

Industrial Power Transformers: Selection, Installation, Advanced Maintenance and Reliability

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INDUSTRIAL POWER TRANSFORMERS:
SELECTION, INSTALLATION, ADVANCED
MAINTENANCE AND RELIABILITY

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Selection, Installation, Advanced Maintenance
and Reliability**

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This book

The goal of this book is to explain the recommended ways to do work usually done to prevent problems with transformers.

The methods taught in this book are not for big overhauls and rehabilitations to fix a transformer. However, a lot of activities are done during normal procedures.

Maintenance and major transformer overhaul could be similar. The tasks for taking care of a transformer we talked about can be done if the transformer is not too damaged.

The tips in this book are like the advice that manufacturers give for their products. If you need specific instructions, the operator should look at the manuals from the manufacturer. Preventative maintenance for transformers includes regularly checking, fixing small issues, and special care instructions. Furthermore, if the equipment is installed and operated correctly, it will work well for a long time without any problems.

Large electrical transformers setup and maintenance

A transformer needs to be installed and loaded correctly to work well.

Taking care of something to make sure it works well. It also depends on having the right design and making it well.

Like any device or equipment, if you don't follow the rules for electrical devices, it can cause big problems and you might lose the equipment. The goal of maintaining transformers can be explained like this:

Transformer Corrective (unscheduled) Maintenance

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Briefly, fix the equipment when its breakdown. Otherwise, don't take any action!

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TRANSFORMER ROUTINE Maintenance

This includes adjustments, cleaning, inspection, and necessary replacements. Those are the light regular tasks that can be done by the operator himself. And doesn't require extensive maintenance expertise.

Preventive Maintenance (Scheduled/Planned Maintenance)

This way of doing things involves preventing problems, predicting when issues might occur, and fixing them if they do.

Keeping something in good condition and fixing any problems. Preventive maintenance means doing regular maintenance on a schedule.

Regular testing means regularly checking something to make sure it is working properly. Predictive maintenance means checking and testing things more often.

Fixing and restoring the transformer is what corrective maintenance does.

Repairing something back to its original state when it is damaged.

The aim of transformer preventive maintenance is to stop the oil and winding insulation from getting damaged. Mineral oil and paper insulation can be affected by water, air, heat, and other things like metal, electricity, and stress.

The oil in the transformer gets oxidized, which causes a problem.

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Sludging means moving slowly or with difficulty. In sealed units, we need to stop moisture from getting in through the air or from seal leaks. Wetness will make it harder for both the oil and the insulation of the wires to resist electricity. Additionally, when a transformer gets too hot, the paper coating on the wires inside can break down, leading to moisture build-up. More water in the paper makes the paper weaker and as it gets hotter, the water moves into the oil and makes it weaker too. The most important thing is to make transformers in a way that keeps moisture and oxygen away.

Next, we need to make sure that the transformers are not used at temperatures higher than what they are rated for. Additionally, it is important to regularly check and test the insulation of the transformer and take steps to fix any problems to keep the transformer in good condition.

Monitor and Control
transformer temp.

Check and take care of all
auxiliary parts of the
transformer.

Check and care for the
wrapping/insulation
around a transformer.

Keep the insulation of the
transformer bushing in
good condition.

Keep the coating on the
transformer in good
condition.

**Any Preventive Maintenance
Program for a Transformer Should
Involve Those Steps**

Dry-Type Power Transformers Installation

When you install dry-type transformers, think about how easy it is to reach them, how well they can breathe, and the weather around them. Ventilated dry-type power transformers are usually made for use inside in dry places. They will work well in humid places, but if they are turned off for a long time, it may be necessary to take steps to keep them dry. Stay away from places with water dripping. If we can't do that, we need to make sure the transformer enclosure is protected from water getting in. We need to be careful to protect against water getting in by accident. This could happen from an open window, a broken water or steam pipe, or using water near the transformers. Good air flow is necessary to keep the transformer cool. It's best to use clean, dry air. Clean air can reduce the need for repairs in a place with problems. When power transformers are put in small rooms or other tight spaces, they need enough air flow to keep the air temperature around them at safe levels.

Usually, you need at least 100 cubic feet of air per minute for every kilowatt of transformer loss. The size of the ventilating holes depends on how tall the vault is. Self-cooled power transformers need to have an effective area of at least 1 ft. For every 100 kVA of transformer capacity, there needs to be a certain amount of space for the inlets and outlets, minus the space taken up by screens, gratings, or louvers. Ventilated dry-type transformers should be placed in areas without a lot of dust or strong chemical fumes. Transformers that are bigger