Distribution Transformer Installation Manual

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Book Descriptions:

Distribution Transformer Installation Manual

Wellillustrated, this reference helps everyone install and maintain transformers correctly, quickly, and safely. Contents include transformer connection diagrams; stepbystep installation procedures; electrical formulas; transformer grounding practices; how to check the load on a transformer; how to lift and handle transformers; phasing and paralleling threephase transformer banks; fusing tables; safety tips; work clearances. This book is one of our top sellers. And, each manufacturer will have its own instructions for installing and testing its transformers. Regardless of manufacturer, you should carefully follow these instructions to ensure adequate safety to personnel and equipment. And its important that you follow current NEC practice and applicable local codes. A note of caution The information presented here is not meant to supersede any manufacturers instructions. Each test has a particular objective that helps determine a transformers suitability for use. Also, its a matter of cost. The expense associated with testing represents a larger portion of a small transformers cost compared with the testing cost of a large kVA unit. Should a transformer be built to meet special requirements, however, then some additional testing is recommended to ensure that the unit operates as called for. Sometimes, when testing is carried out at the manufacturers plant, the manufacturer will also allow a purchaser or a representative, such as a consulting engineer, to witness the tests. Usually, additional testing means there will be an increase in transformer cost. Before specifying any additional tests, you should contact the manufacturer to find out what data it has accumulated from testing essentially duplicate units. If this data can be used, the extra cost to carry out tests can be avoided without sacrificing the quality of the transformer. The location should not expose the transformer to possible damage from cranes, trucks, or moving equipment.http://www.ponikwa.pl/htdocs/userfiles/canon-dr-7580-service-manual.xml

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Other site considerations require closer analysis. For transformers placed outside that are 2000kVA and above, you may wish to have the soil examined. Clay soils are compressible and can cause problems that may require stabilizing backfill.For units with ratings above 500kVA to 2500kVA, a typical concrete base would be 8 ft by 9 ft and 10 in.In addition, to avoid problems, a civil engineer should be consulted for guidance on the above matters. For new buildings, you should work with the structural engineers so that the transformers placement is included in the building plans. Structurally speaking, its generally wiser to place a transformer as close as possible to a column.Therefore, its advisable that you seek guidance on this matter from an engineer knowledgeable in seismic supports and the associated code requirements. By studying the overall mounting and terminal dimensions, its possible to plan the installation with an orderly arrangement of connections. Also, with this information, it will be easier to plan site arrangements. Examination should be made before removing it from the railroad car or truck, and, if any damage is evident or any indication of rough handling is visible, a claim should be filed with the carrier at once and the manufacturer notified. Subsequently, covers or panels should be removed and an internal inspection should be made for damage or displacement of parts, loose or broken connections, dirt or foreign material, and for the presence of water or moisture. If the transformer is moved or if it is stored before installation, this inspection should be repeated before placing the transformer in service.

These provisions will vary depending upon the weight, size, and mechanical configuration of the unit. The weight distribution should be studied by examining the inside of the transformer enclosure for drytype units. If appropriate, supports should be used so that the transformer enclosure is not crushed when the unit is lifted.http://danchrisjewelry.com/userfiles/canon-dr-5010c-manual.xml

Larger units will have provisions for lifting from the base frame or from clamps at the top of the core. Make sure the rigging crew is experienced in lifting and moving heavy delicate equipment. Units lifted from the top core clamps will sometimes require that the top cover or part of the cover be removed. There should be no attempt to handle a transformer in any other position. If this isnt possible, you first should contact the manufacturer to explore other options.When rollers are used on transformers without a structural base, you should use skids to distribute the stress over the base. Large enclosed units with base frame type enclosures may be jacked using the base frame angles. The transformer should be jacked evenly on all four corners to prevent warping or tipping over. A check sheet should be used to record all items, and verification should be made that these items have been properly accounted for upon completion of work. Check all of the tap jumpers for proper location and for tightness. Retighten all cable retaining bolts after the first 30 days of service. Before working on the connections make sure all safety precautions have been taken. Such stress could cause a bushing to crack or a connection to fail. A protective plating or compound that prevents surface oxidation on the aluminum terminals is usually applied at the factory. You should not remove this coating from tap and line terminals. Also, when aluminum conductors are used, give them a protective compound treatment at the terminal as specified by the cable manufacturer. To avoid problems, you should follow the instructions provided by the transformer manufacturer. Torque specifications are sometimes listed on the hardware. After applying proper torque, you should wait a minute or so, and then retighten all bolts to the specified torque. These terminations should be attached to the cables as specified by the termination or cable manufacturer.

Such terminations are available from electrical distributors. Do not install washers between the terminal lugs and the termination bus bar as this will introduce an added impedance and will cause heating and possible connection failure. When speaking to consulting engineers on this topic, weve found that they recommend the cable be sized for the transformers nameplate rating. You take your choice; extra safety and extra cost or regularsized cables. Whatever the choice, the cable insulation rating must be adequate for the installation. The cables you install must be kept as far away as possible from coils and top blades. If in doubt about clearances, do not hesitate to call the transformer manufacturer. Information on minimum wire bending space clearances at terminals for conductors is found in NEC Sec. 3736, Deflection of Conductors, and referenced in Sec. 45012 on Terminal Wiring Space. Although there are no moving parts in a transformer, the core does generate sound. In the presence of a magnetic field, the core laminations elongate and contract. These periodic mechanical movements create sound vibrations with a fundamental frequency of 120 Hz and harmonics derivatives of this fundamental. For example, if the transformer is installed in a quiet hallway, a definite hum will be noticed. If the unit is installed in a location it shares with other equipment such as motors, pumps, or compressors, the transformer hum will go unnoticed. Some applications require a reduced sound level, such as a large unit in a commercial building with people working close to it. Occasionally, the installation of some method of sound abatement will be called for. You should consider this when planning the units installation. Locating a unit at the end of a long, narrow room, or in the corner of a room can cause a megaphone effect and amplify the transformers sound.

Mounting the unit on a platform that has less mass than the transformer will make the platform serve as a sounding board, just like the body of a violin. Even mounting the unit a distance that is an exact multiple of the 120 Hz wavelength from a solid reflective surface may reinforce the sound

waves, causing the transformer to seem louder than it actually is. These considerations should be taken into account, as well as the use of sound absorbing materials on walls for low frequency sound and vibration isolation pads under the unit. You should note, though, that transformers serving large harmonic loads can produce a higher audible noise. The usual sound levels for liquidfilled transformers range from 40 dB to 60 dB for units below 500kVA, about 65 dB for units between 4000kVA to 5000kVA, 73 dB for transformers with ratings between 6000kVA to 7500kVA, and 76 dB for units between 8000kVA and 10,000kVA. Sound levels associated with certain kVA ratings will vary depending upon the type of transformer and manufacturer. You should ground the transformer as per NEC Sec. 45010 and check the grounding of the neutral as applicable per NEC. Before energizing the unit, its very important that you alert all personnel installing the transformer that lethal voltages will be present inside the transformer enclosure as well as at all connection points. The installation of conductors should be performed only by personnel qualified and experienced in highvoltage equipment. Personnel should be instructed that should any service work be required to the unit, the lines that power the transformer must be opened and appropriate safety locks and tags applied. For this test, apply a lowvoltage 240V or 480V to the highvoltage winding and measure the output at the lowvoltage winding. However, for lowvoltage 600V and below transformers, this is not practical. Here, a transformer turns ratio indicator should be used to measure the ratio.

These include the operation of fans, motors, thermal relays, and other auxiliary devices. Correct fan rotation should be visually verified as well as by checking indicator lights if they are installed. Also, you should arrange for a oneminute, 1200V insulation resistance test of the control circuits. If the power transformer has CT circuits, they should be closed. But be careful here Before applying this voltage, check with the manufacturers manuals. Some microprocessorbased electronic devices may not be able to withstand the voltage. You should check the internal connections with the diagram on the nameplate to make sure they are correct for the application. The tap setting should also be verified for the proper voltage. You should arrange for an insulation resistance test to be carried out to make certain that no windings are grounded. A number of manufacturers require that insulation resistance testing be successfully completed prior to the transformer being placed in service for the warranty to be valid. Some manufacturers require that the megohmmeter readings and date of energizing be sent to them within a specified time after the transformer is placed in service for the warranty to be valid. The insulation resistance test should be conducted immediately prior to energizing the transformer or the beginning of the dielectric test. If these parameters are different, circulation current will exist in the circuit loop between these units. The difference in impedance should not exceed 7.5%. The greater the differences in these parameters, the greater the magnitude of the circulating current. When specifying a transformer to be operated in parallel with existing units, all these parameters should be discussed with the transformer manufacturer. Then, without connecting the load, energize the transformer. The magnitude of the voltages shown linetoground and linetoline should be very similar.

If this is not the case, deenergize the transformer and contact the manufacturer before proceeding further. While monitoring the voltages and currents, gradually increase the load in a stepped or gradual application until full load is reached. If you cannot gradually increase the load, then full load may be applied. Both the voltages and currents should change in a similar fashion. If this does not happen, deenergize the transformer and contact the manufacturer. However, a specially designed unit may have specific load capabilities not indicated on the nameplate. If you have some doubt as to the load capability of the unit, contact the manufacturer. This should be done at some safe access point near or at the load. Never attempt to check the output voltage at the transformer. Dangerous high voltage will be present within the transformer enclosure. Consult the transformer diagrammatic nameplate for information on what tap must be used to correct for extra high or extra low incoming line voltage. The same adjustment should be made to compensate for voltage drop in the output due

to long cable runs. When the loadside voltage is low, tap connections below 100% of line voltage must be used to raise the load voltage. If the loadside voltage is high, tap connections above 100% of line voltage must be used to lower the load voltage. Part 3 will cover installation procedures for liquidfilled transformers that are shipped unassembled. Reflecting back on the past year, we thought it would be worthwhile to revisit the 10 most popular photo galleries of 2016. Presented in descending order, these galleries are ranked based on total website traffic over the last 12 months. All rights reserved. A transformer is characterized by its electrical parameters, but also by its technology and its conditions of use.

The first letter refers to the high voltage winding, the second letter to low voltage windingTwo loading guides can help to verify if the transformer is correctly defined according to the expected lifespan, which are respectively the IEC 600767 and IEC 6007612.The moulding of the windings contain no halogen compounds chlorine, bromine, etc. and no other compounds capable of producing corrosive or toxic pollutants, thereby guaranteeing a high degree of safety to personnel in emergency situations, notably in the event of a fire. Transformers exposed to fire risk with low flammability and self extinguishing in a given time.This latter is assessed according to two criteria see Fig. B39 The expansion of the insulating liquid is compensated inside the conservator by the raising of the oil level.This is achieved by admitting the outside air in the conservator through a desiccating device containing silicagel crystals.For ratings up to 10 MVA, totally filled units are available as an alternative to conservator type transformers.In some countries drytype transformers are mandatory for specific buildings such as hospitals, commercial premises etc. The highest efficiency is attained in the range 50 % 70 % of the full load, This wiki is a collaborative platform, brought to you by Schneider Electric our experts are continuously improving its content, as they were doing for the guide. Collaboration to this wiki is also open to all. This family of products available in either copper or aluminum windings includes products such asDelta Transformers Inc.Delta Transformers Inc.The dry type DELTA transformer minimizes the risk of toxic smoke in case of fire plus eliminates the risk of contamination resulting from chemical product spills. This characteristic lets you save on high intensity conductors and on the bus joints. The modular construction of the enclosure makes it easier to access, install and assure maintenance of the transformer.

The DELTA approach lets us build transformers with reduced losses and a better voltage regulation to be able to save on its operation during the life of your equipment. They are only listed for informative purposes. IEC60354 Loading Guide for oil immersed power transformer. IEC60364 Specification for Gas operated relays IEC156 Method for the determination of the electric strength of insulating oils. IS10028 Code of Practice for Installation of Transformers. IS335 Code of Practice for Maintenance of Transformers IS1866 Code of Practice for maintenance of Transformer oil IS1646 Code of Practice for Electrical Installation Transformer is one of the most vital and important electrical machinery. Being a static machine, it is inherently reliable compared to other machines. Distribution transformers are a important link between the power system and millions of electricity consumers. Any failure of this important equipment, apart from adversely affecting the consumers, will also mean considerable financial loss to the electricity undertaking. It is therefore of important that utmost care is taken in the design, manufacture, testing, installation, and maintenance of transformers To Read the entire document, link of the free download link below LINK 1 Share to Twitter Share to Facebook Share to Pinterest If you feel that we need to remove any of those aforementioned elements, feel free to inform the administrator of the site. The transformer permits multiple voltages to be leveraged in the design of the system. The transformer permits multiple voltages to be leveraged in the design of the system. For more details, please read our We are excited that you have joined the group. You will receive your first welcome message soon. It will describe the email program and what to expect in the upcoming weeks. Enjoy. Schneider Electric’s Innovation Summits are all about preparing you to lead in this era.

Certified to the latest E4 C4 F1 Next, discover our energy and sustainability services, including big data management, to turn this vision into your business reality. For more details, please read our We are excited that you have joined the group. Please restart your browser and try again. If the error persists contact the Support Team. Please restart your browser and try again. If the error persists contact the Support Team. Detailed information on the use of cookies on this website is provided in our Privacy Policy. By continuing to browse the site you are agreeing to our use of cookies. Find out more here. Hitachi ABB Power Grids liquidfilled transformers are manufactured in accordance with the most demanding industry and international standards. Transformers can be used for indoor or outdoor applications and can be provided with offload and onload tapchangers. The invention of a practical efficient transformer made AC power distribution feasible; a system using distribution transformers was demonstrated as early as 1882.If the distribution lines are located at ground level or underground, distribution transformers are mounted on concrete pads and locked in steel cases, thus known as distribution tap padmount transformers. Since distribution transformers are energized for 24 hours a day even when they dont carry any load, reducing iron losses has an important role in their design. As they usually dont operate at full load, they are designed to have maximum efficiency at lower loads. To have a better efficiency, voltage regulation in these transformers should be kept to a minimum.They are often used for the power supply of facilities outside settlements, such as isolated houses, farmyards or pumping stations at voltages below 30 kV. Another application is the power supply of the overhead wire of railways electrified with AC.Several homes may be fed from a single transformer in urban areas.

Rural distribution may require one transformer per customer, depending on mains voltage. A large commercial or industrial complex will have multiple distribution transformers. In urban areas and neighborhoods where the primary distribution lines run underground, padmount transformers, transformers in locked metal enclosures mounted on a concreted pad, are used. Many large buildings have electric service provided at primary distribution voltage.The primary distribution wires use the threephase system. Main distribution lines always have three wires. Primaries provide power at the standard distribution voltages used in the area; these range from as low as 2300 volts to about 35,000 volts depending on local distribution practice and standards; often 11,000 V 50 Hz systems and 13,800 V 60 Hz systems are used, but many other voltages are standard. For example, in the United States, 12,470 V is most common. This is to create three 7,200 V phases with respect to earth ground, exactly 30 times the 240 V splitphase secondary side.A single phase wye transformer usually has only one bushing on top, connected to one of the three primary phases. The other end of the primary winding is connected to the transformers case, which is connected to the neutral wire of the wye system, and is also grounded. A wye distribution system is preferred because the transformers present unbalanced loads on the line that cause currents in the neutral wire and are then grounded. But with a delta distribution system the unbalanced loads can cause variations in the voltages on the 3 phase wires. A single phase delta transformer has two bushings on top which are connected to two of the three primary wires, so the voltage across the primary winding is the phasetophase voltage. A disadvantage of a delta transformer is if only one of the two primary phases is deenergized, the remaining phase will backfeed through the transformer winding into the deenergized phase, which could be a hazard to line workers.

The windings are almost always connected in a wye configuration, with the ends of the three windings connected and grounded. For polemounted transformers this usually takes the form of a fused cutout . An electrical fault causes the fuse to melt, and the device drops open to give a visual indication of trouble. It can also be manually opened while the line is energized by lineworkers using insulated hot sticks. In some cases completely self protected transformers are used, which have a circuit breaker built in, so a fused cutout isnt needed.Connecting a load between either hot wire and the neutral gives 120 volts, which is used for lighting circuits. Connecting between both hot wires gives 240 volts, which is used for large appliances such as ovens and clothes dryers. There are three

230 V secondary windings, each receiving power from a primary winding attached to one of the primary phases. One end of each secondary winding is connected to a neutral wire, which is grounded. The other end of the 3 secondary windings, along with the neutral, are brought down the service drop to the service panel. 230 V loads are connected between any of the three phase wires and the neutral. Some industrial customers require threephase power at secondary voltages. To provide this, threephase transformers can be used. In the US, which uses mostly single phase transformers, three identical single phase transformers are often wired in a transformer bank in either a wye or delta connection, to create a three phase transformer.Near Jelenia Gora, Poland This core construction is designed to reduce core losses, dissipation of magnetic energy as heat in the core, which are an economically important cause of power loss in utility grids. Core losses are caused by two effects; hysteresis loss in the steel, and eddy currents. Silicon steel has low hysteresis loss, and the laminated construction prevents eddy currents from flowing in the core, which dissipate power in the resistance of the steel.

The windings are insulated with resinimpregnated paper. The entire assembly is baked to cure the resin and then submerged in a powder coated steel tank which is then filled with transformer oil or other insulating liquid, which is inert and nonconductive. The transformer oil cools and insulates the windings, and protects the transformer winding from moisture, which will float on the surface of the oil. The tank is temporarily evacuated during manufacture to remove any remaining moisture that would cause arcing and is sealed against the weather with a gasket at the top.Because these chemicals persist in the environment and have adverse effects on animals, they have been banned. Other fireresistant liquids such as silicones are used where a liquidfilled transformer must be used indoors.The enclosure may also include fuses, isolating switches, loadbreak bushings, and other accessories as described in technical standards. Padmounted transformers for distribution systems typically range from around 100 to 2000 kVA, although some larger units are also used.The Fairmont Press, Inc.By using this site, you agree to the Terms of Use and Privacy Policy. Our search algorithmIt is primarily intended to be used as an apprenticeship textbook and a homestudy book to supplement daily work experiences. This Handbook has 50 chapters; 11 chapters are devoted to a general understanding of electricity, electrical terms, and electricpower systems; 31 chapters are devoted to actual construction of overhead and underground distribution and transmission lines and to maintenance procedures; and 7 chapters are expressly devoted to safety guidelines. The final chapter can be used by the reader as a selfexamination of the information presented. Elementary Electrical Principles 1.1. Electron Theory 1.2. Electric Current 1.3. Conductors and Insulators 1.4. Electric Circuit Compared with Water Circuit 1.5. Series Circuit 1.6. Parallel Circuit 1.7. SeriesParallel Circuit 1.8. Electric System 1.9.

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