PCB PLATFORM

Handling and maintenance of equipment containing PCBs

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Table of contents

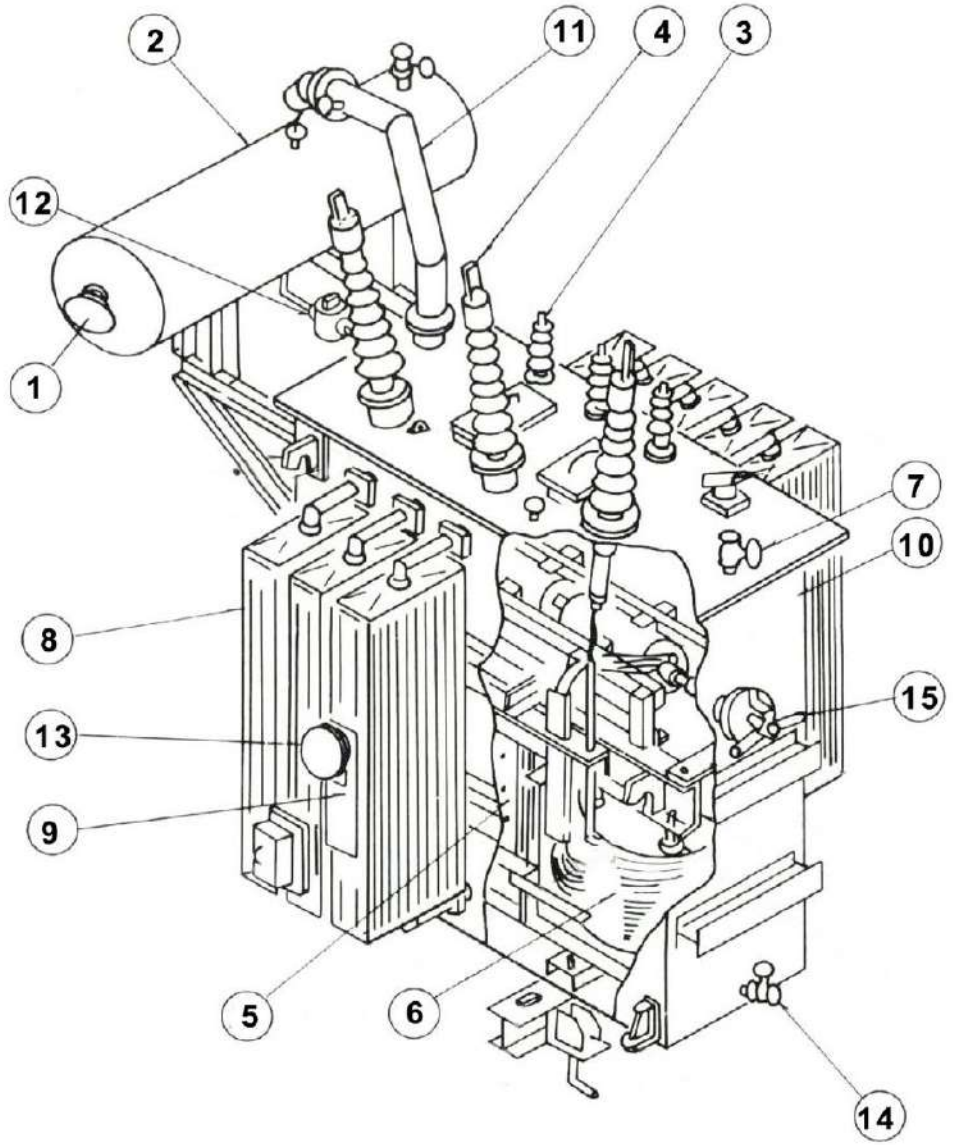
1. Objective

Defining the appropriate control measures and environmental management procedures for the maintenance of equipment with PCB reducing the risk to human health, the environment, and the facilities.

3. Main activities during the operation and maintenance of the transformers

- Operation of transformers
- Transformer temperature verification
- Maintenance and inspection of insulators or bushings
- Dielectric oil sampling
- Tap change
- Inspection of the cooling system and fan repairs
- Inspecting the dielectric oil level
- Noise inspection
- Inspection of Buchholz relay or gas detector relay
- Maintenance of the silica gel

2. Main parts of a transformer



1. Oil level indicator.
2. Conservator tank.
3. Primary bushing (input).
4. Secondary bushing (output).
5. Core.
6. Winding.
7. Globe valve.
8. Cooling radiator.
9. Nameplate.
10. Tank.
11. Breather.
12. Buchholz relay (gas detector relay).
13. Thermostat.
14. Oil outlet Drain Cock.
15. Taps.

4. Frequency of inspections

Nº	Pieces to survey	Frequency	Observations
1	Thermometers	1 / year	
2	Accessories with alarm and/or trigger contacts	1 / year	Inspect operation conditions of the contacts and measure the circuit insulation resistance
3	Cooling fans	1 / year	If an anomaly is found
4	Conservator	1 in 5 years	
5	Winding Insulation resistance	1 / year	If a drastic change is perceived after years of use, or if the new data is different than the one registered in previous tests.
6	Delta tangent measurement	1 in 3 years	Same as item 5
7	Oil's breakdown value	1 / year	
8	Oil acidity value	1 / year	
9	Oil functioning test	Check for irregularities in the tests on items 5 through 8	Remove two liters of oil and check them according to ASTM D3487
10	Filtered insulating oil	Check for irregularities in the tests on items 5 through 8	
11	Interior components	1 in 7 years	

5. Repair services

- Maintenance standards for insulating oil
- Maintenance and inspection of gaskets
- Bushing insulation inspection
- Maintenance and inspection of protection relays
- Buchholz relay
- Protective relay for the on-load tap changer

6. Handling transformer under operation

Environmental control and management measures (Operation)

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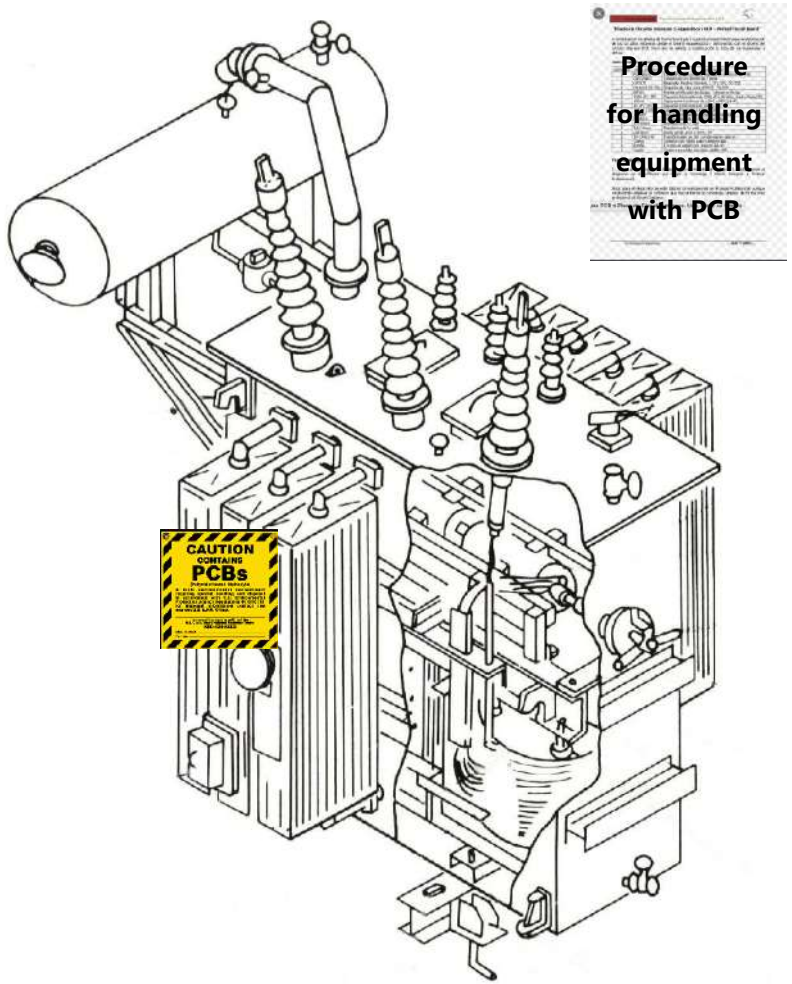
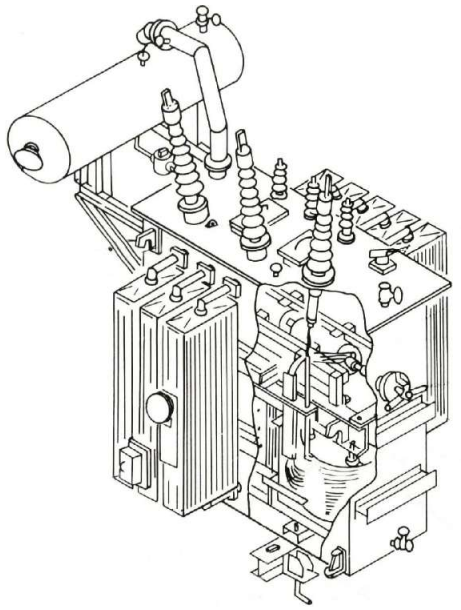
6. Handling transformer under operation

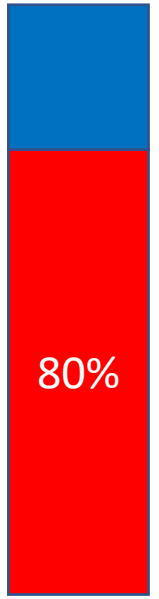
- Label the equipment indicating its status.
- Inform the personnel about the danger, the necessary precautions, and measures to take in case of accidents.
- Check the impermeability of the equipment periodically.
- If leaks occur, the equipment needs to be taken out of use immediately, the oil removed and the equipment stored securely.



6. Handling transformer under operation

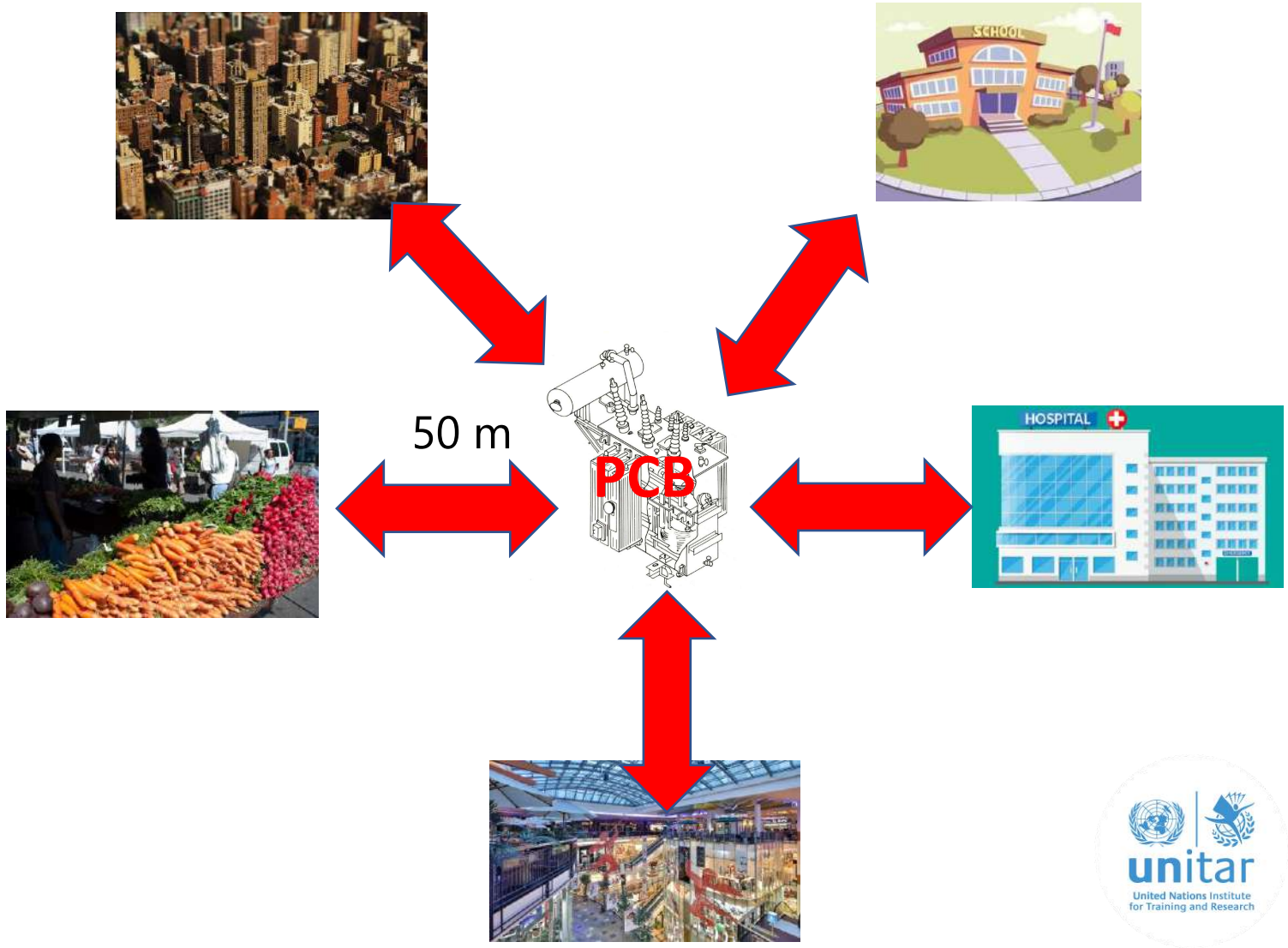
The equipment cannot be subject to charges above 80% of their rated capacity, to prevent raising the fluid's temperature, and thus reducing the risk of fire.





6. Handling transformer under operation

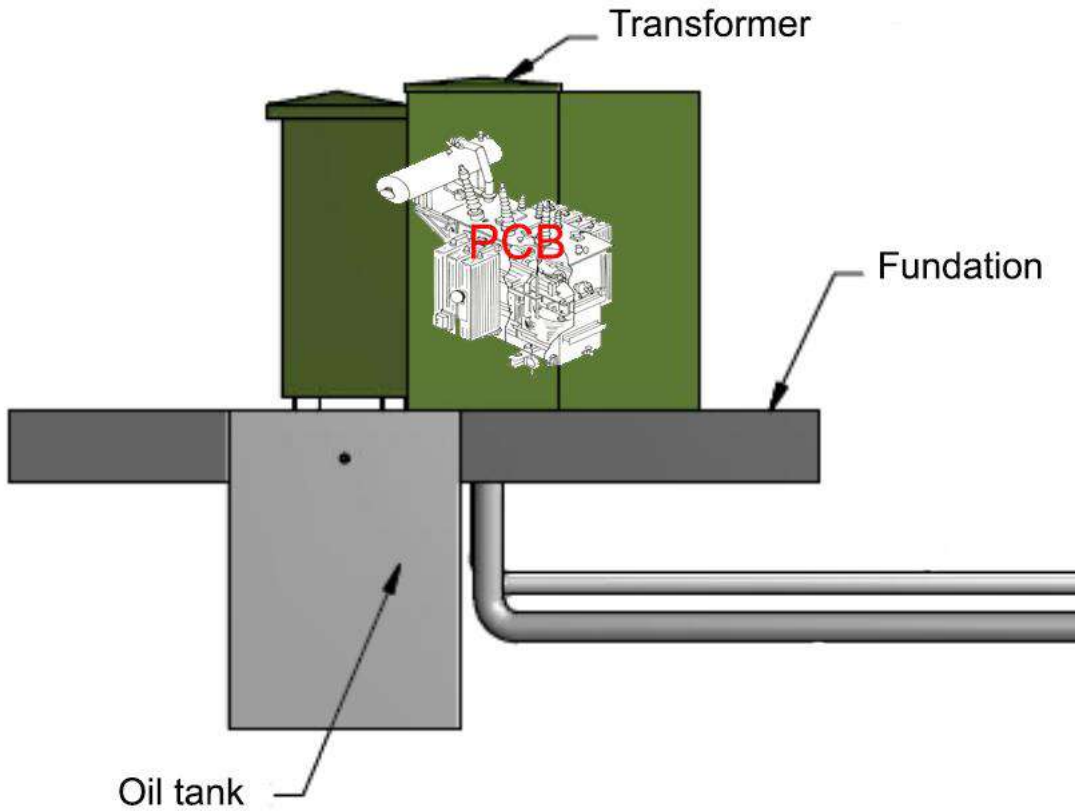
A 50 m safety distance from high sensibilities areas is required for transformer containing PCB (e.g. educational institutions, dense urban areas, markets, hospitals, and shopping centers).



6. Handling transformer under operation

The area where the equipment is located should be enclosed with a chain-link fence or walls to prevent access from unauthorized personnel.

6. Handling transformer under operation

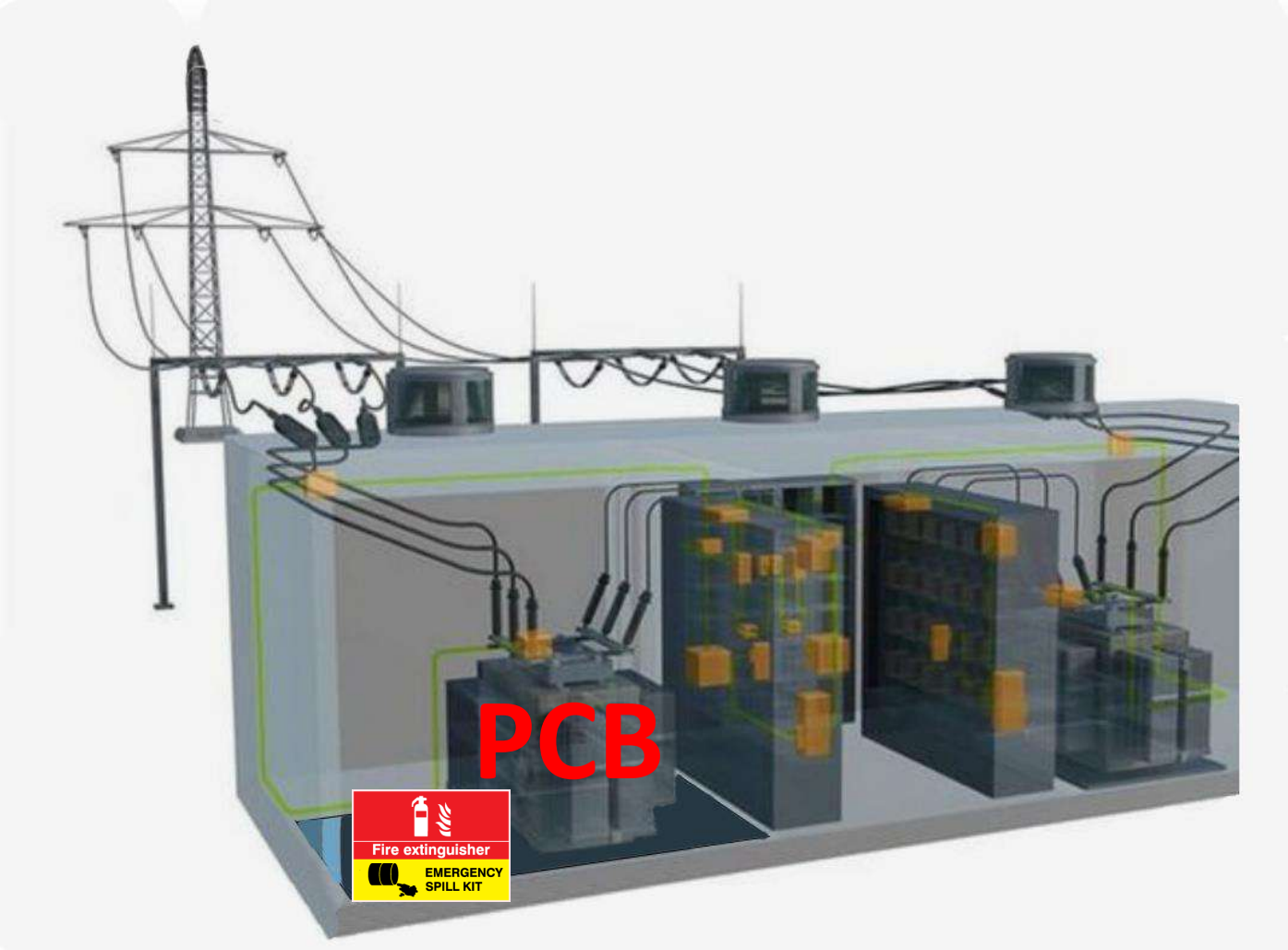


The safety drains and oil tank should be able to contain at least 110% of the dielectric oil in the event of failure, spillage or leaks.

These should be covered with a metallic sheet or a geomembrane to prevent PCB contamination of the concrete floors.

6. Handling transformer under operation

A complete kit for managing spills, fires and medical emergencies should be available in the area.



6. Handling transformer under operation

The company should provide workers with personal protection equipment (PPE) and use them.

Non-compliance must be considered a serious violation and sanctioned as per the company's regulation.

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6. Handling transformer under operation

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The company should have a set of tools which will only be used to work on PCB-contaminated equipment.

6. Handling transformer under operation

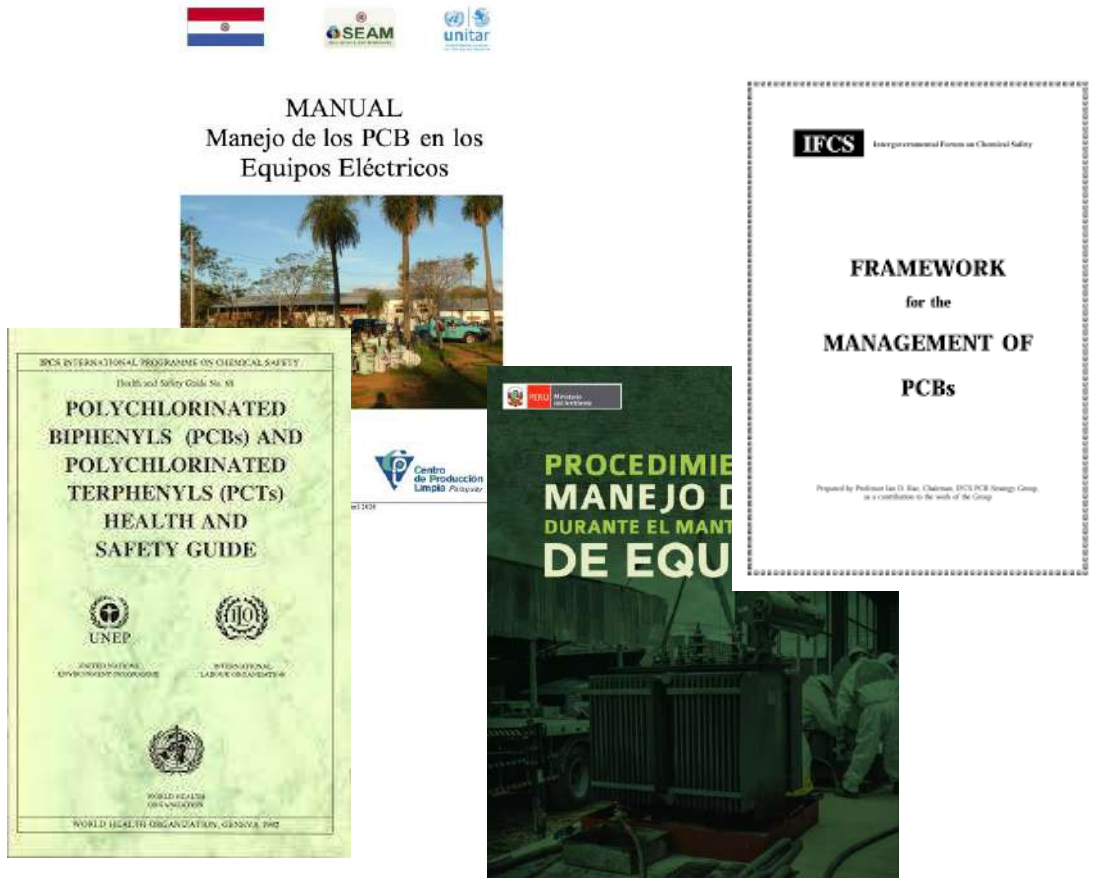
Physical inspection of the equipment should be carried out every two weeks or less.

For the purpose of detecting structural flaws, dielectric oil leaks, perforations, rust or unusually high temperatures.

Physical Inspection Program every two weeks

6. Handling transformer under operation

Fluids and accessories used to clean the bushings should be disposed of in accordance with recommendations found in Guidelines and Decision-Making Toolkit (DMT).



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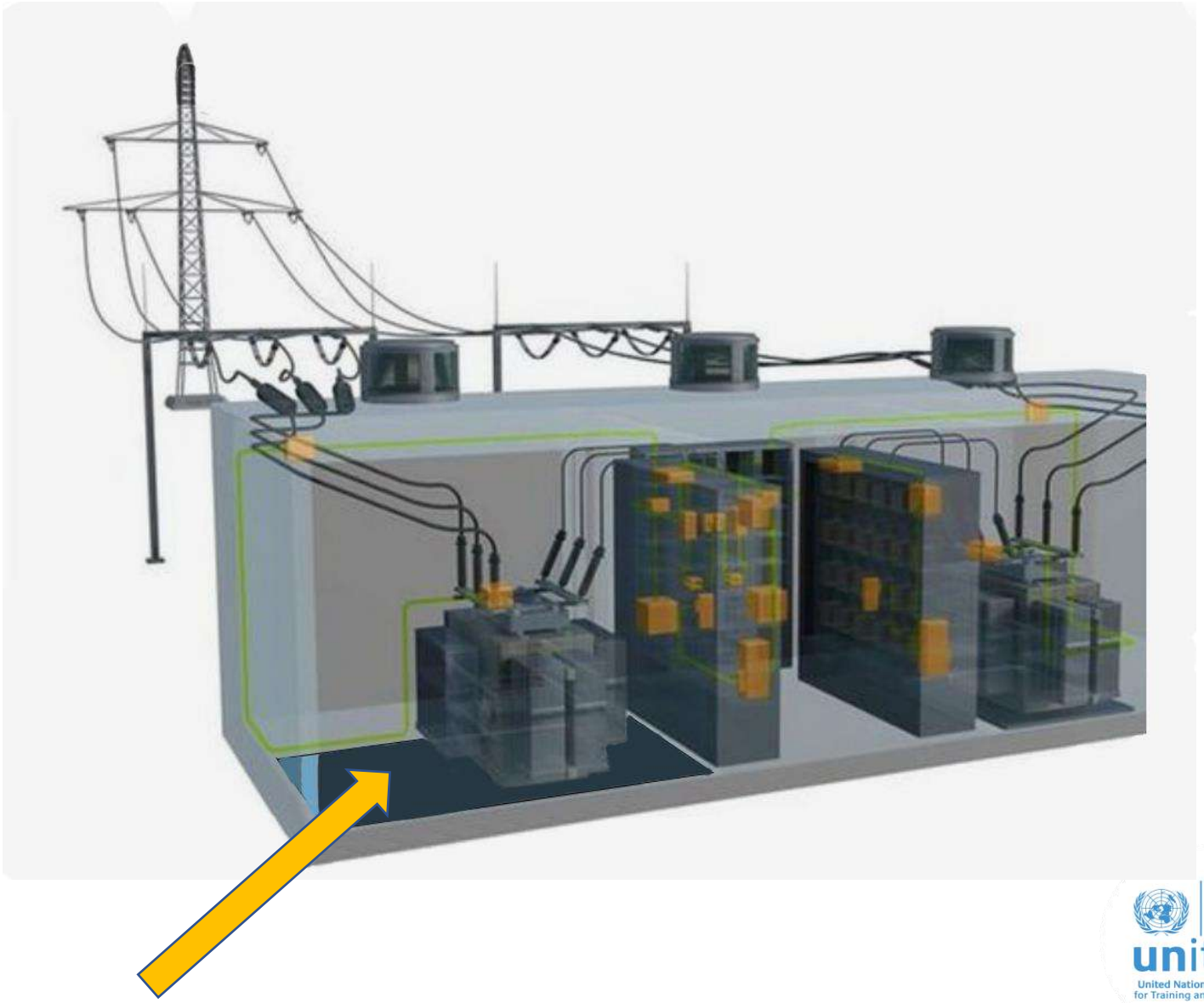
6. Handling transformer under operation

The surface of the containment area should be coated with protective material:

- paint, urethane or epoxy,
- or plastic coating or absorbent mats should be placed under the equipment.



6. Handling transformer under operation

Designated pumps, pipe systems, and special drums should be used to decant liquid waste with PCB (and for no other purpose) during maintenance activities.

https://www.acodal.com/curso-taller-diligenciamiento-del-registro-de-bifenilos-policlorados-pcb/

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6. Handling transformer under operation

Clean-up:

- All spilled liquid should be cleaned with cloths, paper, or other absorbent materials after maintenance and field activities.
- All traces of PCB on surfaces should be eliminated by triple-rinsing with a solvent such as kerosene.
- All cloths, papers, absorbent materials, solvents used in the triple rinse, as well as PCB-contaminated disposable protection equipment and plastic coating, must be properly stored until their treatment and final disposal.

7. Maintenance of transformers

Environmental control and management measures (Maintenance)

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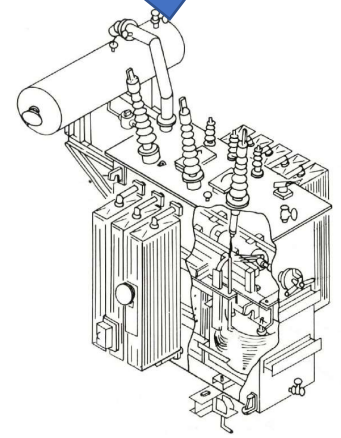
7. Maintenance of transformers

- All equipment sent to specialized service companies must be screened by PCB (such as the Clor-N-Oil or L2000DXT Analyzer).
- All equipment that is returned to clients after maintenance or repair must have a certificate of having been screened for PCB using any of the previously mentioned procedures.



PCB screening before the maintenance

PCB screening after the maintenance

Workers must use personal protection equipment (PPE).

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7. Maintenance of transformers

The specialized service company must have a PCB tools and machine kit just for maintenance and repair of equipment with PCB.

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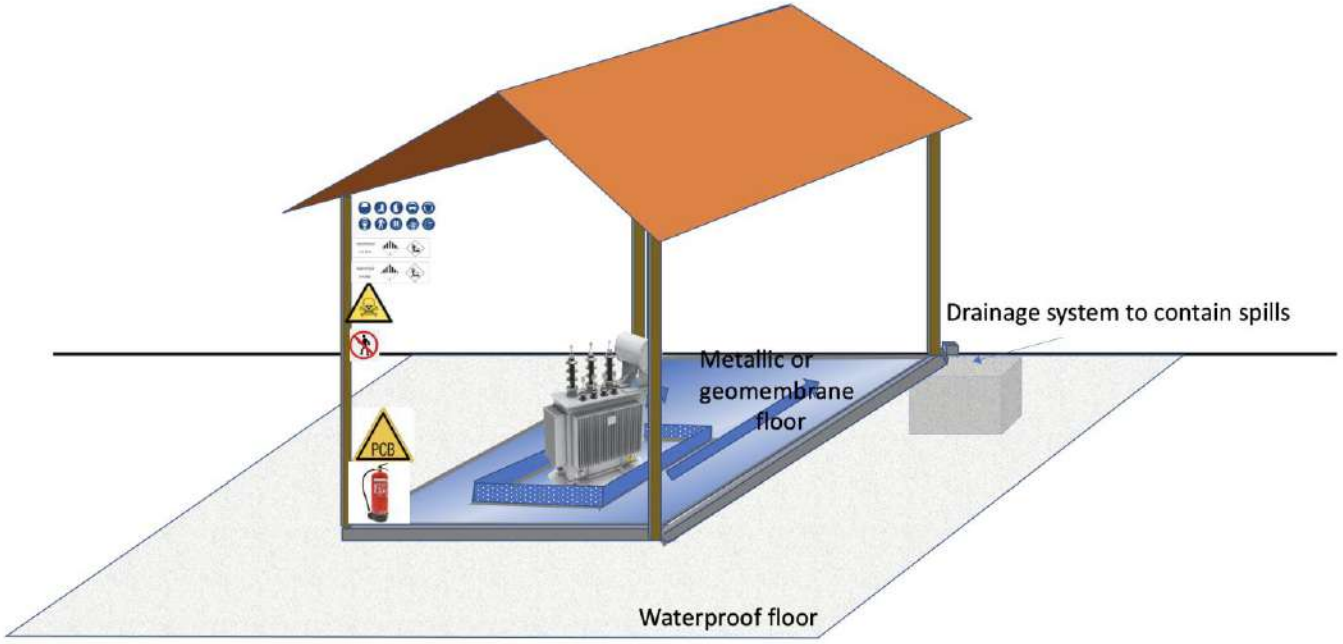
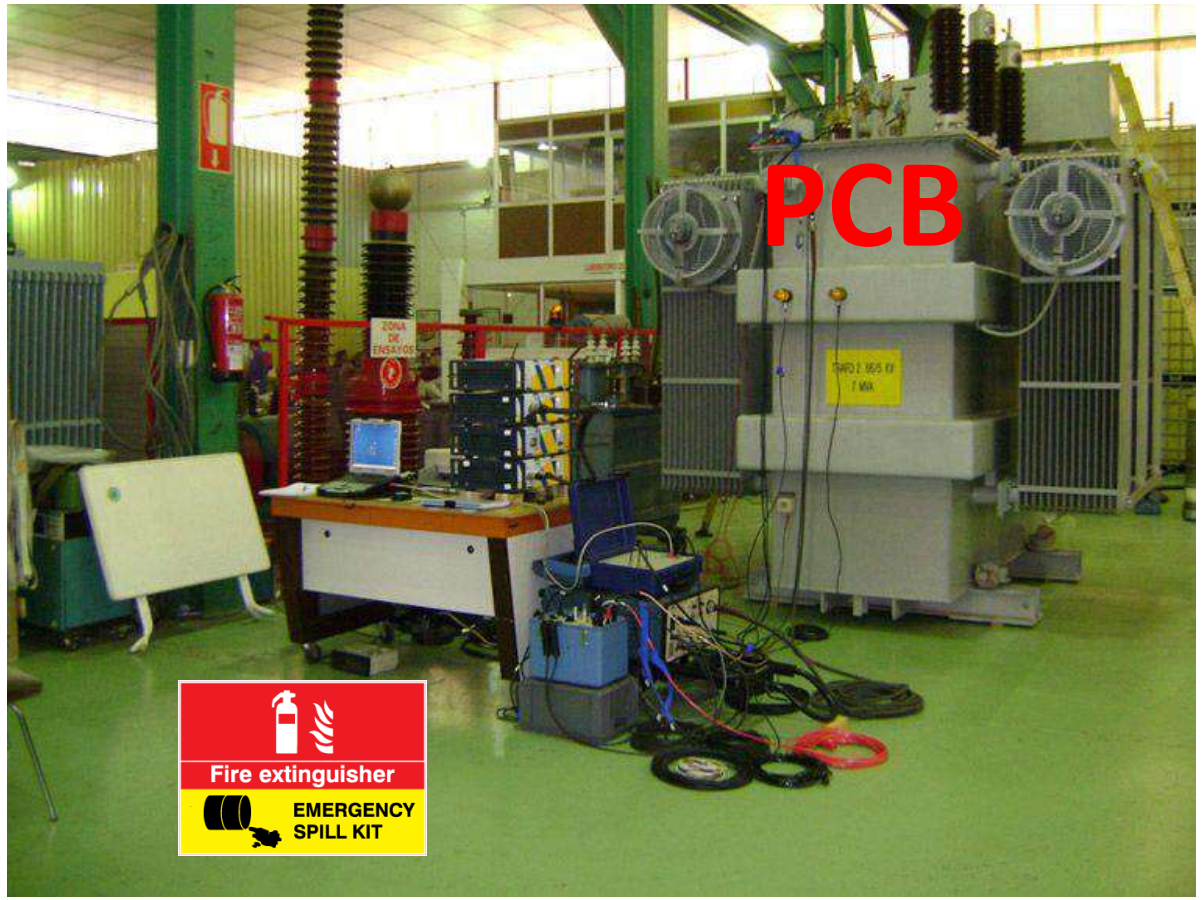
7. Maintenance of transformers



The repair area for equipment with PCB must be equipped with an oil leak or spill collection system, as well as a collection well or soak pit that may contain at least 110% of the dielectric oil in the area in the event of an incident, such as a leak.

The walls and floors must be coated metallic sheets or geomembrane to prevent PCB contamination of the concrete floors.

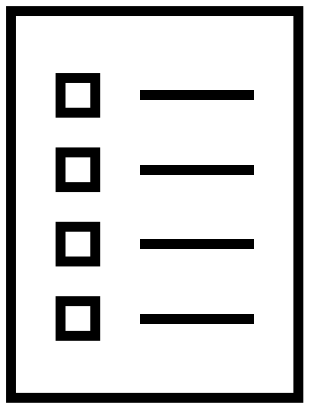
7. Maintenance of transformers



A complete kit for spills, fires and medical emergencies must be available.

7. Maintenance of transformers

It is necessary to have a Contingency Plan for PCB-related incidents.



7. Maintenance of transformers

Designated pumps, pipe systems, and special drums should be used to decant liquid waste with PCB (and for no other purpose) during maintenance activities.

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7. Maintenance of transformers

Clean-up:

- All spilled liquid should be cleaned with cloths, paper, or other absorbent materials after maintenance and field activities.
- All traces of PCB on surfaces should be eliminated by triple-rinsing with a solvent such as kerosene.
- All cloths, papers, absorbent materials, solvents used in the triple rinse, as well as PCB-contaminated disposable protection equipment and plastic coating, must be properly stored until their treatment and final disposal.

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Thank you for your attention !

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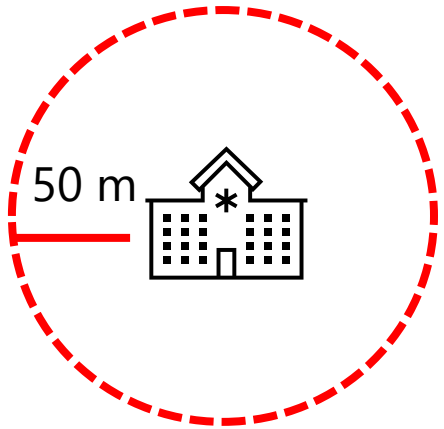
Annex

Overview of procedures

6. Environmental control and management measures (Operation)

Equipment containing PCB at concentrations above 50 ppm, and which are in suitable operating conditions, may continue to be used with the following restrictions:

- 50 m safety distance from high sensibilities areas (e.g. educational institutions, dense urban areas, markets, hospitals, and shopping centers).
- The area with PCB equipment should accessible only for auhtorized personnel.
- The safety drains and oil tank should be able to contain at least 110% of the dielectric oil in the event of failure, spillage or leaks. Those should be covered with a metallic sheet or a geomembrane to prevent PCB contamination of the concrete floors.
- A complete kit for managing spills, fires and medical emergencies should be available in the area.



6. Environmental control and management measures (Operation)

- The company should provide workers with personal protection equipment (PPE) and use them. Non-compliance must be considered a serious violation and sanctioned as per the company's regulation
- The company should have a set of tools which will only be used to work on PCB-contaminated equipment.
- Physical inspection of the equipment should be carried out every two weeks or less, with the purpose of detecting structural flaws, dielectric oil leaks, perforations, rust or unusually high temperatures.
- Fluids and accessories used to clean the bushings should be disposed of in accordance with recommendations found in Guidelines and Decision-Making Toolkit (DMT).



6. Environmental control and management measures (Operation)

- The surface of the containment area should be coated with protective material:
  - paint, urethane or epoxy,
  - or plastic coating or absorbent mats should be placed under the equipment.
- Tools and machine items such as pumps, pipe systems and special drums especially designated for maintenance and repair of PCB containing equipment should be used.
- All spilled liquids should be cleaned with cloths, paper, or other absorbent materials after maintenance and field activities.
- All traces of PCB on surfaces should be eliminated by triple-rinsing with a solvent such as kerosene.
- All cloths, papers, absorbent materials, solvents used in the triple rinse, as well as PCB-contaminated disposable protection equipment and plastic coating, must be properly stored until their treatment and final disposal.

7. Environmental control and management measures (Maintenance)

- All equipment sent to specialized service companies must be screened by PCB (such as the Clor-N-Oil or L2000DXT Analyzer).
- All equipment that is returned to clients after maintenance or repair must have a certificate of having been screened for PCB using any of the previously mentioned procedures.
- Workers must use personal protection equipment (PPE).
- The specialized service company must have a PCB tools and machine kit just for maintenance and repair of equipment with PCB.
- The repair area for equipment with PCB must be conditioned with an oil leak or spill collection system, as well as a collection well or soak pit that may contain at least 110% of the dielectric oil in the area in the event of an incident, such as a leak. The walls and floors must be coated metallic sheets or geomembrane to prevent PCB contamination of the concrete floors.

7. Environmental control and management measures (Maintenance)

- A complete kit for spills, fires and medical emergencies must be available.
- It is necessary to have a Contingency Plan for PCB-related incidents.
- Designated pumps, pipe systems and special drums should be used to transfer liquid waste from equipment with PCB, and for no other purpose during maintenance activities.
- After maintenance and repair, transport or field work of equipment with PCB, the involved area should be carefully cleaned, ensuring that all PCB spills have been removed using cleaning cloths, paper or other absorbent materials.
- All contaminated surfaces must be triple-rinsed with organic solvents, to eliminate any traces of PCB.
- Cleaning cloths, papers and absorbent materials, as well as any disposable PPE or plastic coating used in the PCB workroom must be appropriately stored until their treatment or final disposal.