Asbestos Roof Sheet Removal Manual

CRS – Gaza

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Background

Asbestos is a natural mineral fibre that has characteristics and qualities that are unique and ideal for construction, including:

- It has a tensile strength comparable to steel
- It can be used as an electrical and sound insulator
- It is chemical resistant
- It is fire and heat resistant
- It does not degrade

There are many 6 types of asbestos: chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, but the most common are:

1. Chrysotile (**white asbestos**)
2. Amosite (which is an acronym for the asbestos mines of south Africa, it is also known as asbestos grunerite, **brown asbestos**)
3. Crocidolite (**blue asbestos**)

The word asbestos is believed to be from an ancient Greek word meaning 'inextinguishable' or 'unquenchable', and has been used for over 2000 years as a material for fire proofing and strengthening. However, health risks, including mesothelioma, asbestosis, and various forms of cancer have been attributed to contact with asbestos. Typically, micro fibres of asbestos are inhaled into the lungs where they can cause infection, loss of pulmonary function, and poisoning. Symptoms can take many years to develop and include debilitating lung disease and cancers which can be fatal.

Chrysotile (white asbestos) is used to reinforce cement roof sheeting and has been used widely throughout the world, although around 55 countries have now banned asbestos, it is still being used and available. Israel have had a defacto ban on the import and use of asbestos since the 1980's, while Egypt had production of asbestos up until 2005. Gaza, therefore had potential access to asbestos roof sheets up until recent years, and because of its durability (over 20 years), a large percentage of roof covering in Gaza is asbestos reinforced roof sheeting. Regardless of any health risks, this is still a material of choice when compared with metal sheet roofing because of its durability, thermal properties, and has less noise issues from rainfall.

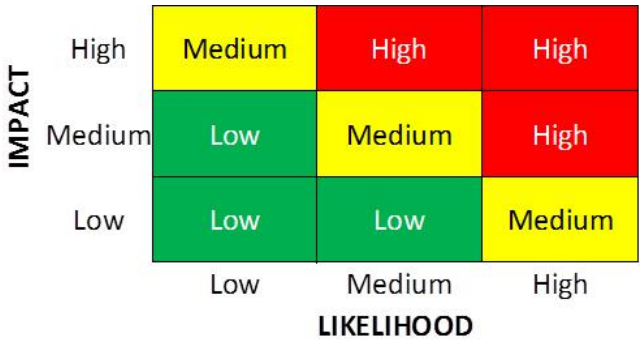
The asbestos fibres in asbestos-cement sheets are found within the cement itself; the asbestos cement will have a cement-rich surface, and thus the fibres are generally contained. The small quantities of fibres released during natural weathering of asbestos cement are considered unlikely to be dangerous. However, significant, and possibly dangerous, amounts of fibres can be released if the cement is subject to any abrasive cleaning or working (drilling, cutting, and grinding). Therefore, until roof sheets need to be removed, normally due to cracks and leaking, the risk to health is minimal. If the roof sheeting is removed carefully, so as not cause the release of fibres, there is little or no public health risk. The process is relatively simple and is described in this manual.

Due to the nature of the material, the only safe option for disposing of asbestos is to be buried. This manual will also provide the advice and protocols for responsible disposal.

Risk Assessment and Mitigation Statement (RAMS)

While there are generic risks associated with asbestos sheet removal, every site will present different challenges and therefore requires its own assessment and mitigation plan, this is often referred to as a Risk Assessment and Mitigation Statement (RAMS).

The 'Initial' Risk Level is measured by assessing the 'Likelihood' and 'Impact' before any mitigation measures are put in place. By reducing the risk or likelihood the overall risk level may be reduced.



The 'Residual' Risk is an assessment of the level of risk after any mitigation. Common hazards associated with the removal of asbestos roof sheeting are listed below:

- **Access and Egress** – This may include vehicles and trucks for supplies and collections, and will also include control of who can access the site
- **Manual Handling** - Given the weight and difficulty in handling asbestos sheets, there is a risk of strain and injury
- **Working at Heights** – The risk of falling from the building or through the roof sheets. Asbestos sheets are brittle and can easily break and result in a fall
- **Electricity** – There is risk of electrocution from overhead power supplies and electrical tools and equipment
- **Power Tools and Machinery** – There are inherent risks associate with the use of power tools and machinery that are the common cause of cuts, abrasions, crushing, and other injuries
- **Trips and Slips** – The most common risk of falling and injury on construction sites is due to tripping and slipping
- **Falling Items** – There is a risk of debris, materials, and tools falling on workers and the public below
- **Hazardous Materials and Substances –** This includes health risks associated with asbestos but also any other materials, chemicals, gases or fumes, that may be part of, or a result of the activity

These hazards and risks will be considered in more detail in the following section and the same can be used as a template that can be used as an assessment for each site. Using the risk level table, the initial and residual risks are measured. Ideally all risk is removed or reduced to an acceptable or manageable level.

PROJECT: XXXXXX	**LOCATION: GAZA**
TASK: ASBESTOS ROOF SHEET REMOVAL	

ACTIVITY AND HAZARDS (Identify hazards associated with task)	INITIAL RISK RATING			CONTROL MEASURES (Identify measures to eliminate, reduce or control hazard or as requested by others)				RESIDUAL RISK RATING		
Hazard:	**High**	**Med**	**Low**					**High**	**Med**	**Low**
Access and Egress – Proximity of work and restrictive access.		**X**		**Who?**	**Operator (s)**	**Employees**	Third Party			**X**
				How?	Fatal	Major	Minor			
				a. Construction area will be fenced off with warning signs b. Only approved access to the site (employees and accompanied visitors) c. Safe access will be guaranteed onto and around the site for people and vehicles. d. Truck delivery and collections to be outside of school hours when possible e. Deliveries and collections to be supervised						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Manual handling		X		**Who?**	**Operator (s)**	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Operators will work in pairs/small groups to avoid carrying and lifting more than 25 kg each. b. Operators are experienced in safe lifting techniques and sensible handling of loads. **c.** Operators will wear protective clothes and PPE (Safety Helmet, Safety Boots, Hi-Vis Jacket, Goggles, Gloves)						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Working at heights	X			**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Working at height will be avoided where possible by working from inside the building b. Appropriate equipment (mobile scaffold towers, ladders, crawling boards) will be used to protect our operators and to have proper handrails and brick guards c. Ladders are to be tied at the top and held in place at ground level d. Materials are to be lowered and raised using ropes and hoists and not carried on ladders						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Electricity	X			**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Operators to use hand tools or battery power tools b. Circuit breakers are to be used and checked by an electrician to protect mains and generator supplied power c. Earthing to be in place where required d. Overhead power lines to be sheathed and protected, and preferably isolated during the construction work						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Slips and trips		X		**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Work and storage areas will be kept tidy b. Footpaths and other areas used by pedestrian will be kept clear of obstructions at all times c. Disposal of waste materials will be kept as minimum as possible and areas for collection will be clearly identified. Waste will be removed at the end of the construction work d. Operators will wear footwear that provides good grip						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Hazardous substances and processes		X		**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Asbestos roof sheets to be removed in full accordance with protocols and approved methods for this b. Asbestos roof sheets to be removed by trained contractors c. Asbestos to be disposed of in designated landfill sites d. Operators will wear appropriate Personal Protective Equipment (PPE) e. The site to be thoroughly cleaned after Asbestos removal f. No unauthorised persons to have access to the work area						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Power tools			X	**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Operators will mainly use power tools working with batteries b. Where possible hand operated tools will be used for removing roof sheet fixings c. Operators will wear appropriate Personal Protective Equipment (PPE) d. No unauthorised persons to have access to the work area						

Hazard:	High	Med	Low	Control Measures:				High	Med	Low
Items falling	X			**Who?**	Operator (s)	Employees	Third Party			X
				How?	Fatal	Major	Minor			
				a. Work and storage areas will be kept tidy b. The work area to be clearly marked and fenced off when operators are working overhead c. Appropriate equipment (scaffolds, ladders) will be used d. Ropes and hoists to be of adequate strength and in good condition e. Operators will wear appropriate Personal Protective Equipment (PPE) f. No unauthorised persons to have access to the work area						

COMPLETED BY:	**DATE:**
SIGNATURE:	**REVIEW DATE:**

Asbestos Roof Sheet Removal Method Statement

The following sections provide details of the processes and schedule of work for the safe removal and disposal of Asbestos roof sheets.

Scope of work

1. Procurement and supply of PPE, materials, and equipment
2. Training of operative and project staff
3. Information and awareness training for the householders
4. Local public awareness of Asbestos hazard and risk
5. Site Health and Safety
6. The safe removal of roof sheets
7. The safe temporary onsite storage of roof sheets
8. Site cleaning
9. The safe transport and disposal of roof sheets

Sequence of work

REF	TASK	TASK SEQUENCE														
	Procurement															
1	Procurement of PPE and Equipment															
2	Procurement of asbestos sheet protective covering															
3	Printing of labels, signs, and other IEC															
	Training and Information															
4	Training of program staff															
5	Training of contractors															
6	Information and Awareness training of households															
7	Public information and awareness															
	Assessment															
8	Initial site survey to record sheets to be replaced															
9	Risk Assessment and Mitigation Statement															
10	Schedule of work															
	Site Preparation															
11	Ensure safe access to the site															
12	Provide site barriers															
13	Provide warning signs and information															
14	Clear room/s of all furniture carpets, curtains, and blinds															
15	Seal room/s to contain dust and debris															
16	Install ladders and scaffold as required															
17	Install pulleys and hoists as required															
18	Prepare safe temporary storage area															
	Asbestos Sheet Removal															
19	Wet asbestos sheets (keep wetting as required)															
20	Remove sheets															
21	Wrap / bag asbestos sheets (2 x layers) and seal															
22	Store sheets ready for transportation															
	Site Cleaning															
23	Clean rooms (using class H vacuum cleaner)															
24	Bag and label PPE clothing and masks															
	Asbestos Sheet Disposal															
25	Transport to landfill asbestos sheets, dust, and disposable PPE															
26	Check number of sheets against original survey															
27	Record delivery to site (waybill / weigh bridge note)															
	Inspection															
28	Final inspection															
29	Sign off															

Preparedness

Procurement of PPE, materials, and equipment:

Personal Protective Equipment (PPE)

1. Disposable Coveralls – Type 5 Close weave material, elastic wrist, ankle and hood bands; hood; zip opening.	
2. Respiratory Protective Equipment (RPE) – EN 149 (type FFP3) or EN 1827 (type FMP3) Disposable face mask	
3. Safety goggle / eye defenders	
4. Safety Gloves Disposable gloves preferably made from close weave or coated material	
5. Safety foot ware Steel toe capped boots (not shoes)	
6. Hard Hat - EN 397:2012	

Specialist Equipment and Materials:

1. Class H vacuum cleaner Ideally class H but minimally vacuums fitted with high-efficiency particle arrestor (HEPA) filters.	
2. Plastic bags / wrapping for asbestos Minimum 1000-gauge plastic	
3. Asbestos warning labels	
4. Duct Tape	
5. Water Sprayer	

Training:

Program staff, contractors and households are to be provided hazard and risks awareness training and detailed step-by-step instruction on the safe removal and disposal of asbestos roof sheets. This training is compulsory to all who are involved in the process or may be exposed to any risk, and to include post-training evaluation to provide assurance of knowledge transfer. A curriculum and materials for training are provided in the annex.

At the location of the site, public awareness information should be displayed to inform people of the hazards and risks associated with asbestos roof sheets and the safe steps for removal and disposal.

Site survey:

A detailed survey of the site to be carried out using a survey template. To identify the sheets to be replaced, access, storage, and health and safety risks and mitigation. This will produce the schedule of works and method statement for each individual site and will be used to brief the household and contractor.

Method

The following are more detailed instructions for the removal and disposal of asbestos roof sheeting:

1. Ensure that there is adequate access to the site and the area is free of any hazards. This is also to allow for easier cleaning when the works have been completed
2. Remove all furniture, carpets, curtains, light fittings, and any surface or item that may collect or trap dust. Sweep and clean the room to minimise the dust that may be removed once the work is complete
3. Use plastic sheet and duct tape to seal the room or to make an entrance to prevent dust and fibres travelling to other parts of the dwelling
4. Put in place any ladders, trestles, or scaffold that may be required to access the roof and the roof sheet fixings
5. Crawling boards must in place if the work requires walking on the roof. Asbestos is very brittle and falling through roofs is a common accident
6. Identify a secure and safe area away from the dwelling where the sheets can be stored
7. The site must be inspected at this stage to ensure the site is ready for the work to begin
8. All operators and supervising staff must wear full PPE before starting the work. Before and during the work the supervising engineer will check compliance with this rule
9. To reduce the risks of dust, roof sheets should be sprayed with water and kept damp. In hot weather, this will require regular spraying
10. The roof fixings should be removed in a way that avoids breaking the sheets or making dust. This can include unscrewing fixings or cutting off with bolt cutters / croppers
11. Sheets need to be carefully carried or lowered to ground level. Operators should not carry more than 25kg and therefore more than one person will be needed to carry and handle the sheets
12. The sheets are then to be double wrapped and sealed with a warning label between the layers
13. Sheets are to be stacked and counted to make sure that all the sheets removed are accounted for
14. Once all the sheets are removed, the site and exposed rooms are to be fully cleaned, with attention to the tops of rafters and beams, wall-plate ledges, and any other areas where dust and fibres could be trapped
15. Cleaning should be with a type H vacuum cleaner rather than brushing to prevent creating dust
16. Once the site is cleaned, the site must be inspected and if completed, the seals to the rooms can be removed
17. When the cleaning is completed, the vacuum-cleaner should be emptied and all debris sealed in bags
18. The sheets and bags of debris then should be transported to the landfill site and deposited at a pre-arranged location to ensure the sheets will be buried. The sheets must be counted and checked to ensure all sheets have been disposed of
19. Once the sheets and bags of debris are unloaded, the disposable PPE is to be removed and sealed in bags and left with the roof sheets to be buried
20. The supervisor is to keep a copy of the waybill or weigh-bridge note to prove delivery to the landfill
21. Once all these tasks are completed and all records have been checked, a completion certificate can be issued for the work

Monitoring and Supervision

To provide assurance that the works are completed as specified there is need for rigorous and consistent supervision and inspection. This requires a site engineer to be on site throughout the work to provide daily supervision and monitoring. The program supervisors should monitor the engineer by making scheduled and unscheduled visits to physically verify that the works are being undertaken as specified and that a correct record of the work is being kept.

The schedule for supervision, validation, and inspection is set out in the table below:

Activity	Expected Result	Means of Verification	Person Responsible	Evidence
Training of Staff, Contractors, and Householders	That all personnel will have knowledge of the hazards, risks, and procedures for asbestos sheet removal	• Post-training test • On-site observation of adherence to correct processes	• Trainer • Supervising engineer	• Post training tests results • Site supervision checklists
Site survey	Detailed schedule of work and Risk Assessment and Method Statement (RAMS)	• Survey and RAMS is checked by supervisor	• Site engineer • Supervisor	• Survey and RAMS document
Site Preparation	That the site is prepared ready for work to start and meets health and safety standards	• Physical inspection	• Site engineer	• Works checklist • Photos
Removal of roof sheets	That works are completed in full compliance with the specification and follow health and safety procedures	• Daily constant supervision	• Site engineer	• Works checklist • Photos
Disposal of roof sheets, debris, and disposable PPE	That roof sheets and debris are safely transported to the landfill site and PPE is disposed of as specified	• Supervision and observation	• Site engineers	• Works checklist • Waybills • Photos
Final inspection	The site to have a final inspection and to ensure that all records are correct	• Physical inspection • Check site / project documentation	• Site engineers • Supervisor	• Completion certificate • Site / project files • Photos

References

http://www.hse.gov.uk/pubns/guidance/em9.pdf

http://www.hse.gov.uk/pubns/guidance/em4.pdf

http://www.hse.gov.uk/pubns/guidance/a14.pdf

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