



Maintenance of **PCB** equipment



Maintenance PCB equipment

The best working practices

Avoid direct contact skin contact with PCB contaminated materials by wearing appropriate PPE*.
Properly ventilated the work area.
Prevent spills by using spill trays or plastic sheeting.
Avoid PCB contact with a combustion source greater than 300°C.
Tools and materials that have had contact with PCBs should be disposed of as PCB-contaminated waste or decontaminated with an appropriate solvent for materials such as steel, glass or ceramics.
Operations involving drainage, oil refilling, etc. must be performed by companies authorized by the environmental authority.



*PPE: Personal Protective Equipment

Maintenance PCB equipment

Maintenance of transformers containing PCB

Visual inspection or test

It is the simplest and most economical test.

The following should be inspected:

- Oil stains near the equipment
- Oil stains or spill marks on equipment
- Severe physical damage
- Narrow drip pan



Transformers should be visually inspected every three months by the owner, who is responsible for maintaining inspection records.

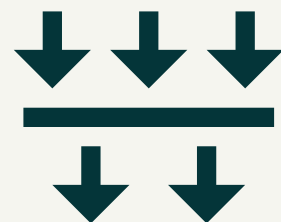
Maintenance and potential problems that might occur

Leaking transformers

When a leak or spill has been detected in or near a transformer, it is necessary to **identify the cause of the leak and prepare clean-up**. If possible, repairs should be carried out without affecting the main parts of the transformer.

The most common leaks are

- In the seals
- In joints



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The following table present situations with leakages of PCBs oils.

Cause of leakage	Corrective actions	Comments
Damage to the metal structure of the transformer	Seal the leak temporarily with a sealing paste and place a drip pan under the equipment or transformer.	Since this is a temporary solution, a proper repair should be made as soon as possible.
Slow degradation of the cooling fluid, which increases corrosion	Seal the transformer with a sealing paste, disassemble it as soon as possible and replace it with a new device.	This recommendation is provided whenever corrosion is very advanced.

Transformer oil level

Most transformers have a direct or indirect device that controls the level of the dielectric oil.

Recommendation

Before bringing the dielectric level to full capacity, it is crucial to check the PCB content of the transformer as well as the additional coolant to avoid any possible contamination.

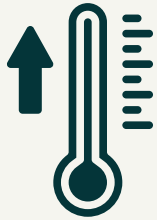


Figure 1: Oil level indicator for transformers

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Temperature gauge

- **Function:** Indicates the temperature of the dielectric fluid inside the transformer.



Problem detected during maintenance	Recommendation
Transformer overheating due to excessive temperatures, possibly due to dielectric fluid losses.	Check regularly the temperature gauge, as elevated temperatures can increase the level of deterioration of the insulating materials in the transformer when above normal operating temperature.

Pressure vacuum gauge

- **Function:** Measures pressure changes in the headspace between the dielectric fluid and the tank lid. One example is the vacuum manometer.

Problem detected during maintenance	Recommendation
Abnormally high pressure indicates that short circuits or electric arcs may have occurred.	Performal test as soon as possible.
Unusually low pressure indicates a low dielectric fluid level.	Take immediate action to identify the cause of dielectric fluid loss.



Figure 2: Vacuum manometer

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Corrosion on the tank and radiator fins

The condition of the tank and radiator fins should be checked regularly. If corrosion occurs, the rust should be removed from and the affected area should be painted.



Figure 3: Corrosion on radiator fins



Figure 4: Corrosion on the tank

Performance test

Transformers should be periodically checked for any changes that may be the first signs of degradation in the performance of a transformer and, therefore, may suggest the possibility of hazards.

The following should be verified:

- Operation of all safety devices.
- Electrical behavior of the transformer
- Oil quality (physical and chemical tests)



PCB equipment maintenance

Maintenance of capacitors

Visual inspection

This is easy to perform and can be carried out frequently.

It allows detection of the following:

- Leaks in the casing
- Swelling or deformation of the casing
- Oxidation of the casing

A swelling or convex shape of the casing is a clear indication of an imminent short circuit in the capacitor.



Figure 5: Convex or swollen shape capacitor

Damage	Recommendation
<ul style="list-style-type: none">• Leaks in the casing• Swellings or deformations in the casing	Capacitors should be dismantled immediately and disposed of in an environmentally safe manner.



Visual checks should be **complemented with technical inspections** that require a qualified team.

The frequency of technical inspections can be determined depending on the condition of the equipment (at least once a year).