukraine, we have identified both product types and a large number of asbestos containing products. Therefore, the quality of the screening process as described in Section 4 is of utmost importance.

#### **Strongly Bound Asbestos Product / Non-friable Asbestos**

Asbestos cement products and other complex asbestos products (with a density of at least 1.5 kg / dm<sup>3</sup>) have a comparatively high proportion of mineral binders (such as cement) and a considerably low raw asbestos content of 10-15%. The asbestos fibres are relatively tightly bound in the other binding material.

Typical non-friable complex asbestos products are roof and wall coverings, ventilation ducts, pipes, windowsills and countertops, and fittings such as flowerpots, floor coverings, brake pads, and chemical containers.

These products release fibres only through mechanical processing, such as sawing, grinding, drilling, or cutting and using pressure washers.

Fibre cement is one of the world's most applied hard asbestos products, strongly bound and non-friable, used mainly in roofing and facade products (Brand names include "Eternit" / "Shyfer" / "Salonit" / "Sokalit" / "Fulgurit" / "Torfit" / "Baufanit"). Uses include:

- Flat sheets as base and/or architectural facing
- Flat sheets for windshields, wall copings, fencing and soffits
- Corrugated façade panels (waviness)
- Slates as architectural full and partial facing
- Sewage pipes
- Ventilation channels
- Under roofing
- Planks
- Roof slates
- Corrugated roof sheets
- Flower boxes on windows sills or outside

Fibre cement in internal claddings and fire-retarding sealing:

- Fire protection walls/cable ducts / prefabricated air ducts
- Partition walls
- Windowsills

- Ceilings
- Electrical meter boxes

Appliances containing other strongly bound (non-friable) asbestos materials include:

- Fire flaps in heating and ventilation systems and channels
- Gaskets / Gasket rings in heating pipes
- Cardboard on covered radiators or night storage heaters
- Spun asbestos fibres within insulation mattresses or plaids
- PVC flooring with an asbestos-containing layer (near the glue)

The applicable type of asbestos abatement method:

Due to the lower risk of releasing fibres during the ACM removal process, international standards (such as TRGS 519) describe methods that require a significantly lower number of environmental and human protection measures. Personal protection equipment such as respiratory masks, protective clothing, and clothes are required in all cases.

- If the strongly bound asbestos products are demountable, meaning if a non-destructive removal of the ACM is possible, then an abatement method that requires a lower number of protective measures can be applied.
- If products are not removable in a non-destructive manner, enhanced protection measures during the asbestos abatement works should be applied.

To define the correct asbestos abatement method, it is necessary to involve experts that have experience of handling ACM. As a first indication, suitable methods are referenced in section 6.

#### **Weakly Bound Asbestos Product/ Friable Asbestos**

Weakly bound asbestos is also called 'sprayed asbestos' or refers to products with soft, friable asbestos fibres or asbestos dust with more than 25% asbestos content. Due to the relatively low binder content, asbestos fibres are not sufficiently tied and can quickly release fibre dust into the surroundings.

Weakly bound asbestos products have been used worldwide as fire protection for buildings with steel frame constructions and for separating fire zones within a building.

In the building and industry sector, weakly bound asbestos products were also used as insulating material in several fields:

- Crushed asbestos products that already have released fibres / large amount of asbestos caused by mechanical treatment of strongly bound asbestos products
- Hard coating of thermal insulation (lagging) of heating pipes and similar (vessel houses, cellars)
- Fire and noise protection (jacket/coat/seals for components made of steel, reinforced concrete, and wood, especially in attics, suspended ceilings, installation cores and technology shafts, fire dampers, and fire-retardant doors, oil tank fire protection and so on)
- Heat protection (on heating pipes, boilers, night storage heating devices, and protective clothing)
- Moisture protection (coatings of ceilings in indoor swimming pools, showers or changing rooms, storage masses of heat recovery systems and sealing cords)
- Sprayed asbestos as fire insulation on steel beams or steel surfaces, wall penetration of ducts or cabling and fire protection of ventilation ducts

Type of asbestos abatement method applicable

Due to the high risk of releasing fibres during the ACM removal process, international standards (such as TRGS 519) describe methods that require a significant lower number of environmental and human protection measures. Personal protection equipment such as respiratory masks, protective clothing, and clothes are required in all cases.

These products are only removable by applying advanced protection measures for the environment. Reference is made to section 6 which describes the methods for asbestos abatement.

#### 5.4. ASBESTOS MANAGEMENT PLAN (AMP)

Once the presence of ACM in the existing infrastructure has been presumed or confirmed and their removal or any other kind of mechanical disturbance is shown to be unavoidable, the following requirements should apply and should also be reflected in an ESMP - Environmental and Social Management Plan (if applicable) or going further, in the Construction Management Plan:

- Apply international and national laws and regulations for monitoring workers' exposure to asbestos during construction works and waste disposal where ACM are present.
- Apply international and national laws and regulations for monitoring third-party exposure to asbestos during construction works and waste disposal where ACM are present, such as tenants, children/pupils/students/athletes/patients in public buildings, next-door neighbours and so forth.
- Development of an Asbestos Management Plan (AMP) with the design documentation / tender documents or, if prepared by the construction company, at the latest before the start of the abatement works. The AMP should demonstrate a stepwise performance of works involving the removal, repair and disposal of ACM and show measures to minimise workers and community asbestos exposure.
- Plan special training for construction companies and supervisors on how to manage ACM.
- Require that the construction firms/and or individuals employed during the construction work have received training in relevant health and safety issues.
- Require that contaminated disposable clothing be used in contaminated environments only and pulled off and packed in impermeable waste bags before entering clean rooms/cars.
- Require that shoes be properly cleaned to prevent the dispersal of asbestos dust into clean environments.
- Require that the beneficiary or the selected contractor notifies the relevant authorities of these particular removal and disposal works, according to applicable regulations and cooperates fully with representatives of the responsible agency during all inspections and inquiries.

Regardless of the type of asbestos (strongly or weakly bound), as soon as the removal of ACM is required, an AMP should be elaborated either by the designer (and becomes part of the tender documents) or by the works contractor before starting the ACM removal work.

In the AMP, the following information should be provided at a minimum:

- Company name (responsible for asbestos abatement)
- Type and use of the building/facility
- Type of the ACM: Weakly bound / strongly bound
- Location of the ACM
- Estimated amount of ACM
- Name of the transportation company responsible for transport
- Name of the landfill site operator where the ACM will be disposed of
- A step-by-step description of the ACM removal process indicating protective measures, zoning, shower facilities, under pressure equipment to be utilized, personal protection equipment required, trainings applied and so on, in line with national standards and international best practice

- Implementation timeframe
- Description of a signalling and evacuation plan

## **6. ABATEMENT OF ASBESTOS CONTAINING MATERIAL AND VERIFICATION**

In the following subsections, we hope to provide guidelines on how to implement asbestos removal works in line with best international practice, but also provide suggestions on how to adapt to the current war situation in Ukraine in terms of:

- Limited awareness about the hazard of asbestos in general
- Limited awareness among stakeholders in the (re-)construction, demolition, and waste disposal sector about asbestos abatement procedures
- Limited availability of equipment for implementing asbestos removal works such as air lock systems, negative pressure holding devices and filters
- Limited availability of skilled labour (including designers, construction managers, supervisors, and workers)
- Limited availability of laboratory facilities for measurement and verification
- The tremendous need for fast-track reconstruction of buildings and infrastructure
- The high demand for construction materials that can derive from contaminated demolition waste

Therefore, in the following sub sections, we indicate recommendations on how to handle ACM under the current circumstances wherever possible, and which still comply with the required safety measures as stipulated in national and international regulations.

### **6.1. GENERAL RULES FOR ABATEMENT OF ASBESTOS CONTAINING MATERIALS**

#### **6.1.1. Avoiding Fibre Exposure**

The general approach for handling ACM is that constructors (including demolishers or artisans at maintenance or rehabilitation works) avoid crushing/destructing ACM (including asbestos cement sheets from roofs or walls).

That is to say that the release of asbestos fibres into the air must be avoided at all costs.

To ensure that these principles are adhered to, organisational and technical measures are to be applied, such as:

- Moistening, demounting
- Painting with a binding agent
- Vacuum cleaning with equipment with special filter class
- Removal within an encapsulation area (“black zone”) with a negative-pressure atmosphere and with access through air lock systems



The choice of a removal technique needs to be carefully considered to ensure that the most appropriate techniques are employed. The less the ACM are disturbed, the fewer harmful fibres will be released. Therefore, ACM removal with “No disturbance” is the preferred removal technique.

In reality, this is not always possible. In the following section, which includes some experience-based examples for ACM removal, works are categorized by the level of disturbance:

- No disturbance: The ACM is removed without destruction, meaning without any breakage, cutting, or chipping. For example:
  - Bagging loose and undamaged small asbestos cement sheets that is in stock
  - Removing a gasket by leaving it between the flanges and cutting the flanges at both sites before placing the complete flange in an asbestos waste bag
- Minor disturbance (also outdoor): The ACM are briefly damaged while dismantling. For example:
  - Unscrewing asbestos cement corrugated sheets before wrapping them in PE sheeting
  - Scraping: Cutting off sealant with non-powered hand tools
- Major disturbance: The ACM has to be majorly damaged and tooled to remove it. For example:
  - Removing asbestos insulation boards that were glued to another surface by breaking it and scraping it from that surface
  - Removing sprayed asbestos or any other weakly bound asbestos product from surfaces (such as beams, ceilings, air ducts and heating pipes)
  - Chopping, breaking, cutting and so on of asbestos cement sheets or any kind of asbestos cement products

In addition to the indicative level of disturbance of the ACM product caused during removal/demounting, the characteristics of the ACM/product itself provides an indication which removal technique should be applied.

We can distinguish between:

- Materials/products where fibres are strongly bound into a material matrix and
- Materials/products where fibres are weakly bound into a material matrix.

For both types of ACM, different removal techniques are applied. More information on the specific removal techniques for weakly and strongly bound ACMs is provided from Sections 6.2 to 6.9.

### **6.1.2. Personal Protective Equipment (PPE)**

It is also imperative that workers and supervisors wear disposable single-use personal protection clothing (Type 5 – against airborne particles and fibres), gloves, and FFP3 respiratory masks while assessing, removing, packing, or manipulating ACM material.



**Figure 1: Example of personal protective clothing**

The filter class for respiratory masks is described in the European Standard EN 149. A summary is presented below:

Filter Class (FFP -Filtering Face Piece)	Filter penetration limit (at 95 L/min airflow)	Inward leakage
FFP1	Filters at least 80% of airborne particles	<22%
FFP2	Filters at least 94% of airborne particles	<8%
<b>FFP3</b>	<b>Filters at least 99% of airborne particles</b>	<b>&lt;2%</b>

**Table 1: Overview of the Filter Classes for respiratory masks**

Typically, different types of respiratory masks exist on the market. Full-face respiratory masks are recommended to remove weakly bound asbestos materials. For handling strongly bound asbestos-containing materials such as asbestos cement, FFP3 “half” masks are recommended.





**Figure 2: Example of FFP3 respiratory masks**

Detailed instructions on how to properly wear a respiratory mask are presented in Annex 5: Instructions on how to wear a respiratory mask.

**6.1.3. ESHS on Site**

Besides the aforementioned Health & Safety rules for works on removal of ACMs, general Environmental ESHS requirements must be considered while planning construction works. Additional details are mentioned in Annex 5: ESHS on site.

**6.1.4. Typical equipment and material required for abatement works**

The table below includes a compilation of equipment that could be utilized in asbestos remediation, offering an overview of the current methods and tools designed to protect sites contaminated with asbestos.

Equipment / Comments	Example Suppliers for demonstrating the type of equipment Note: Some suppliers offer equipment for rent
<b>Personal Safety Equipment</b>	
Respiratory full-face mask with FFP3 filter  For removal of weakly bound asbestos products with high levels of fibre exposure within a dedicated decontamination area (“black zone”)	<ul style="list-style-type: none"> <li>• Scott ProFlow SC</li> <li>• Scott PRO2000 dust filter PF10 P3/PSL/PAPR-P3 (20 pieces per box)</li> </ul>
Respiratory half-face mask with FFP3 filter  Recommended for all other asbestos removal works with medium and low-level asbestos fibre exposure	Dräger half-face mask X-plore 3300
One-time use FFP3 Respiratory half mask.  Optional for works with medium-low level asbestos fibre exposure	3M - FFP3 NR D – Series 9332
Fibre guard coverall with footer	Available in different forms on the Ukrainian market
<b>Equipment</b>	

Equipment / Comments	Example Suppliers for demonstrating the type of equipment <b>Note: Some suppliers offer equipment for rent</b>
Negative Pressure Unit (e.g. 700 m <sup>3</sup> per hour) Including filters for asbestos removal works and exhaust air hose  For small-scale working zones (“black zones”) with an air volume of approximately 80 m <sup>3</sup>	Deconta green dec G 50 Deconta Pre- and intermediate filters (Filter quality G3 (EU3) and G4 (EU4)) <ul style="list-style-type: none"> <li>• HEPA filter according to EN 1822 class H13 or H14</li> </ul> Deconta exhaust air hose
Negative Pressure Unit (e.g. 2300 m <sup>3</sup> per hour) Including filters for asbestos removal works and exhaust air hose  For medium scale working zones (“black zones”) with an air volume of approx. 280 m <sup>3</sup>	<ul style="list-style-type: none"> <li>• Deconta green dec G 200 Deconta Pre- and intermediate filters (Filter quality G3 (EU3) and G4 (EU4))</li> <li>• HEPA filter according to EN 1822 class H13 or H14 Deconta exhaust air hose</li> </ul>
Negative Pressure Unit (e.g. 4200 m <sup>3</sup> per hour) Including filters for asbestos removal works and exhaust air hose  For medium scale working zones (“black zones”) with an air volume of approx. 550 m <sup>3</sup>	<ul style="list-style-type: none"> <li>• Deconta green dec G 300</li> <li>• Deconta Pre- and intermediate filters (Filter quality G3 (EU3) and G4 (EU4))</li> <li>• HEPA filter according to EN 1822 class H13 or H14 Deconta exhaust air hose</li> </ul>
Panel shower, three compartments 89 x 89 cm  An airlock system to enter and exit the “black zone.”  Comment: in the absence of suitable products on the Ukraine market, the airlock system can also be built from Wood structures covered with PE foil and with self-closing doors or zipper doors between each air lock chamber	<ul style="list-style-type: none"> <li>• Deconta Quick-Dush personnel airlock</li> </ul>
Foldable shower system 3 compartments, 2 pieces 85x85x200 with side doors and shower tray  An airlock system to enter and exit the “black zone.”  Comment: in the absence of suitable products on the Ukraine market, the airlock system can also be built from Wood structures covered with PE foil and with self-closing doors or zipper doors between each air lock chamber.	<ul style="list-style-type: none"> <li>• Deconta SMART-LINE personnel airlock</li> </ul>
Water management system (e.g. 45 litres)	<ul style="list-style-type: none"> <li>• Deconta Water Management System C 60 L</li> </ul>
A vacuum cleaner with a filter system for dust class H	<ul style="list-style-type: none"> <li>• Numatic HZQ190 asbestos vacuum cleaner 230V 1000 W</li> <li>• Vacuum cleaner bags HEPA-flow NVM-1CH voor Numatic HZQ250/HZQ190 per 10 pieces</li> </ul>
Spraying device for fibre binding dispersion	<ul style="list-style-type: none"> <li>• Gloria hand pump spraying device</li> </ul>
<b>Typical material for establishment of the working areas (“black zones”) and waste disposal</b>	
8 x 8 cm / 10 x 10 cm stave wood  For the construction of encapsulation zones, airlocks, etc.	Available on the Ukraine market

Equipment / Comments	Example Suppliers for demonstrating the type of equipment Note: Some suppliers offer equipment for rent
PE foil, 150 µm – 250 µm For the construction of encapsulation zones, airlocks, packing of bulky contaminated materials, etc.	Available in Ukraine
Waste bag PE labelled T100 80x120 cm (200 bags per box) Comment: All kinds of Waste bags with a PE thickness of 100 µm can used. Labelling can be performed with stickers or by marking with coloured.	Available in Ukraine
Big bags PE Big bags are used for large-scale contaminated waste or bulky ACM that can be lifted with a crane or lift forks.	Available in Ukraine
Fibre binding dispersion For binding non-visible fibres after the fine/precision cleaning of the “black zone.”	Available in Ukraine
Usable small materials: Duct tape 48 mm x 50 m / sprayable glue / Tucker machine and tucker for fixing the foil on wood / etc.	All these materials are available in Ukraine

**Table 2: Examples of remediation equipment**

**6.2. STANDARD ABATEMENT OF WEAKLY BOUND ASBESTOS MATERIAL OR ASBESTOS DUSTS**

The removal of ACM in an enclosed containment (“Encapsulated dirt zone” or “black zone”) is the typical way of remediating weakly bound ACM with a high asbestos content.

The size of the black zone is limited by the capacity of the installed air extraction system (negative pressure holding devices) that should allow for a minimum air change rate of eight times per hour and a negative pressure of minimum 20 pascal.

Through the establishment of the black zone, asbestos fibres released outside of the black zone will be avoided and risks to humans and the environment will be mitigated.

Entrance to and exit from the black zone is provided through an air lock system with a shower facility that avoids any kind of asbestos fibre release.

**Requirements:**

- Personal safety equipment must be worn inside the enclosure (Disposable coveralls, overshoes, appropriate respiratory protection FFP3);
- Outside the enclosure, and next to the air lock system, a minimum of one person/worker must be available for safety, help and control reasons;
- During works in the black zone, a minimum of two workers should always be present for safety reasons;
- Constructive works for establishing a black zone: Sealing of openings to neighbouring areas or to the exterior (Sealing of windows, shafts, ventilation channels and so on);
- Negative pressure shall be maintained using an installed air extraction equipment with a HEPPA filter;

- Minimum three chamber airlock system can provide access to the “Black zone” with cleaning/shower facilities;
- If required, a separate material lock for cleaning and removal of bulky equipment or material from the black zone.

#### **Remediation work steps:**

##### Preparation:

- Dense air tightening of the total enclosure, including the installation of required scaffolding, and the sealing of openings to neighbouring areas.
- Establishment of minimum three-chamber personnel lock(s) with staff shower.
- If required, set-up a dual chamber material lock for removing material and equipment from the black zone.
- Establishment of a negative pressure (eight times per hour air-exchange rate and negative pressure of minimum 20 pascal during the working period), including vacuum monitoring at a minimum of two points and exhaust air extraction to the exterior.
- Verification of the preparatory works by the supervisor.

##### ACM Removal:

- Manual removal of ACM material from surfaces;
- Treatment, collection and packaging of un-cleanable asbestos-contaminated by-products (including wood scrap and mineral wool), porous or solidified asbestos or other ACM;
- Raw and fine/precision cleaning of the Black zone with Vacuum cleaners, washing of surfaces with detergents, filtered and controlled air exchange;
- Use of fibre binding dispersion for binding nonvisible fibres after the fine/precision cleaning of the Black zone.

##### Comments:

- Asbestos removal should be performed from top to bottom;
- Air flow in the enclosure should be from the top to down and diagonal;
- Staff must not work under negative pressure longer than two hours without a break.

##### Verification of the success of the ACM removal works / before opening the black zone

- Visual inspection of the black zone to check the removal and cleaning process;
- Air sampling for the clearance of the black zone is recommended after the finalisation of removal works;
- Documentation of works and the results of the verification in a final asbestos abatement report.

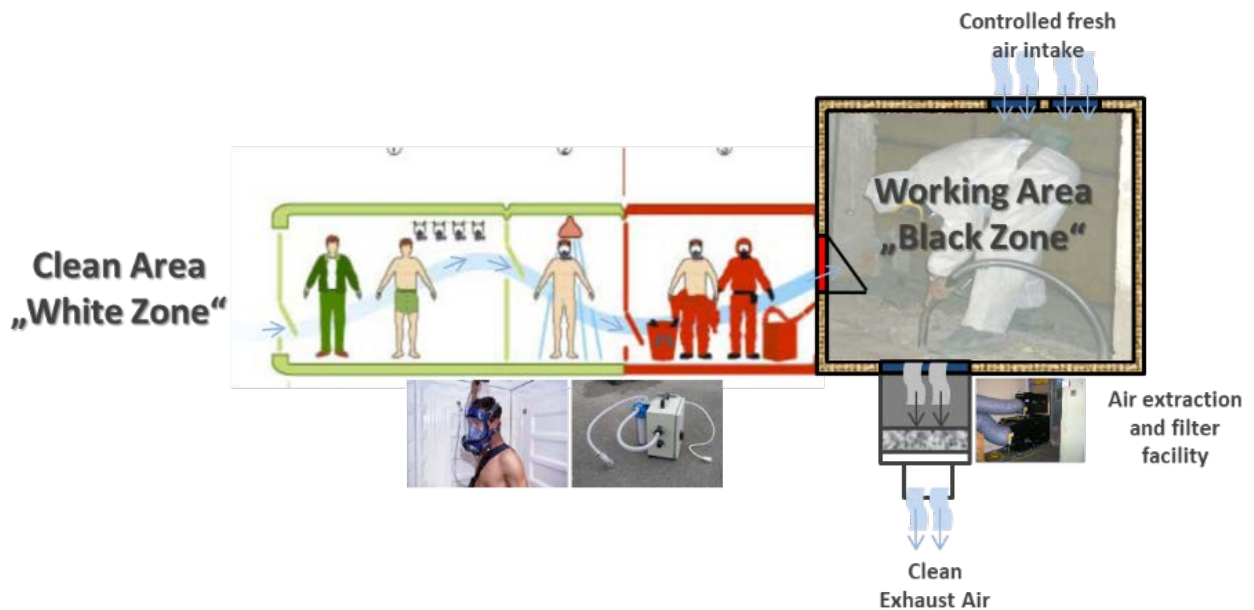


Figure 3: Example installation of a black zone and related equipment

### 6.3. ABATEMENT OF WEAKLY BOUND ASBESTOS MATERIAL OF LIMITED MASSES

#### Relieved Decontamination Area (mini enclosure)

Removing ACM using a mini enclosure allows to relieve remediation of smaller volumes with a maximum surface or weight without constructing three-chamber lock(s).

#### **Requirements:**

- Negative pressure shall be maintained using an industrial vacuum cleaner;
- Disposed volume of ACM should not exceed 10 kg or 7 m<sup>2</sup>. Otherwise, the standard method should be considered;
- Wear complete personal safety equipment inside the mini enclosure (disposable coveralls, overshoes and appropriate FFP3 respiratory protection).

#### **Remediation work steps:**

- Prepare dense scaffold with 0.2 mm foil including one-chamber lock with thick doors or two-chamber locks with overlapping plastic curtains;
- The vacuum cleaner hose leads into the removal area through a densified hole;
- Remove asbestos with tools and vacuum cleaner only;
- Use a residual fibre bonding agent;
- ACM residues and other contaminated materials should be packed in double-foiled bags and stored in temporary storage until transport and disposal at the appropriate disposal site.

#### **Comments:**

- Staff must not work longer than two hours consecutively;
- Removal of a limited amount of asbestos;
- Directed air flow (maintained by a class H vacuum cleaner by EN 60335-2-69);

### **Glove Bag Remediation in situ**

The removal of ACM using glove bags allows for a relatively cheap remediation of surfaces and pipes. This method is especially suitable for unique asbestos deposits. Glove bag remediation can be performed by a single well-trained worker in a timely manner or in parallel.

#### **Requirements:**

- Diameter of insulated pipes of a maximum of 250 mm;
- Flat surfaces of a maximum of 1 m<sup>2</sup>;
- Consider movable scaffold or aerial work platforms;
- Personal safety equipment should be worn (disposable coveralls, overshoes, appropriate FFP3 respiratory protection).

#### **Remediation work steps:**

- Prepare scaffold, glove bag and tools;
- Enclose the installation, including ACM to be uninsulated into a glove bag;
- Remove the asbestos deposit under glove bag conditions (please consider weight);
- Under pressure shall be maintained using an industrial vacuum cleaner (Class H);
- ACM residues and other contaminated materials should be packed with glove bags in double foils and stored in temporary storage until transport and disposal at the appropriate disposal site.

#### **Comments:**

- Designate remediation area with signs and barrier tape at a reasonable distance and prohibit access to non-workers;
- Clean designated areas during low occupational hours.

## **6.4. ABATEMENT METHOD FOR ASBESTOS CONTAINING FIBRE CEMENT PANELS**

The removal of ACM containing fibre-cement panels (“Shifer” “Eternit,” or similar brands) falls under the removal of so-called strong bonded/non-friable ACM because these panels consist of a lesser amount of asbestos, which is firmly embedded in a cement matrix.

However, whenever fibre-cement panels are mechanically damaged or destroyed, ACM fibre dust is set free or released to the surroundings, where its sediments can be found on all surfaces.

The best practice is to prevent or minimise dust release from a destruction-free removal process.

#### **Main remediation work steps:**

The following work sequence should be applied (in line with TRGS 519 Section 16.2):

- Secure all work against falling through and down using suitable climbing aids and scaffolding.
- Spray the weathered surface with dust-binding agents (residual fibre binders) before dismantling or permanently damping the surface. After filtration, the water must be drained into the sewage system. Uncontrolled drying on surfaces should not be permitted.
- Detachable fasteners should be removed so that the asbestos cement products are not broken. The fasteners should be collected in suitable, leak-proof containers. Sheets and panels with fasteners embedded in the back should be removed.
- Asbestos-cement products should be detached from the substructure in the opposite direction to the direction of installation and removed, in the case of roofs from the ridge to the eaves.
- When removing the fasteners, the products should be secured against slipping. Products to be released should be lifted off and not broken out. They should not be pulled over edges and adjoining products or pulled out of overlaps.

- Uncoated asbestos-cement products should be kept moist after removal until they are stored in big bags (or films approved for asbestos waste) unless treated with residual fibre binders.
- Asbestos cement products should be transported to avoid the release of asbestos fibres.
- Debris chutes should not be used.
- Reloading should only be carried out by hand or using lifting gear. The material must not be thrown away.
- Immediately after removing the asbestos-cement products, the surfaces of the sub-structure contaminated by asbestos-containing dust, such as battens, rafters, purlins, and formwork, should be carefully cleaned by vacuuming with industrial vacuum cleaners or by wiping with a damp cloth.
- During the work, ensure that building openings including windows, doors and gates in the immediate work area are closed.
- After working on roofs, the gutters must be cleaned and rinsed. The rinsing water should be filtered before being discharged into the sewage system.
- Protective suits and breathing masks should be put on and taken off outdoors.
- Verification is conducted by visual inspection.

**Further ideas include:**

- Nails/rivets should be removed with sharp tools.
- If the fixing can't be released, small sheets can be pried out one by one.
- Dismantling of asbestos cement panels could take place for roofs from the ridge to the eaves, for walls from top to bottom.
- When removing fixation materials, the product has to be secured against sliding off.
- Whenever possible, products should be lifted off rather than quarried out.
- Encrustation or plant cover can be scraped off using a wood scraper.
- Broken bits and debris can be wrapped in dustproof foil or bags.
- The transportation of asbestos cement products should happen in such a way that prevents asbestos dust from being released (packaging).
- For cleaning purposes, use Class H (H13/H14) vacuum cleaners only.
- Storage and transport of material should take place in suited, closed containers.

**Actions to be avoided:**

- Breaking, cutting, throwing, and milling of sheets.
- Drilling, sawing, and grinding with fast-running machinery.
- Cleaning with high-pressure cleaners.
- Shaking out of canvasses or undercover sheeting.
- Use of debris chutes.

## **6.5. METAL AIR DUCTS AND STEAM PIPES WITH ACM GASKET RINGS**

**Requirements:**

- Assessment of the occurrence of asbestos in gasket rings (mainly through lab analysis);
- Please refer to Section 4;

**Remediation work steps:**

- Pipe or duct flanges with ACM gasket rings should not be opened if the entire pipe is to be demolished;
- Flanges shall be moistened from all sides with, for example, a manual water sprayer;
- Flanges should be cut out as a whole (unopened) and packed dustproof into double plastic foil;

- Flanges should be transported to a scrap recycling facility for melting in steel production.

**Comments:**

- In the case of opening the flanges, both sides of the flanges and the ambient air will be contaminated.

## **6.6. TEXTILES CONTAINING ASBESTOS**

**Requirements:**

- Assessment of the occurrence of asbestos in thermal insulations and gaskets (mainly by lab analysis), such as sealing cords of hot metal appliances;
- Please refer to Section 4.

**Remediation work steps:**

- Before and regularly during all manipulation works, moistening surfaces from all sides, for example with a manual water sprayer, prevents asbestos dust generation.
- Manually cut out the ACM product, preferably as a whole. Do not use electromechanical devices that might cause dust generation and distribution.
- Pack product or parts into dustproof double plastic foil with an asbestos label.
- Dispose in packed form in temporary storage or suitable landfills.

**Comments:**

- Asbestos-containing textiles cannot be incinerated at temperatures under 1500 °C.

## **6.7. ACM HANDLING OF DEMOLITION MATERIAL AND DEBRIS – GENERAL RULES AND BEST PRACTICES**

Basically, one needs to distinguish between asbestos in open-air rubble cleaning and in a closed environment.

In this section, we will specifically address open-air exposure, where there are naturally fewer particles per cubic metre and lower exposure.

The first step is to establish an inventory of the building's pre-deconstruction images. In Ukraine, the variation in the application of asbestos is far less common than in France, Germany, or Austria.

We, therefore, typically know which type of asbestos we are facing, what it looks like and where to look for it.

Within the entire process, a step-by-step approach is applied:

### **Step 1: Pre-destruction inventory**

In many cases, various sources of images are available (including Google Street View, satellite, and personal pictures). In this picture, we can often see if the roof contains asbestos. In addition, we can check if there are boiler houses or central heating systems.

The principle is that everything that looks like asbestos is asbestos. There is no need to do lab tests at this juncture.

### **Step 2: Remove all safely accessible hazardous materials, including asbestos, before tearing down the building**

In general, we can remove the roof with a crane in advance, for example, as the buildings are not always stable.



During this stage, a perimeter of about 100 m is set up, and everyone within this perimeter should wear personal protective clothing (including crane operators and truck drivers). This is paramount so that no one in the community or neighbourhood is unnecessarily exposed to a higher risk of asbestos contamination. There are often 'tourists' who want to see the activity.

The hazardous materials should be placed into double-sealed bags, are labelled with a warning about asbestos containing material and remain on site.

**Step 3: Once the safely accessible asbestos has all been removed, the building is torn down, and we proceed to the picking stage of the fragments we could not remove beforehand**

The hazardous materials are placed into double-sealed bags and remain on site. Any small remaining asbestos particles contained in the total volume of residual debris are minimal.

**Step 4: The different sorted materials (bricks, concrete) are crushed and screened on-site or on a distant platform.**

Around the machines, a perimeter of 100 m is maintained, and PPE needs to be used. Samples are taken by batch to calculate the amount of solid-state asbestos in the materials. If the amount is more significant than 0.01 fibres of asbestos per cm<sup>3</sup>, the concrete from it can only be used for underground structures, and an inventory is made. If it is below this amount, the materials can be used for all bonded applications (mortar or concrete). In the various pilot projects carried out in Ukraine, we surpassed this norm only once.

**Step 5: Temporary storage**

The double-sealed and labelled bags are removed from the job site for temporary storage. This temporary storage is a fenced zone with only authorised access and clear pictograms. An inventory register is made per bag.

These temporary storages are managed by the Hromada and under the supervision/responsibility of the Hromada.

**Step 6: Final disposal**

Ukraine has currently no correct or appropriate final storage area for ACM.

Apart from landfilling that is widely applied in Central Europe, there are possibilities for thermal or chemical treatment applied in France which may be an option for Ukraine as an ultimate solution.

For more information on landfill side operations in Ukraine, please refer to Section 9.

## **6.8. HANDLING OF INDOOR DUST AND DEBRIS AND WITHIN REMEDIATION ZONES**

When handling asbestos dust (resulting from asbestos cement erosion), state-of-the-art working methods should be employed so that the fewest asbestos fibres possible are released (minimisation requirement).

According to international standards (TRGS 519), the following protective measures and work procedures are required when handling such asbestos products:

- The renovation area may only be entered by those with asbestos-specific personal protective equipment (including a FFP-3 mask, disposable protective suit and nitrile protective gloves) and routine construction site protective equipment.
- Removal of these asbestos products should be in compliance with the minimisation requirement and performed by registered remediation company and skilled personnel.
- The asbestos-containing materials should be hoovered with a wet vacuum cleaner where possible. Wastewater containing asbestos must be filtered before being discharged into the sewage system and must not be allowed to seep away or dry up without monitoring.

- Asbestos waste and materials contaminated with asbestos must be processed or packaged in the work area so that asbestos fibres are not released during transport from the point of origin to the landfill.
- Shredding materials containing asbestos should not be permitted.
- Clean the entire work area (including rough cleaning and damp wiping of all surfaces with relaxed water) by the specialist renovation company's specialist personnel.
- Verification and acceptance are carried out by visual inspection and dust sampling.

**Note on the removal of dust and debris containing asbestos in Ukraine:**

Historically, Ukraine has a very particular situation in terms of asbestos debris and associated dust caused by working procedures during the repair and or replacement of asbestos cement roofs.

As seen during a large number of surveys performed on public buildings (including schools, kindergartens, office buildings and hospitals), the removal of old asbestos cement roofs was performed by demolition and by keeping the debris and also the dust within the attic before installing the new roof.

To a very large extent, attic spaces are used as storage areas and are also used for technical infrastructures such as ventilation machinery and ducts, heating pipes, exhaust systems and ducts. In some cases, mineral was placed over the ACM debris for energy efficiency reasons.

To clean these attic floors from asbestos debris and dust containing asbestos, special measures should be applied in addition to the measures described above.

These measures include:

- Before starting the asbestos removal works, all openings to neighbouring and lower located rooms should be sealed to avoid contamination of non-contaminated areas.
- Access to the attic floor should be gained through a minimum two chamber air lock system.
- A cleaning area for hands, shoes and so on should be set up.
- If the building is in use, meaning that the lower floors are inhabited and/or operational, an AMP which specifically addresses mechanisms for handling collected debris and dust and the avoidance of movement of personnel and material through building areas that are in use should be implemented. The AMP shall clearly indicate temporary storage areas for contaminated material
- If the floor surface of the attic area is made of soil, meaning that no cleanable surface such as concrete exists, the upper five to ten centimetres of the soil should be removed.
- After cleaning all surfaces, a fibre binding dispersion should be applied on all surfaces. If fire protection regulations require the application of fire protective paint on wooden beams in the attic, this paint can be considered as fibre binding dispersion.
- Verification and acceptance of works is conducted by visual inspection, dust sampling and if deemed necessary and decided by the supervisor, through air measurement.

**6.9. VERIFICATION OF THE IMPLEMENTATION OF ASBESTOS ABATEMENT WORKS**

In the case of standard abatement according to Section 6.2 (Abatement of weakly bound asbestos in black zones), the following measures should be applied:

Any deviations from the measures described should be justified in the asbestos management plan (AMP).

- A skilled supervisor verifies that abatement personnel have received instructions/training on occupational health safety measures by a competent person (including written confirmation of such).
- A skilled supervisor verifies the establishment of a dust-tight barrier around the remediation zone (black zone).
- A skilled supervisor verifies that black zones are accessed using a four-chamber personnel airlock with water management (if applicable).
- A skilled supervisor verifies the existence of a material lock/storage area for transport, cleaning, packing and temporarily storing work equipment and to transport conditioned asbestos waste for professional disposal.
- A skilled supervisor verifies that an exclusive controlled access for authorised and instructed persons with the mandatory use of complete personal protective equipment (including a FFP3 mask, disposable protective suit, nitrile rubber gloves, socks, safety goggles and helmet if necessary) and a written record of the duration of stay ("Airlock logbook") is set up.
- A skilled supervisor verifies if a regulated air flow and negative pressure maintenance (including recording and visual-acoustic alarms in the event of a pressure drop) with at least eight air changes per hour, exhaust air routed to the outside, and controlled supply air routing is installed.
- A skilled supervisor performs an initial technical acceptance of the remediation zone before the start of remediation works.
- A skilled supervisor verifies the removal of the contaminated material with the aid of suitable tools and the use of appropriate, low-dust working methods as well as Class H industrial vacuum cleaners, conditioning of the waste and temporary storage in double-foiled, appropriately labelled bags until removal.
- A skilled supervisor checks if a clear separation between different waste fractions is possible. If this is the case, it should be carried out.
- A skilled supervisor verifies the transport of the treated waste to the waste skips provided and removal by authorised transporters.
- A skilled supervisor checks after the rough cleaning and subsequent fine cleaning of all surfaces within the renovation zone by trained specialists.
- A skilled supervisor performs a visual quality control and final acceptance of each renovation zone.
- A skilled supervisor performs clearance measurement of the remediation zone through eight-hour air sampling. If the asbestos fibre concentration is below 500 F/m<sup>3</sup> and 1,000 F/m<sup>3</sup> upper Poisson value, the fibre concentration threshold value was not exceeded, and the asbestos remediation was successful.
- After confirmation of the success of the measurement, the skilled supervisor provides approval to dismantle the remediation zone.

**Note on the verification process reflecting the situation in Ukraine:**

- Due to the limited awareness among construction companies and asbestos removal workers, it is crucial that independent skilled supervisors perform the verification process.
- It is recommended that the verification method is also applied for the removal of limited masses of weakly bound asbestos products and for the removal of indoor debris and dust.

## 7. TREATMENT OF ACM AND HOW IT SHOULD BE TRANSPORTED TO THE LANDFILL SITE

### 7.1. **STRONGLY BOUND ASBESTOS / NON-FRIABLE ASBESTOS:**

#### Definition:

Asbestos cement products and other complex asbestos products (with a density of at least 1.5 kg/dm<sup>3</sup>) have a comparatively high proportion of mineral binders (with an asbestos content of 10%-15%). The asbestos fibres are relatively tightly bound.

Typical non-friable complex asbestos products are roof and wall coverings, ventilation ducts, pipes, windowsills and countertops, and fittings such as flowerpots, floor coverings, brake pads, and chemical containers. These products only release fibres through mechanical processing, such as sawing, grinding, drilling, or cutting and using pressure washers.

Strongly bound asbestos must be packed twice in 200 µm PE foil or once in 400 µm PE foil and then labelled.

#### **Packaging of asbestos cement and labelling**

ACM waste should be safe, fibre-bound/coated or appropriately packed in impenetrable PE foil with a thickness of 400 µm or more or as required.

However, from a practical perspective, handling asbestos cement on the construction site, packaging with two layers of PE foil of 200 µm is more convenient and less cost intensive. Of course, in addition, labelling has to be provided.



**Figure 4: Example of prefabricated and labelled big bags or PE foil 0.2 mm**

Labelling is most appropriate if it is an integrated part of the PE bags where the asbestos material is stored. This avoids the unwanted removal of the asbestos label. If this option is not available as an integrated part of the PE bag, the label is supplied in rolls of self-adhesive 500 pieces measuring 50 x 25 mm.

### 7.2. **WEAKLY BOUND ASBESTOS / FRIABLE ASBESTOS:**

#### Definition:

This includes sprayed asbestos, asbestos products or asbestos dust containing friable asbestos (with an asbestos content of 25% - 40%).

Due to the relatively low binder content, asbestos fibres are not sufficiently tied. Sprayed asbestos has been used worldwide as fire protection and/or insulation material in buildings with steel frame construction, ventilation ducts and for establishing fire protection zones.

#### **Treatment of asbestos at the construction/demolition site**

International legislation specifies three isolation methods for asbestos:

- Destruction of the asbestos fibre: *Thermal or chemical processing of ACM to create other mineral conjunctions to destructure fibres.*
- Isolation of asbestos: *ACM is homogeneously mixed with cement (to 10 N/mm<sup>2</sup>).*
- Strengthening surface: *Coating weakly bound ACM surfaces with suitable materials to effectively prevent fibre release, packing and labelling.*

Method 1 is very cost-intensive and is, therefore, typically not used or applied.

Method 2 is the most common praxis.

Method 3 is only used for temporary treatment.

Considering the current landfill operation practices in Ukraine, it is recommended that asbestos be homogeneously mixed with cement in an enclosed area on the construction side, packed and labelled before receiving it at the landfill site.

For specific weakly bound ACM that cannot be homogeneously mixed with cement (asbestos-containing cartons, plates, or materials contaminated with asbestos dust), the material must be packed and conditioned with a fibre-binding agent (spray).



**Figure 5: Example of packaging and labelling of ACM products**

### **7.3. TRANSPORT OF ACM**

In general, the landfill disposal of hazardous materials should be documented in a weighing and official disposal document including date, mass, name, and landfill location.

The contractor should prepare and provide a coordinated transport and disposal concept as soon as the contract is signed. Based on the appointment with the authorities, this concept should include a signed confirmation of the nearest suitable approved landfill to accept ACM.

The contractor should perform or carry out all transport in full accordance with national statutory and technical rules (including a permission to transport hazardous waste from Ukrtransbezpeka).

Accordingly, the transport containers and equipment require certain danger marks depending on the shipped masses.

Vehicles and their drivers require specific licenses. Each driver should carry documentation to identify the origin and destination, mass, and waste type in their charge.

It is recommended that a signed confirmation of the subcontracted transportation company holding the required licenses is provided.

## **8. HANDLING OF ACM ON THE LANDFILL SITE – EXAMPLE OF EU NORMS**

Waste owners should liaise with the relevant authorities regarding the final disposal and treatment options, licensing requirements and applicable local regulations on this issue.

The relevant Ministry or other appropriate authority should provide a list of registered and licensed landfills with storage compartments for hazardous ACM material.

Currently, no legal treatment and/or disposal processes for ACM that are fully compliant with international standards have been established in Ukraine.

With the latest changes to the waste management legislation in Ukraine, specially designated hazardous waste landfill sites should be established. Furthermore, the latest amendments to the licensing rules on the management of hazardous materials require all market operators to obtain a new license for any treatment steps, including the disposal of hazardous waste. However, as no designated disposal sites for ACM products are foreseen in Ukraine currently, asbestos cement products (e.g. roof sheets) are generally disposed of at solid household or construction waste landfills.

**Previously allowed re-use and recycling of ACMs is currently prohibited.**

### **8.1. ORGANIZATIONAL REQUIREMENTS OF ACM DUMPING**

1. Asbestos does not contain heavy metals nor other hazardous substances which might immobilise into leachate (require suitable ways of inspection, without destruction of packaging or endangering landfill staff. The package should not be opened regularly but for random inspection only).
2. After treatment and packaging, the ACM waste should be transported specifically and explicitly to the nearest landfill for registered dumping in dedicated asbestos compartments (to be established at the landfill site).
3. Cars or trucks delivering ACM waste should directly unload the packed waste and big bags at the defined landfill compartment to prevent multiple transshipping. The mass of ACM should be weighed at the landfill entrance or any other treatment facility and duly documented.
4. During unloading from the truck, waste material should be moistened only by a landfill sprinkler or water sprayer for the safety of landfill staff (as a preventive measure against fibre dust diffusion).
5. To avoid potential airborne or waterborne<sup>1</sup> fibre dispersion, the waste material should be covered with appropriate material daily and before each compacting operation with appropriate materials. This avoids any impact through fibres on nature or human health. Airborne fibre dispersion can be avoided if the landfill compartment is covered with sufficient material.
6. The location of asbestos compartments should be marked (physically on the area as well in GIS and/or on the map with the dumping period and amounts) for reporting and protection purposes.

This method would allow Ukraine to manage asbestos waste disposal in an economically, politically viable and environmentally suitable way and prevent the wild landfilling of hazardous materials and thus hidden threats for the population's health and safety.

#### **8.1.1. International Rules for ACM Waste Disposal – Landfill Operation**

The following guidelines aim to ensure the safe and environmentally sound management of asbestos waste in landfill sites, minimising the risk of asbestos fibre release and human exposure. Adapting these

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<sup>1</sup> Dispersion through fibres in leachate water shall be prevented, as re-infiltration and recirculation procedure is common at Ukraine landfills.

practices to the Ukrainian context would require considering local environmental regulations, landfill management capabilities, and specific health and safety standards.

- Separate Compartments for Asbestos Waste: Asbestos waste, including asbestos cement waste and artificial mineral fibre waste with hazardous fibre properties, should be deposited in designated compartments within non-hazardous waste landfills. These compartments should be structurally separate if they are not exclusively authorised for asbestos waste.
- Containment and Confirmation of Asbestos Waste: Asbestos fibres bound in binders or packed in plastic should be confirmed by the packaging company to exclusively contain asbestos waste. This ensures that no other hazardous substances are present with the asbestos waste.
- Supervised Handling: The placement of asbestos waste should only be conducted under the supervision of personnel trained in handling asbestos. This is crucial for ensuring safe handling and reducing the risk of asbestos fibre release.
- Precautionary Measures Before Placement: Asbestos waste may need to be moistened before placement to prevent the release of fibres. Additionally, the area where asbestos waste is deposited should be covered daily and before any compaction activities with suitable materials to prevent the release of fibres.
- Restricting Access to Asbestos Waste Areas: Authorities and landfill operators must take appropriate measures to limit the potential use of the area to prevent human contact with asbestos waste.
- Covering and Sealing Asbestos Compartments: Waste with loosely bound asbestos fibres must be covered with fine-grained material immediately after placement. The surface covering of the landfill body or compartment section must permanently prevent the release of fibres. In addition, no activities that could lead to releasing asbestos fibres should be conducted on the landfill site.
- Documentation and Planning Post-Closure: After the disposal phase ends, a plan detailing the exact location of the asbestos disposal should be submitted to the authorities. A copy of this plan should also be provided to the local spatial planning authority.

### **8.1.2. Inspections**

To adopt a landfill site inspection process as a guideline, the following structured approach could be implemented:

#### Establishing a Regular Inspection Schedule

Inspections should be scheduled based on the type and size of the landfill. Annual inspections are recommended for landfills managing soil excavation or inert waste, while other landfill types should be inspected more frequently, for example on a quarterly basis. This schedule can be adjusted during operational interruption periods or in the post-closure care phase. A regular inspection schedule ensures consistent monitoring and the timely identification of potential issues.

#### Detailed Inspection Activities

- The supervisory body responsible for landfill oversight should focus on critical areas during inspections:
  - Verify the completeness and accuracy of the landfill's base data in the relevant environmental or waste management registry.
  - Examine or arrange for the examination of newly delivered waste. This waste should be representative and testable, per established guidelines for waste identity checks. This step is crucial to ensure that the landfill only processes appropriate waste, adhering to environmental and safety standards.

#### Reporting and Documentation

Following each inspection, the supervisory body should promptly inform the landfill owner of the results. Communication of these results should be electronic, conforming to national data management standards.

In the case where deficiencies or non-compliance issues are identified during an inspection and are not remedied within a reasonable timeframe, the supervisory body should promptly report this to the authority responsible for oversight. This could lead to closure or severe actions by the overseeing authority in case of significant violations.

The supervisory body should maintain detailed records of their supervisory activities. An annual report should be compiled and submitted to the relevant environmental authority, detailing the supervisory activities from the previous year, organised by landfill compartments.

Thorough documentation and annual reporting process are essential for maintaining transparency and accountability in landfill operations. They serve as a tool for continuous improvement and compliance with national and international environmental standards.

Adhering to these guidelines will help ensure that landfill operations are conducted safely, efficiently, and in an environmentally responsible way. Regular inspections, stringent documentation and reporting processes are crucial to achieving these objectives.

### **8.1.3. Temporary Storage / Option for the War Period -Bart – temporary alternative to final disposal of ACM**

There is currently no single correct storage solution available for asbestos. In the southern Mykolaiv region, Neo-Eco Ukraine intends to store ACM in double sealed bags immediately at the job site, which will then be brought to collective storage areas, with clearly signage, which are both locked and fenced off area and where the underlying surface is stable. This procedure would ensure that only authorised personnel are able to open and access the temporary storage area to discharge ACM. It is also proposed to establish a register of the provenance of the ACM waste at the moment of discharge. This is Neo-Eco Ukraine's current professional opinion about what is acceptable in terms of temporary storage



**ANNEX 1: GAP ANALYSIS OF UKRAINIAN LEGISLATION IN THE ACM ABATEMENT FIELD**

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
<p><b>Decree of the Cabinet of Ministers of Ukraine No. 1073 dated 27.09.2022 "On Approval of the Procedure for Waste Management Generated due to Damage (Destruction) of Buildings and Structures as a Result of Hostilities, Terrorist Acts, Sabotage or Works to Eliminate Their Consequences and Amendments to Certain Resolutions of the Cabinet of Ministers of Ukraine"</b></p>			N/A
<p>12. In the case of detection of hazardous waste at damaged (destroyed) facilities and/or during dismantling works, such waste shall be managed by Article 34 of the Law of Ukraine "On Waste" (repealed).</p>	<p>This Resolution was not amended in line with new legislation on waste management – Law "On waste management" was adopted in July 2023.</p>	<p>Revision of the Decree in line with new legislation.</p>	
<p>24. The dismantling of damaged (destroyed) facilities shall be performed by the Procedure for the dismantling of facilities damaged (destroyed) as a result of emergencies, hostilities, or terrorist acts, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 474 of April 19, 2022 (Official Gazette of Ukraine, 2022, No. 37, p. 1982), taking into account the following features: Before starting dismantling works (in the absence of a threat of emergency collapse of the facility or its structural elements), the contractor (performer) of dismantling works shall ensure the removal (separation) of components that may contain hazardous waste (hazardous constituent waste from destruction, in particular, asbestos-containing waste).</p>	<p>Risk of misinterpretation of the statement. There is no clear definition of the requirements to the contractor whether they must be licensed for the works with hazardous materials (dismantling works), as required by the Law "On Waste Management".</p>	<p>The norms should clearly indicate whether only licensed companies on work/abatement of hazardous materials are allowed to perform on-site demolition work<sup>2</sup> OR if the contractor is allowed (uncertified) to perform demolition of dangerous materials with the explicit requirement that the company (contractor) must train</p>	<p>In the case where only licensed contractors can perform the work, there should be a register/database including all eligible licensed contractors. The licensed contractors have to obtain a "collection &amp; treatment" license (Waste Management Law 2002, §24a) by: Applying to the relevant authorities Provide the authority with necessary information regarding:</p>

<sup>2</sup> On 12th December 2023 new licensing rules on abatement of hazardous waste were introduced.

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
<p>During the dismantling works, measures should be taken to minimise hazardous impacts to human health and the environment, in particular, those related to possible asbestos dust emissions;</p>	<p>There are no clear definitions or requirements for minimising the hazardous impact on health and the environment.</p>	<p>their personnel on works with hazardous materials such as asbestos and prepare in advance an Asbestos Abatement plan, which will be further explained to involved personnel.</p> <p>The norm must give an exact list of measures to reduce the negative impact of asbestos fibres. This list shall define methods, techniques, equipment and PIP used for different types of asbestos materials.</p> <p>The norm shall define requirements for obligatory supervision and monitoring measures along the asbestos abatement works.</p> <p>Supervision shall be performed by a third party, either from the state authority or a private inspectorate with relevant qualifications.</p> <p>Revision of the norm in line with new legislation.</p> <p>Monitoring shall be made obligatory with a clear definition of</p>	<p>Relevant Information about the owner and company itself (incl. criminal record)</p> <p>Information on the hazardous waste(s) that shall be treated/collected</p> <p>Relevant licenses, expertise, knowledge, and skills of workers</p> <p>Relevant Technical Equipment/infrastructure (storage)</p> <p>Confirmation of the storage area by the relevant local authority</p> <p>Nomination of a responsible person with legal responsibility</p> <p>This license is not necessary for transportation of hazardous materials (though drivers need to be educated)</p> <p>There could be a “light” version of the license, distinguishing between weakly and strongly bound asbestos (including other hazardous materials)</p> <p>Asbestos Cement (AC) could be handled under:</p> <p>Non-licensed contractor with exceptional knowledge regarding AC (special [shortened] AC courses, limitations on the amount of AC, Asbestos Abatement Plan, etc...)</p> <p>Licensed contractor, eligible to demolish all kinds of ACM + hazardous materials</p> <p>There has to be an official inquiry/statement of the contractor to the relevant (local) authority with the relevant information regarding the hazardous deconstruction process</p> <p>Depending on the asbestos fibre concentration</p> <p>Legally: Regulations on this can be found in the Personal Protective Equipment Ordinance (PSA-V).</p> <p>Technically: See TRGS 519, sections 5/7/8/9</p> <p>Qualifications of the supervisors shall include knowledge of all asbestos types, relevant</p>

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
		<p>requirements (Note: considering that monitoring activities on asbestos fibres presence in ambient working air is described in Order No. 1013, even without detailed explanations on exact thresholds, etc., the reference to it might be added to this Resolution.</p>	<p>regulations, requirements and all relevant necessary technical and protective specifications                      See (Ordinance of the Federal Minister of Labor on limit values for working substances and carcinogenic and reprotoxic working substances (Limit Values Ordinance 2021 – GKV) §24                      VDI 3492 – indoor air measurement / Ambient air measurement Measurement of inorganic fibrous particles (SEM – Method)                      VDI 3877 / 1 – Indoor pollution Measurement of fibrous dust settled on surfaces, Sampling and analysis (SEM/EDXA)                      VDI 3866 / 5 - Determination of asbestos in technical products (SEM – Method)</p>
<p>The list of components of demolition waste and possible ways of their reuse in construction, construction materials industry (production of construction products)                      6. Insulation materials and asbestos-containing building materials                      1) Insulation materials containing asbestos - aggregates for the production of fire-resistant products, aggregates for concrete, roofing products</p> <p>Note: Asbestos-containing waste should be collected using personal respiratory protection equipment and protective clothing, and the collection sites should be moistened. If possible, prevent further destruction of asbestos-containing waste. Accumulated asbestos-containing waste should be packaged to avoid contact with the environment and transported to the place of its disposal. After the asbestos-</p>	<p>This Resolution still allows the reusing of asbestos-containing products, which has been forbidden by the Law “On Public Health.”</p> <p>No precise details on abatement methods and techniques (type of PIP, packaging, labelling, transportation rules, disposal methods with separation of ACM from other waste, etc.)</p>	<p>Revision of the norm in line with new legislation, which prohibits any use of asbestos-containing materials</p>	<p>See Figure 7.                      Waste Catalogue Ordinance (Bundesabfallwirtschaftsplan, section 4.2 “Asbesthaltige Abfälle”)                      In Austria, it is forbidden to mix uncontaminated waste with contaminated waste                      Explanatory notes on the Waste Catalogue Ordinance 2020 (Erläuterungen zur Abfallverzeichnisverordnung 2020) Page 23/42</p>

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
containing waste is stored at the disposal site, it shall be covered with an insulating layer (soil, clay, crushed construction waste, etc.) with a thickness of at least 75 centimetres.			
In temporary storage facilities, only the main components of demolition waste (parts (debris, combat) of building structures, door and window block fillings, engineering networks, sanitary appliances, etc.) that do not contain and/or are not contaminated with hazardous waste may be processed (recycled).	All contaminated construction and demolition waste with hazardous materials is subject to final disposal. However, the Resolution is missing details on the procedure to identify and screen construction and demolition on the presence of hazardous materials (who is performing visual and laboratory analysis of suspicious materials, etc.), as well as methods of confirmation of ACM presence.	Revision of the norm in line with new legislation Here, it is suggested to refer to Order No. 1013, which requires performing an initial site screening to identify the presence of ACMs.	See <a href="https://www.ris.bka.gv.at/NormDokument.wxe?Abfrage=Bundesnormen&amp;Gesetzesnummer=20005653&amp;Paragraf=10">https://www.ris.bka.gv.at/NormDokument.wxe?Abfrage=Bundesnormen&amp;Gesetzesnummer=20005653&amp;Paragraf=10</a>
<b>Order No. 1013 of 05.06.2023 On Approval of the State Sanitary Norms and Rules "On Safety and Protection of Workers from the Harmful Effects of Asbestos and Materials and Products Containing Asbestos"</b>			
Asbestos-containing insulation materials and products of low density (1 g/cm <sup>3</sup> ) must be replaced and removed.		It's not clear who is responsible for this action and budget suggestions.	There is no obligation to remove (once legally constructed) asbestos-containing materials except if there is a credible danger of exposing workers.
handling of asbestos, asbestos-containing materials and products - carrying out any technological operations to prepare them for safe storage, transportation and removal;	Risk of uncertainties due to unclear statement	It suggested being in line with the terms of the leading law on waste management and using common terminology like demolition, treatment or processing, etc.	

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
<p>1. For any type of activity that poses a risk of exposure to asbestos dust or dust emitted by asbestos-containing materials and products, the business entity shall conduct a risk assessment to determine the nature of the exposure, in particular, the mineralogical type of asbestos and fibre size, and the degree of exposure of employees to asbestos dust or dust emitted by asbestos-containing materials and products.</p>	<p>Inadequate and unqualified risk assessment process</p>	<p>The norm must clearly define qualification requirements for the entity, company or individual who performs risk assessment analysis. This entity shall be certified or licensed by the state authorities and perform constant (annual, semi-annual, etc.) qualification checks and improvements. In addition, the norm shall define a minimal level of information to be presented within the analysis.</p>	<p>In Europe, risk assessment is performed by the contractor itself --&gt; see TRGS 519, section 4, chapter 4.1. "Risk assessment for activities involving asbestos" (Beurteilung der Gefährdung bei Tätigkeiten mit Asbest)</p>
<p>2. If the results of the occupational risk assessment referred to in paragraph 1 of this section determine that the maximum exposure to asbestos in the air of the work area does not exceed the value specified in paragraph 16 of this section, paragraphs 5-7 of this section of these State Sanitary Norms and Rules may not be applied if the work involves Short intermittent operational activities in which only non-friable materials are used. Removal without damage of non-degradable materials in which asbestos fibres are firmly bound into a matrix. Encapsulation or sealing of materials containing asbestos and in good condition. Air quality monitoring and sample collection to determine the presence of asbestos in a particular material.</p>			<p>For exceptions, see "Ordinance of the Federal Minister of Labour on limit values for working substances and carcinogenic and reprotoxic working substances (Limit Values Ordinance 2021 - GKV)." §22 Notification of asbestos-related works (Meldung von Asbestarbeiten) Light works: If the risk assessment states that the threshold limit value will probably not be exceeded because of the works performed (little time for asbestos removal, strongly bound asbestos, etc.) Procedures shall be established and stated in the work plan and be part of the workers' instruction. Medium works: Established procedures for removing strongly bound asbestos floor and wall tiles, night storage heaters, etc., can be implemented if the workers are trained and knowledgeable of the specific requirements of the procedure and safety precautions. It might be possible that the established procedures require special equipment so that the procedure can</p>

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
			be performed with low risk for the workers and the environment.
3. The risk assessment provided for in clause 1 of this section shall be subject to consultation with employees (their representatives) within the enterprise or institution. It shall be reviewed if there are grounds to believe it is incorrect or if the material at work changes.	The involvement of unqualified employees can increase the risk of poor ACM treatment and lead to significant E&S and health risks.	Either authorities or certified/qualified persons (with ACM abatement experience) shall be involved in revising or approving the risk assessment strategy.	See "In Europe, risk assessment is performed by the contractor itself --> See TRGS 519, section 4, chapter 4.1. "Risk assessment for activities involving asbestos" (Beurteilung der Gefährdung bei Tätigkeiten mit Asbest)" and the following chapters
5. At least ten calendar days before the start of the work specified in paragraph 1 of Section I of these State Sanitary Norms and Rules, the employer shall submit a notification to the interregional territorial body of the State Labor Service and the Center for Disease Control and Prevention of the Ministry of Health of the relevant administrative-territorial unit in the area of activity of which the work will be performed, which shall specify: location of the work area; type and amount of asbestos used or processed; activities and processes performed; the number of employees involved; date of commencement and duration of the work; and measures taken to limit asbestos exposure to employees.	N/A	The Norm states that this step should be done only for notification of authorities, not giving them the power to verify whether the measures identified during the risk assessment phase to eliminate risks associated with ACM abatement works have been fully assured and implemented.	Regarding the company's licensing, it should be verified in obtaining a license that the company is aware of different types of asbestos and has proven its capability to perform abatement works of needed complexity to the licensing authority. The proper execution of works has to be verified on-site by a knowledgeable person, regardless of whether the company uses an appropriate or inappropriate approach.
8. For all types of activities specified in paragraph 1 of Section I of these State Sanitary Norms and Regulations, exposure of employees to dust generated by asbestos or asbestos-containing materials in the workplace shall not exceed the limit value specified in paragraph 16 of this section and shall be minimised, in particular, using the following measures:	Clear and specific requirements for the equipment and reduction methods are not provided, which potentially leads to an increase of dust spread to clean premises and areas, weak abatement performance, unclear methods of ACM waste labelling and packaging, and high health and safety risks for abatement		See T-O-P principles: T: Technical measures: Minimise hazards at the source (separation) O: Organisational measures: Minimise exposure by having a minimum amount of people present P: Personal measures: Personal Protective Equipment The system mentioned above secures a holistic approach to the asbestos materials.

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
<p>the number of employees exposed or likely to be exposed to dust generated by asbestos or asbestos-containing materials should be minimised.</p> <p>work processes are organised in such a way that asbestos dust is not generated or, if this is not possible, that it does not get into the air.</p> <p>All premises and equipment used in the processing of asbestos must be regularly and effectively cleaned and maintained.</p> <p>Asbestos or asbestos-containing material that generates dust is stored and transported in properly sealed packaging.</p> <p>Waste is collected and promptly removed from the workplace in proper sealed packaging with labels indicating the asbestos content.</p>	<p>workers and not protected people.</p>		<p>It can be adapted to the specific asbestos type and asbestos deposits.</p> <p>Equipment used in asbestos remediation shall fulfil international safety standards and thus show norm correspondence, e.g. asbestos vacuums (H13), etc.</p> <p>Packaging must ensure that no dust is released during transport (double sealed packaging); labelling shall only contain the word “asbestos” and not further specify the content. The aim is that no opening of the bags is performed.</p>
<p>9. Depending on the results of the initial risk assessment and to ensure compliance with the limit value set out in paragraph 16 of this section, the employer shall ensure that asbestos fibres in the air at the workplace are measured regularly.</p> <p>11. Work area air samples are collected by personnel with the necessary qualifications after consultation with employees (their representatives) responsible for health and safety at the enterprise or institution.</p> <p>12. Subsequently, the selected air samples in the work area are analysed in laboratories</p>	<p>Risk of not performing the requirement.</p>	<p>It’s unclear who shall check the measured parameters, and the formulation of the requirements is unclear without the specification of the responsible authority. Performing checks of the measured air samples allows an employee to skip this step.</p> <p>No one shall be allowed any judgment or interpretation regarding quality verification. Qualification requirements must be stipulated.</p> <p>Laboratories must be adequately equipped and provided with a list of equipment and certified.</p>	<p>Difficulty in performing a competent and efficient risk assessment, fulfilling air fibre concentration analyses, and complying with construction schedule based on the timely results of air samples.</p> <p>Regular air sampling is complex because of construction progress and resulting dust generation, access by workers, and condition of the object / built environment.</p> <p>Solution: Shortened air sampling duration</p> <p>Air sampling is to be performed before the start of work/outside of the work zone (surrounding).</p> <p>Air samples must be performed and checked by an independent, knowledgeable person competent with measuring equipment.</p> <p>Laboratories that analyse the air sample must meet quality standards by official designation or random ring test (air samples and blank samples are sent to the laboratory for analysis).</p>

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
equipped with fibre-counting equipment in paragraphs 14 and 15 of this section.		Certification must be permanently checked and updated with constant training and education of laboratory staff, etc.	The analysis results are then sent to the laboratory and can be presented on the homepage or similar. This independent quality control is not performed by the state authority but rather by private, European-wide institutions and is regarded as best practice. The knowledgeable person will give all clear for work if the threshold is adhered to or stop the work to search for the source of origin if the threshold is not attached.
14. Fibers are counted by phase contrast microscopy, which corresponds to the method recommended by the World Health Organization (Optical microscopy with phase contrast (counting on a membrane filter), ISBN 9241544961, WHO, Geneva, 1997), or by the Methodology for measuring the counted concentration of asbestos fibres in the air of the working area and atmospheric air by optical microscopy (dated March 09, 2010, MBB No. 081/12-0673-10).	N/A	N/A	The best practice method for counting asbestos fibres is the scanning electron microscope (SEM). The SEM can identify different types of asbestos and provide much more accurate results. Acquisition costs are very high, and operation needs specific operating resources, such as: Helium (or similar) for cooling of the sample/microscope Specific equipment for preparation of the sample (coating, etc.) Preparation of the office (flat surfaces, energy supply, accessibility, service and maintenance, cooling/heating, etc.) Staff training is essential and can significantly alter the results /analysis of fibres. Staff training is also essential for phase contrast microscopy (PCM).
16. The employer shall protect employees against asbestos concentrations in the air exceeding 0.1 fibres per cm-3 as a time-weighted average over eight hours.		In case ACM presence is discovered, Personnel Protection must be ensured regularly without any thresholds of fibre presence.	Depending on the asbestos fibre concentration in the air, suitable and adequate personnel protective equipment should be used.
18. Activities in areas exceeding the threshold value provided for in paragraph 16 of this section are prohibited until specific measures are taken to protect the workers concerned or until the results of improving the situation are obtained.	Unprofessional and unqualified actions might lead to further contamination or increase health risks.	Specific professional methods and techniques must be provided	A phased approach is suggested if a threshold level is recognised. Immediate work stop is the first step, followed by securing the area/workers, investigating the origin, removing the source of origin, cleaning the



Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
			contaminated area, investigating additional sources, and continuing standard work procedures. Evaluation of measurements Check of fibres' sources of origin Encapsulation of source of origin Protection of workers Protection of surroundings
20. Before starting destructive or operational work, employers, by obtaining information from the owners of the premises, shall take all necessary measures to identify materials that may contain asbestos.	Inadequate and unqualified actions might lead to further contamination or increase health risks.	Specific professional methods and techniques must be provided	Categorisation of the premise instead of usage/history. Research on materials used for specific usage or time Research of historic plans, documents, renovations, etc. Talk with a representative on-site Site visit and visual identification of suspect materials Sampling strategy, sampling, laboratory analysis Plan view with identified materials and expansion, estimation of amount, reporting
21. In the case of certain activities, such as demolition, asbestos removal, repair and maintenance, which imply that the limit value set out in paragraph 16 of this section may be exceeded despite the use of technical precautions to limit the concentration of asbestos in the air, the employer shall determine measures to ensure the protection of workers during such activities by Provide employees with and use appropriate respiratory and other personal protective equipment; installation of warning signs indicating the possibility of exceeding the limit value outlined in clause 16 of this section;	Unprofessional and unqualified actions might lead to further contamination or increase health risks.	The norm must clearly define the minimum PPE that workers must apply and specify how the working/abatement zone must be fenced and labelled to prevent third-party entrance and the exact measures to avoid spreading asbestos dust.	It is impossible to perform on-site air sampling with immediate analysis and results. A workaround would be to set up a measurement device to analyse the dust particles in the air. The conclusion is that the more dust in the air, the more asbestos fibres are in the air, and there is a possibility of exceeding the threshold limit value. The airlock chamber door has to be closed permanently; a visual or audio alarm sets off if the locked door to the chamber is open for longer than 15 seconds. The alarm sets off if the equipment does not work correctly (vacuum is plugged, air filter is blocked, etc.)

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
preventing the spread of dust generated by asbestos or asbestos-containing materials outside the premises or workplace.			
28. Demolition or removal of asbestos shall be carried out by business entities that have obtained a license to carry out economic activities for hazardous waste management by the procedure established by law.	Order of the Ministry of Environment No. 729 dated 10/31/2023: “On the approval of the Procedure for verifying the compliance of the material and technical base of the license applicant with the technological requirements for the implementation of economic activities for the management of hazardous waste, the rules for the technical operation of installations and technological regulations” doesn’t clearly define a minimal set of equipment or expertise a contractor must have to be licensed. These “compliance checks” are currently performed by the experts of the Ministry of Environment based on the internal procedures/methodology placing the verification process under a specific question of subjectivity.	Legal requirements stipulate clear and transparent criteria that the applicant should meet to obtain the license. See the next column on BIP.	<p>Asbestos removal/demolition works may only be performed by licensed companies. Companies must apply for a license at the relevant governmental authority and comply with the established requirements. Requirements have to be defined, regarding the:</p> <ul style="list-style-type: none"> <li>• Technical equipment</li> <li>• Daily visual checks before usage,</li> <li>• Regular checks on electrical Compliance and completeness and so on</li> </ul> <p>Knowledgeable workers</p> <ul style="list-style-type: none"> <li>• Skilled in the usage of equipment and materials,</li> <li>• Attended an asbestos training course</li> <li>• Certification of successful attendance/exam</li> </ul> <p>Fulfilment of financial and legal capability of the company</p> <ul style="list-style-type: none"> <li>• No standing court proceedings,</li> <li>• No bankruptcy proceedings,</li> <li>• No financial malversion,</li> </ul> <p>The license might state which type of asbestos the company is capable of demolishing (strongly/weakly bound asbestos)</p> <p>Establishing guidelines for companies to demolish asbestos cement without being licensed might be feasible so that roof companies can demolish asbestos cement sheets without applying for a license.</p> <p>The company should fulfil all applicable requirements for protecting workers, the environment, and its surroundings while complying with the guidelines. Depositing of this type of</p>

Ukrainian norm	Risk	Suggestion for improvement	Best Industry Practice
			asbestos material has to happen at the same landfills as by licensed companies.
<p>IV. Sanitary requirements for technological processes and production equipment</p> <p>3. All types of equipment that are a potential source of asbestos-containing dust emission into the air of the working area must be sealed, connected to aspiration systems and provided with air purification devices. Operation of the equipment with disconnected aspiration systems and air purification devices is prohibited.</p>	<p>Inadequate and insufficient equipment might be used</p> <p>There is no clear definition and specification of necessary equipment.</p>	<p>This statement should be adjusted with more detailed equipment and filter class requirements.</p>	<p>Asbestos under pressure devices must be coupled with an exhaust that leads to the outside.</p> <p>Before letting any air from the work zone outside, it has to be filtered through HEPA filters.</p> <p>The filter has to have an alarm that sets off if the filter is blocked or not working.</p> <p>In this case, the under-pressure device will stop working, prohibiting the release of asbestos-contaminated air into the outside.</p>



**ANNEX 2: TEMPLATES FOR RISKS ASSESSMENT AND SCREENING CHECKLISTS**

An example forms for assessing the structural situation and the usage situation formerly provided by Austrian norms (ÖNORM M 9406 is no longer in force)

Group	Line	Reference:		
		Building..... Room..... ..... Component.....	Valuation 1)	Valuation number
<b>I</b>		<b>Type of asbestos use</b>		
	1	Sprayed asbestos	0	20
	2	Plaster containing asbestos	0	10
	3	Light asbestos-containing panels	0	10
	4	Other materials containing asbestos	0	From 5 to 20
<b>II</b>		<b>Asbestos type</b>		
	5	Amphibole asbestos	0	2
	6	Serpentine asbestos (Chrysotile)	0	0
<b>III</b>		<b>Surface condition of the asbestos-containing material - Structure</b>		
	7	Loosened fiber structure	0	10
	8	Solid fibre structure without or with insufficient dense surface coating	0	4
	9	Coated, dense surface	0	0
<b>IV</b>		<b>Surface condition of the asbestos-containing material - Damage</b>		
	10	Severe damage	0	6
	11	Slight damage	0	3
	12	No damage	0	0
<b>V</b>		<b>Impairment of the asbestos-containing material from the outside</b>		
	13	Material is directly accessible (from the floor up to reach height) exposed to damage	0	10
	14	Work is occasionally carried out on the material	0	10
	15	Material is exposed to mechanical influences	0	10
	16	Material is exposed to vibrations	0	10
	17	Material is exposed to strong alternating climatic stresses	0	10
	18	Material is in the area of strong air currents	0	10
	19	In the room with the asbestos-containing material, strong air currents are Available	0	7
	20	Abrasion may occur on the material if used improperly	0	3
	21	The material is not affected from the outside	0	0
<b>VI</b>		<b>Room affected by the asbestos-containing material - Room use</b>		
	22	Room is regularly used by children, young people, and athletes	0	25

2)

	23	Room used permanently or frequently by other persons	0	20
	24	Temporarily used room	0	15
	25	Only rarely used room	0	8
<b>VII</b>		<b>Room affected by the asbestos-containing material - Location of the material</b>		
	26	Directly in the room	0	25
	27	In the ventilation system (lining or sheathing of leaking ducts) for the room	0	25
	28	Behind a suspended, leaking ceiling or cladding	0	25
	29	Behind a suspended, airtight ceiling or cladding, behind dust-tight		
		Underpinning or coating outside sealed ventilation ducts	0	0
	<b>30</b>	<b>The sum of the valuation figures</b>		
		<b>Measures according to Section 10, ÖNORM M 9406:2001-08</b>		
	31	Immediate measures to be taken	0	Over 80
	32	Monitoring interval - two years	0	70 to 79
	33	Monitoring interval – five years	0	Under 70

- 1) Please mark with a cross where applicable. If several assessments have been ticked within a group, only the highest assessment number may be considered when calculating the total (line 30).
- 2) e.g.: Asbestos putty (5), asbestos filler (5), asbestos foam (10), asbestos cardboard (10), asbestos fabric mat (15), asbestos cord (15), unbound asbestos tamping compounds (20)

**Environmental and Social Screening Checklist (focusing on ACM)**

Environmental and Social Screening					
Block A: Environmental Screening					
#	Question	Yes / No	Comment	Yes / No	Comment
1	Does the project need any specific construction and/or operation environmental permit? E.g., water use, waste management, wastewater discharge, dust/vapour/noise emissions.				
2	Does the project activity require additional temporary land acquisition for the construction period? E.g. public roads, greens, neighbouring parcels?				
2.1.	If yes, will this result in potential adverse environmental impacts?				
2.2.	Are there any impacts on direct or secondary stakeholders?				
3	Does the client have a Waste Management Plan in place and/or contracts with waste management companies for services?				


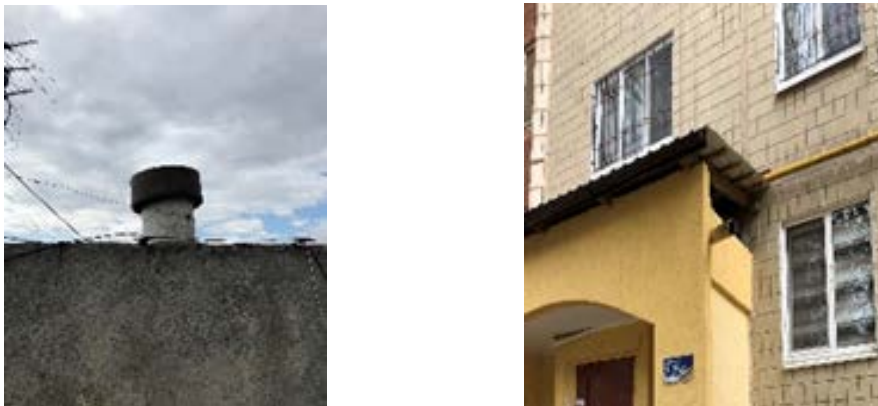
Block B: Screening of Social Aspects					
#	Question	Yes / No	Comment	Yes / No	Comment
4	Please specify affected stakeholders to directly or indirectly involved in the development process.				
4.1.	Public authorities (e.g. building administrations or student administrations)				
4.2.	Building occupants (Students, staff, kitchen operators and so on)				
4.3.	Neighbours in apartment buildings and (separately identified) in individual houses (please estimate the number)				
4.4.	Hospitals, police, etc.				
4.5.	Businesses, offices, places of worship or religious buildings				
4.6.	Individuals who access their facilities through the project site				
4.7.	Children, e.g. in playgrounds, neighbouring kindergartens and so on				
5	Do people with limited mobility and/or wheelchair users visit the facility? Please provide the number.				
6	Have any complaints or concerns already been made to the project unit or local authorities? Please describe the measures taken to resolve the issues.				
7	Will the project implementation result in people's temporary relocation, including direct and secondary stakeholders? Please describe who, why and for how long they will be relocated or displaced.				
8	Are there any sensitive groups living nearby that may suffer from the intended activity and require special consultations before implementation works (including childcare homes, maternity hospitals and nursing homes)?				




Block C: Screening of potentially hazardous materials in rooms, building parts and related facades, subject to removal/change/manipulation during project works					
#	Question	If Yes: Type	Amount [no. / m <sup>2</sup> ]	If Yes: Type	Amount [no. / m <sup>2</sup> ]
<b>5</b>	Will asbestos products (including Salomit) be manipulated?				
5.1.	Ceiling tiles or wall boards or fire-protection panels (asbestos)				
5.2.	Facade cladding (asbestos cement)				
5.3.	Windowsill boards, thermo-insulation panels near radiators				
5.4.	Window putty in wooden windows, Insulation compounds in construction joints.				
5.5.	PVC flooring / Cushion Vinyl incl.				
5.6.	Fire protection doors (core boards inside)				
5.7.	Hot pipe insulation (other than gypsum or hemp yard, felt mesh layers)				
5.8.	Prefabricated duct fittings and pipes from asbestos cement				
5.9.	Flange gasket rings in heating/ventilation systems (not green)				
5.10	Electrical (night) storage heaters				
5.11	Damper blades/flaps in fire dampers of ventilation systems				
	Is asbestos likely to be present in flooring/tiles or VTI machinery/equipment part of training				
<b>6</b>	Will hydrocarbon products (tar, mazut, parquet, lamps) be manipulated?				
6.1.	Coal tar roofing membranes				
6.2.	Tar cork panels as thermal insulation/fireproof				
6.3	Tar-insulated electrical cables.				
6.4.	Mazut (Heavy-duty oil) spills.				
6.5	PCB liquid in electrical appliances (transformers) and as capacitors in fluorescent lamps				
6.6	Tar glue underneath parquet flooring or wooden (pile) plasters				
	Does tar exist in flooring?				
<b>7</b>	Will glass wool/rock wool/mineral fibre/fibreglass be manipulated?				
7.1.	Panels of suspended ceilings containing gypsum and mineral fibres				
7.2.	Hot pipe insulation (other than gypsum or hempyard, felt mesh layers)				
7.3.	Other glassware insulations				



	<b>Photos</b>				
	Have photos been submitted?				
	Did the photos show obvious hazardous materials?				
	Did the photos show obvious health and safety issues?				
	Result (Upgrade / Keep category)				












**ANNEX 3: CATALOGUE OF THE MOST WIDELY USED ACM PRODUCTS IN UKRAINE**





Product	Area of Application	Images
Corrugated asbestos-cement plates	Roof covering Fence	 The first image shows a house with a roof covered in dark, corrugated asbestos-cement plates. A green fence is in the foreground. The second image shows a close-up of a light-colored, corrugated asbestos-cement fence panel.
Asbestos-cement waste collection and drainage pipes	Private and municipal buildings	 The first image shows a dark, cylindrical asbestos-cement pipe protruding from a roof. The second image shows a yellow building facade with a dark, rectangular asbestos-cement pipe or drainage outlet.


Product	Area of Application	Images	
Fire protection and thermal insulation for premises	Insulation for ceilings		
Attic/technical floor doors	Fire resistant doors		

Product	Area of Application	Images
Asbestos cord	Applied in heating networks of housing and communal services and used as a sealant in ventilation and heating systems	
Asbestos textiles	Insulation for heating network pipes	

Product	Area of Application	Images	
Gasket rings	Sealing material between heating network pipes		
Weakly bound asbestos insulation	Weakly bound insulation material with a mixture of gypsum or similar soft structures used for heating pipeline insulation		
Strongly bound asbestos insulation	Strongly bound insulation material with asbestos as a mixture, added to bitumen or cement and used for heating pipeline insulation		

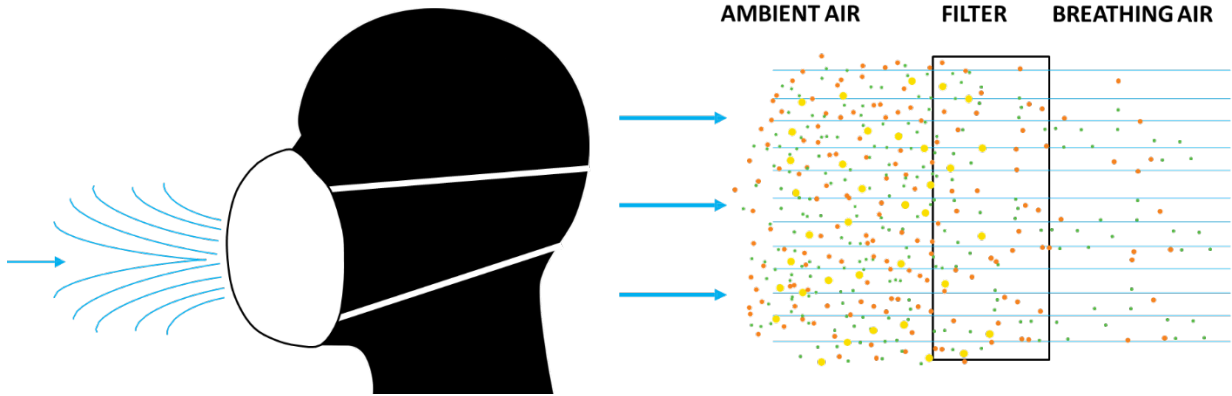
Product	Area of Application	Images	
<p>Asbestos-containing insulation panels for hot water preparation tank</p>	<p>Weakly bound pressed asbestos-containing panels used for the insulation of boilers and hot water preparation tanks</p>		
<p>Asbestos-cement pipes</p>	<p>Used for internal and external pipelines transporting bottled and atmospheric wastewater, during the construction of pressure-less tubular hydraulic structures and drainage collectors of drainage systems, in the underground laying of cables, cables of communication lines, when installing columnar foundations for light low-rise buildings, as well as in the form of supporting posts for fences and fences</p>		

Product	Area of Application	Images
Asbestos-cement air ducts (channels)	Air and smoke channels in private and municipal constructions	
Fire retardant pastes and plasters	Fire protection of building structures, ducts, and products	
Asbestos-containing road slab	For road construction	 

Product	Area of Application	Images
Asbestos brake linings	For commercial vehicles, industrial transport, railway sector and power plant generators	

**ANNEX 4: INSTRUCTIONS ON HOW TO WEAR A RESPIRATORY MASK**

**Respiratory Protection - Operation Filter**



**Dependent Respiratory Protection - Dust Mask**

**Characteristics**

- Filter, disposable or dust mask
- Cup-shaped or foldable
- Breathing air is cleaned (filtered)
- Material: Filter fabric is Tyvek
- Minimal FFP3 filter
- Covers mouth, nose, and chin
- Two rubber headbands
- Flexible metal nose clip
- Available with or without a breathing valve
- Standard: EN 149 (Protection against dust, mist, or fibres)



**DEPENDENT RESPIRATORY PROTECTION - DUST MASK**



1 Hold the mask in one hand, pull it fully open and fold the nose clip

2 Hold the mask upside down with both headbands loosely down

3 Pull the top headband above and the other below your ears

4 Press the mask well all over

5 Perform a positive and negative pressure test / leak test



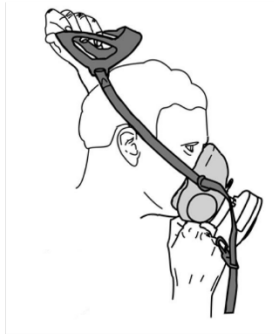
## Dependent Respiratory Protection - Half Mask

### Characteristics

- Half mask
- Breathing air is cleaned (filtered)
- Material: Rubber mask and replaceable filter with screw or insert system
- Minimal FFP3 filter
- Covers mouth, nose, and chin



### DEPENDENT RESPIRATORY PROTECTION - HALF MASK



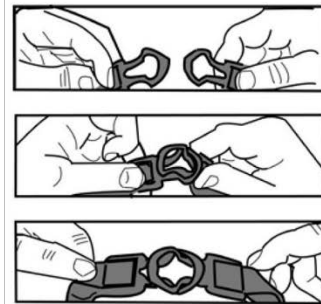
TUCK CHIN FLAP UNDER CHIN AND TURN MASK OVER NOSE



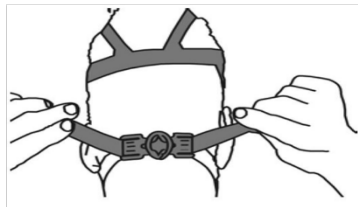
CENTER HEAD HARNESS ON THE HEAD



TIGHTEN EACH STRAP ALTERNATELY TO CLAMP THE MASK



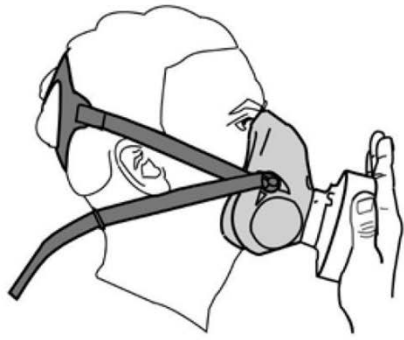
CLICK NECK BUCKLE



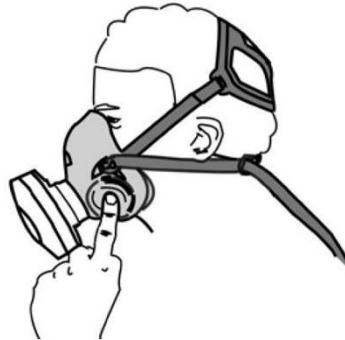
TIGHTEN NECK BUCKLE STRAPS WHILE HOLDING THE BUCKLE IN THE CENTER



PULL LOWER HARNESS STRAPS BACK



CHECK WITH NEGATIVE  
PRESSURE TEST / LEAK TEST



CHECK WITH POSITIVE  
PRESSURE TEST / LEAK TEST

### Usage

- Do not twist or overtighten headbands
- Always test for leaks or damage before use
- If the pressure test fails, repeat the setup instructions
- Note: Filters do not supply oxygen
- Use self-contained respiratory protection in oxygen-poor areas

### Maintenance

- Respect expiration date
- Clean carefully after use
- Replace the filter in a timely way (between five to eight hours)
- The duration of use should be according to breathing volume (effort) and the amount of hazardous substances

### Dependent Respiratory Protection - Full Face Mask

#### Characteristics

- Full face mask Type 1
- Breathing air is cleaned: filtered
- Air is not blown in
- Material: Neoprene or silicone rubber
- Replaceable filter with screw or insert
- Minimum FFP3 filter
- Covers mouth, nose, chin, and eyes
- Sometimes available with an inner mask and speech membrane



#### Characteristics

- Full face mask Type 2
- Characteristics Type 1
- Powered Air Purifying Respirator (PAPR)
- Air is blown by motor: Forced air circulation
- The user inhales air without sucking through the filter
- Replaceable filter on a motor with battery, fan, and supply hose
- Wear with a belt around the waist
- Battery life 4 to 12 hours



## Independent Respiratory Protection - Full Face Mask with Independent Respiratory Protection

### Characteristics

- Full face mask combined with compressed air or oxygen bottle
- Environment independent: It is possible to work in a polluted environment such as a hermetically sealed zone
- Forced supply of fresh air via hose or bottles
- No filters
- There is no risk of aspirating fibres along mask edges
- Dosing system converts high pressure to breathing pressure
- Supply hose crushing: Air loss (alarm)



### RESPIRATORY PROTECTION - PROCEDURE



CHECK THE MASK AND FULLY LOOSE HEAD AND NECK STRAPS



TIE YOUR HAIR IF NECESSARY  
PLACE CHIN IN THE MASK



PLACE MASK OVER HEAD FOR PROPER FIT



PULL BACK LEFT AND RIGHT LOWER STRAPS AT THE SAME TIME



PULL BACK LEFT AND RIGHT SIDE STRAPS AT THE SAME TIME



PULL FOREHEAD STRAP BACK



PERFORM NEGATIVE LEAK TEST  
WITH HAND ON FILTER



PERFORM NEGATIVE LEAK TEST  
WITH HAND ON SUPPLY HOSE



PERFORM NEGATIVE PRESSURE TEST  
WITH HAND ON SUPPLY HOSE



PUT ON OXYGEN BOTTLES WITH  
INDEPENDENT BREATHING PROTECTION



LOOSE THE NECK STRAPS



TAKE OFF THE MASK

### Respiratory Protection - Seven Rules

1. Always use your own model and the correct sized mask
2. Use filters that match your mask and attach them correctly
3. Always carry out a fitting leak test after correctly putting on your mask
4. Continue to monitor the fit during work
5. Take off your mask properly
6. Keep your mask clean
7. Store your mask carefully

## **ANNEX 5: ESHS ON SITE**

Ahead of any construction, the contractor is required to perform a visual inspection of the site. This includes gathering information about any concealed installations that might be damaged during the construction process. Information regarding these installations can also be sourced from the users of the building.

Additionally, before starting the construction, the contractor must design, fence or otherwise secure, and organize the construction site in alignment with the 'Construction Site Organization Plan'. This plan, forming a part of the design for preparatory works, is to be prepared by the contractor.

Furthermore, the site must be cleared before construction begins. This includes the removal of foliage, trimming of branches, and the elimination of other obstructive objects.

### **Camp Management Plan**

The primary offices for the construction project will be situated within the project area. Each project area will include smaller base camps (comprising containers) and designated parking spaces. These base camps will be strategically positioned to avoid environmental damage. The construction site will also feature portable sanitation units. These toilets are to be installed, emptied, and maintained by a certified company, with weekly servicing to prevent contamination of local watercourses and groundwater. As a result, no sanitary wastewater will be generated on site.

Detailed plans for the work camp, including environmental impact mitigation strategies, will be provided. This includes the design and positioning of equipment maintenance areas, as well as storage facilities for lubricants and fuels, ensuring they are adequately distanced from water sources and bodies.

Necessary construction machinery will be delivered to the site in line with the work schedule, using specialized transport vehicles.

During construction, all machines and equipment will be stored inside the project area. Space for parking of construction machinery and vehicles will be provided near the building site. Sufficient precautions and measures will be taken to prevent fuel or oil spills into the surrounding soil. For the case of spillage, suitable binding agents must be kept on site. Only machinery and equipment that meet technical standards will be permitted for use.

### **Storage areas**

The storage areas will be situated at the locations approved by the Employer. Storage areas will be strategically positioned to avoid environmental damage. When raw materials that are susceptible to generating dust and debris are stored in open-air areas and exposed to wind, they will be routinely moistened or sprayed with water from tanks every day. This measure is implemented to prevent the spread of dust and particulate matter into the surrounding environment.

### **Procurement of work material**

Work material will be procured from official and certified material suppliers to ensure compliance with environmental, health, and safety requirements. The Engineer will approve all work materials.

### **Health and Safety Plan**

All issues regarding health and safety, such as identification and characterisation of health and safety risks, including the exposure of personnel to chemicals, biological hazards and radiation, a listing of the types of work, medical facilities in the project area and evacuation procedures for medical emergencies are defined in the Health and Safety Plan, which should be prepared as a separate document.

In addition, the Health and Safety Plan should include:

- Clearly defined roles and responsibilities pertaining to safety and health in the workplace.
- Implementation measures to prevent injuries and occupational illnesses during construction activities.
- A comprehensive emergency medical procedure to address potential accidents that may occur on the job site.

The safety and health plans in place during the execution of work should include the following:

- Implementation of protection measures against falls from heights and into depths, in compliance with the applicable Safety and Health Legislation.
- Specification of the types and quantities of personal protective equipment, according to applicable personal protection legislation.
- Deployment of fire safety measures and equipment, along with the appointment of designated individuals responsible for fire safety, all in accordance with applicable Fire Safety and Rescue Laws.

## **Organization of Health and safety at the site**

### General Provisions

The contractor's operations are governed by the Laws and Safety Rules, and they adhere to the national laws and regulations applicable in the region where the work is being conducted.

- To ensure a safe and productive environment, the contractor must uphold excellent housekeeping practices in their work areas.
- Upon completing each task, all equipment, tools, and materials must be removed from the work area and returned to the designated storage locations.
- Throwing garbage, materials, or tools from elevated areas is prohibited. These should be lowered using containers or special chutes.
- Materials at elevated locations, must be securely fastened to prevent movement in windy conditions.
- The vicinity of emergency equipment, including fire extinguishers, hoses, and emergency personal protective gear, must be kept clear at all times.
- Oily rags should be disposed of in closed metal containers, separate from other waste. Oily rags pose a significant risk of spontaneous combustion!
- Intentional spillage of hydrocarbons or chemicals on the ground is prohibited. Any spills should be reported and promptly cleaned up.
- Rubbish, debris, and other materials must be controlled to prevent them from being scattered by the wind.

The 'ZERO TOLERANCE POLICY' will be strictly enforced for any instances of non-compliance relating to:

- Failure to wear mandatory safety equipment
- Working while under the influence of alcohol or drugs
- Operating equipment without the necessary certification or training
- Deliberate destruction or tampering with safety devices, signs, or signals
- Blatant disregard for situations posing imminent danger

Non-compliance with any of the procedures outlined in the above 'Zero Tolerance Policy' will lead to a minimum one-day suspension for the first offense. Repeated violations will result in permanent dismissal from the site.

### **Work environment and rules of conduct**

The Contractor must conduct a comprehensive Health and Safety (H&S) risk assessment for all employees, highlighting and evaluating potential hazards. Should the H&S manager detect any new potential risks, these will be promptly assessed and mitigated before work initiation. This policy is also applicable to all Subcontractors engaged in the project.

Key hazardous activities include, but are not limited to:

- Transportation, handling of materials, installation of equipment or products, and hoisting.
- Construction of temporary structures, storage of materials, and activities related to start-up and commissioning
- Handling of potentially hazardous materials like asbestos, glass wool, and pigeon droppings, along with associated health risks
- Working at heights
- Conducting electrical works

- Operations near construction machinery.
- Handling mechanical equipment.

Given the dynamic nature of construction sites, hazard assessments must be continuously updated to reflect changes in the work environment. For each identified hazard, the following questions should be systematically addressed:

- What could potentially go wrong?
- What would the consequences be?

It is essential to determine the resources needed for an effective emergency response for each potential hazard. In most construction scenarios, a straightforward analysis based on the collective experience of project participants is usually sufficient.

### **Barricades**

Barricades serve as a physical barrier, preventing workers from entering hazardous zones. These can be constructed from portable wood, posts, and temporary fencing. In situations where crossing a barricade presents an immediate and significant risk to employees, the barricades must be securely fixed in place.

Flagging tape acts as a visual alert to workers about potential hazards within work areas. Generally, two types of flagging are employed:

- Red - "Danger Do Not Enter": This flagging is used in areas with imminent hazards, such as the risk of falling objects. Access to these areas is restricted to personnel directly involved in the work and who are informed about the associated risks.
- Yellow - "Caution": This flagging indicates the presence of a hazard.

Workers are allowed to enter these areas only with explicit permission from the supervisor responsible for the team that installed the flagging. It is important to flag only the specific areas where hazards exist, as over-flagging can disrupt other work activities. Once the work is completed, the flagging should be promptly removed and stored for future use. The type of flagging used must correspond appropriately to the nature of the hazard.

### **Signs**

Notice and prohibition signs will be placed on the construction site as needed, with the HSE Manager responsible for regular updates. Signs indicating "Danger - Construction Site" and "Only Authorized Personnel" will be prominently displayed on the access roads to the site.

Specific hazard warnings will be communicated through signs such as:

- "Danger – Overhead High Voltage Line"
- "Slow Moving Vehicle"
- "Oversize Load"

Measures to prevent tripping, slipping, and falling hazards include:

- Maintaining contact points when embarking or disembarking from heavy equipment or vehicles
- Installing barricades or warning signs near hazardous areas
- Ensuring proper storage of equipment, tools, debris, rocks, branches and so on
- Providing sufficient lighting in work areas to identify safety hazards
- Placing warning signs in wet, slippery, or humid areas and immediately cleaning up spilled products
- Using only the correct, approved equipment for specific jobs, ensuring proper installation and usage
- Avoiding carrying items that obstruct your view or upset your balance
- Keeping work areas clean and neat
- Wearing safety boots suitable for the work area or conditions
- Staying alert, awake, and focused on the job and work area, being mindful of changing conditions
- Avoiding distractions and unnecessary risks

**Length of stay in the remediation zone in case of heat stress**

Shortening of the length of stay in the remediation zone due to physically demanding climatic conditions:

Protective equipment	Wearing time [min]	Recovery time [min]	Assignments per shift	Work shifts per week
<ul style="list-style-type: none"> <li>When wearing protective suits with reduced heat stress properties, the wearing time is reduced to 80% of the declared value</li> <li>Due to ambient climate parameters of &gt;28 °C and &gt;78% RH, the wearing time is reduced to 70% of the specified value</li> </ul>				
Tubing devices	[min]	[min]		
Devices with masks (fresh air and compressed air hose devices)	150 (120/105)	30 (24/21)	2	3
Fresh air suction hose devices	90 (72/63)	45 (36/32)	3	4 (2-1-2)
Filter Devices	[min]	[min]		
Full Face Mask	105 (84/74)	30 (24/21)	3	5
Half/Quarter Mask	120 (96/84)	30 (24/21)	3	5
Filtering half mask with exhalation valve	120 (96/84)	30 (24/21)	3	5
Filter units with blower support	[min]	[min]		
Full Face Mask	150 (120/105)	30 (24/21)	3	5

It is recommended to stay in the sanitation zone with a half mask for 84 to 96 minutes.

These values result from the maximum wearing time reduced to 70% at >28 °C temperature in the working environment or 80% when working with category III, type 5/6 protective suit. If work is carried out with a protective suit and at elevated temperatures in the ambient atmosphere, the shorter of the two reduced wearing times should be used in any case, which is 70% of the maximum wearing time.

The reduced wearing time also reduces the recovery time while the number of work assignments per shift increases.

Suppose there is a high level of physical strain (heavy work, e.g. construction workers). In that case, provision should be made for reducing the wearing time to 70% of the maximum wearing time, but not a decrease in the recovery time.

**Suggestion of work instructions:**

On construction sites where protective suits are mandatory and heavy physical work is performed, the wearing time should be reduced to a maximum of 84 minutes at temperatures of >28 °C, and the recovery time should continue to be 30 minutes.

**Medical verification of the health of workers**

When working with hazardous materials and specifically working with carcinogenic fibres that can cause lung cancer and other forms of cancer, it is necessary that any person who is regularly working in contaminated areas is frequently for example, every two years perform a medical verification on work-related causes of diseases.

Due to the requirement of wearing respiratory masks during the asbestos removal works, each person who is regularly working in contaminated areas is frequently (for example, every two years) performing a test that certifies that the entity is physically fit to wear masks.



## CONCLUSION:

In conclusion, this White Paper has attempted to underscore the strides that have been made and the remaining axes of progress in addressing the challenges associated with asbestos exposure and its impact on public health and the environment. Concerted efforts to raise awareness, the enhancement of existing or new legislation and improved monitoring and enforcement mechanisms will certainly contribute to a positive trajectory in asbestos handling and management in Ukraine.

In addition to providing a comprehensive risk assessment, proposed rules and abatement in real-life situations, practical information on protective measures, this document has also highlighted the gaps between Ukrainian and international regulatory frameworks. This acknowledges that although improvements have been made, there is still important work to be done, including the need for more stringent enforcement of current regulations, continued investment in asbestos removal projects, and the development of safe disposal methods to achieve a comprehensive, coherent, and sustainable asbestos management system across the country.

Additionally, ongoing training, monitoring and research are crucial to understanding the long-term effects of past asbestos exposure and informing future mitigation strategies. This group believes that moving forward, all stakeholders must be committed to collaborative efforts, drawing on the lessons learned from successful interventions internationally to address the required improvements in asbestos management in Ukraine. It is hoped that Ukraine will continue its journey towards a robust and effective asbestos management framework and by doing so, can contribute to safeguarding public health and the environment from the persistent and significant challenges posed by asbestos.

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