



Clearance of PCB-laden sealants in buildings
Operating guidelines recommended by the trade associations

Based on the report
Åtgärder vid sanering av PCB-haltiga fogmassor
(Protective measures and recommended work praxis for the clearance of PCB-laden sealants)

– *Studie och rekommendationer om skyddsåtgärder, utrustning och rutiner*
(Study and recommendations on protective measures, equipment and routines)

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Basis for the guidelines

The Swedish Demolition and Site Clearance Contractors Association has studied the clearance of building sealants containing PCBs with the objective to agree on a shared work method. The focus was on particles and gas that emit during sealant clearance, on suitable tools, and on the function of vacuum cleaners and respiratory protective equipments.

The study is reported in *Measures related to the removal of PCB-laden sealants – study and recommendations of protective measures, equipments and routines* by Gunilla Bernevi Rex, Rex Hus & Miljökonsult, and Eva Sikander, the Swedish National Testing and Research Institute.

Critical factors when clearing building sealants

The objective of the sanitation work is to eliminate building sealants as a source of PCB spread and exposure, to man and environment.

The most important measures to minimize spread of PCBs in the clearing process are

- Collecting emitted particles and gas at the source
- Handling waste in a correct manner
- Cleaning surfaces, protective covers and clothing from PCB-contaminated dust and debris.

The proficiency and commitment of the contractor is vital. Equally important is that owners and consultants request in the purchase that the contractor details his environmental and protective measures as well as his daily routines to protect environment as well as tenants.

Support for contractors, purchasers and consultants

The checklist below, combined with other existing guidelines for the removal of PCB-containing sealants can help the contractor to plan and carry out the sanitation work and prepare his quality and environmental protection documents. Purchasers and consultants can use the checklist as a basis for terms and conditions in the purchase.

Other references to protective measures in the sanitation work

Protection issues are covered in *Sanera PCB-haltiga fogar* published by SFR (The Swedish Sealant Association) and on the website www.sanerapcb.nu.

The Swedish Work Environment Authority has published reports on vibrations, working load ergonomics, exposure limits for hazardous substances and actions against air pollution. The Swedish Work Environment Authority also publishes guidelines for the Swedish Work Environment Authority inspectors (2003, revised 2005) (available for download from www.sanerapcb.nu).

The findings and experience in this study complement these documents. The checklist contains new but also confirms some existing, preceding recommendations.

The recommended working praxis and protective measures described in this document, combined with the SFR guidelines should be considered trade standard for clearance of PCB-laden sealants in buildings, aiming at the protection of the environment and eliminate exposure to workers and other people around.

Check list

	Recommended action	Why?
Sawing	1. Removes sealant and adjacent contaminated substrate layer in one move. Use a dust collector with a brush rim, e.g. the hood designed by SP.	Makes the dust collection efficient and reduces dust spread.
Knife cutting	2. Consider use of the new Fein cutter model, FSC 1,6, with integrated dust collector.	Results in lower PCB content in the breathing zone than the older "Fein cutter" model.
Grinding	3. Use a die grinder with a coned tool when working on inner corners.	Results in lower PCB spread than the angle grinder.
	4. Use a die grinder with a cone grinding tool for indoor work.	Results in lower PCB spread than the angle grinder.
Respiratory protection	5. Use a protective mask with forced air supply. The mask shall have a particle filter type TM3A2P and a gas filter. The mask must be used whenever electric machines are operated in sanitation work.	Has demonstrated a significant reduction of PCBs and dust in the inhalation air.
Collection of PCBs and dust	6. When using a die grinder: Use a suction dust collector with a flexible nozzle that can be pointed at the work area, e.g. "Riktaflex".	The ability to direct the nozzle precisely at the work area results in an effective dust collection.
	7. Design of the dust extracting equipment (vacuum cleaner): - The hose shall be as short as possible - Use a large diameter hose; preferably 63 mm. - Retain the hose diameter for as long as possible. - The connection to the dust collector shall have the same diameter as the attached hose.	To avoid reduced air flow.
	8. Vacuum cleaner; filter specifications: The vacuum cleaner shall have three-step separation: A cyclone, an appropriate pre-filter, and a Hepa-filter 99,95 %, class H13 according to the standard SSEN 1822-1.	To get best possible particle separation.
	9. The filters in the vacuum cleaner shall be cleaned (normally in place in the machine) according to the manufacturers instructions. Clean the particle filter frequently! Notice any reduction in dust collection and separation efficiency – time for cleaning! Filters shall be exchanged as per the manufacturers instruction, in a place protected from wind or in a shielded and ventilated location indoors.	Maintains high flow and air velocity through the vacuum cleaner, which reduces PCB spread to the environment and workspace. Exchange of filter as specified by the manufacturer minimizes the risk of PCB diffusion.

Collection of PCBs and dust (cont.)	10.	<p>Choose a vacuum cleaner with a measured air flow over 370 m³/h (without hose and tools). (The nominal flow must be higher as the flow is reduced during use.)</p> <p>Examples of equipment tested in this study:</p> <ul style="list-style-type: none"> - Hoses: max 10 m Ø 63 mm + max 2 m Ø 50 mm - Tools: Cutter FSN 400 E with Riktaflex or Cutter FSC 1,6 or an angle grinder with the SP 180 mm dust collector hood (for grinding) or an angle grinder with the SP 125 mm dust collecting hood (for cutting) or a straight die grinder with a cylinder grinding pin tool and Riktaflex. 	The study shows that this results in PCB and respirable dust concentration close to the tolerable limit values.
	11.	Evacuate the outlet air from the vacuum cleaner where it does not affect the breathing zone of the worker or anyone else.	Reduces the risk of PCB exposure for workers and people in the vicinity.
	12.	When die grinders are used extensively: Consider use of an active coal filter to clean the exhaust air (specify the cost in the offer)	Considerably reduces the PCB content in the exhaust from the vacuum cleaner.
Quality management	13	Quality management including a constant self control and documentation is vital to prevent the spread of PCBs in all moments of the work.	Reduces the risk of PCB spread.

Tools, tested and reported in Measures related to the removal of PCB-laden sealants – study and recommendations of protective measures, equipments and routines



A new oscillating knife cutter from Fein, model FSC 1.6, used to cut out the PCB containing sealant from the joint.



Oscillating knife cutter from Fein, model FSN 400E with the SP dust collector and Riktaflex.



Straight die grinder used where the workarea is difficult to reach. A dust collecting nozzle with an adjustable hose is applied on the die grinder from Bosch (GGS 27LC).

Right: Grinding with the Bosch die grinder.



Grinding joint walls with the Milwaukee AGV 16180 QXC grinder, equipped with the SP dust collector.



Grinder from Hilti (DC 125-S/EX) with cutting disc for sawing in concrete, with the new SP dust collector.



Respiratory protective equipment from Sundström Safety AB is used.

Air was sampled for analysis inside the mask and in the open air, at shoulder height..



Vacuum cleaners from Pullman and Nederman – used in the measurements.



The active carbon filters tested in this project were supplied by Nederman (picture) and Pullman.

Air was sampled for analysis before and after the filter.



A further developed dust-collecting hood, designed for the Hilti angle grinder with a 125 mm disc cutter.

Measures according to the SFR manual

For information on further measures essential to reduce the spread of PCBs, see *Sanera PCB-haltiga fogar (Removal of sealants containing PCBs) 5th edition, January 2005*. This manual discusses the following issues:

- Closing (fencing) the work area
- Cover the ground (with nonwoven) when working on the facades
- Closing windows and balcony doors when working on facades
- Closing or covering ventilation openings when working on facades
- Shutting off the building ventilation whenever possible when working on facades
- Design of the work platform, e.g. a tight floor and a tight connection to the facade
- Wind protected scaffolding (not above the rail)
- Consider the maximum allowed wind load on the scaffolding. Strong winds also mean increased risk of PCB dispersion
- Ergonomic considerations in general and in particular with respect to the use of handheld machines
- Vibration reduction – in particular on the oscillating cutter
- Respiratory protective equipment
- Hearing protection
- Protective clothing
- Careful cleaning of surfaces from dust (footwear, protective clothing, work platform, cover on ground etc. Also clean adjacent surfaces on facades and indoors.
- Careful handling of waste. Material containing PCBs must be handled and disposed of in accordance to national waste regulations and other rules (collection, storage, labelling, transportation, monitoring, reception etc)

Measures according to the “Checklist for house owners in an outdoor sanitation project”, www.sanerapcb.nu

This checklist (currently the 2002 version) brings up items corresponding to the SFR manual. It also contains complementary information on:

- Report to the local authority for environmental issues.
- Advice on information to tenants.
- Recommendations for purchase, e.g. basis for offers, evaluation of tenders, requested documents (note the revised specifications on vacuum cleaners, see checklist above!)
- Recommendations on quality management exercised by the house owner and on chemical analyses, if any.
- Documentation of remaining PCB
- Analyses on soil.