As with most industries, the distribution transformer industry has its own language.

Use this handy reference guide to understand terms used in our industry.

TRANSFORMER TRANSLATOR

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ANSI – Acronym for American National Standards Institute, a private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the U.S.

BIL – Acronym for *Basic Insulation Level,* the measure of the insulation capability of electrical equipment; the equipment's ability to withstand very high voltage surges. *See Impulse Test.*

Copper Loss – As electricity flows through a conductor (wire), some energy is lost and escapes as heat, due to *electrical resistance*. This wasted energy is called *conductor loss*, *copper loss* or *load loss*.

Commercial Tests – A battery of ANSI tests endorsed by IEEE that include resistance measurements, polarity and phase-relation tests, ratio tests, no-load loss and excitation current measurements, impedance and load loss measurements, dielectric tests, temperature tests, short-circuit tests, audible sound level measurements, and calculated data.

Core Loss – Transformers convert high-voltage electricity into magnetism in the core, then magnetism into low-voltage electricity. While copper loss occurs in the high- and low-voltage sections, the "middle man," magnetism, has a loss called *core loss* or *no-load loss*.

Exciting Current – Current or amperage flowing through the primary (high voltage) winding that is adequate to magnetize the core under no load; usually expressed as a percentage of the rated current of the winding in which it is measured.

FR3 – Envirotemp™ FR3™ fluid is a natural ester derived from renewable vegetable oils – providing improved fire safety, transformer life/loadability, and environmental benefits that are superior to mineral oil and unsurpassed by any other dielectric coolant.

Impedance – The opposition to alternating current presented by a circuit when voltage is applied.

IEEE – Acronym for Institute of Electrical and Electronics Engineers, the world's largest professional association of scientists and allied professionals in the fields of electrical and electronics engineering, computers and software, physics, medicine and others.

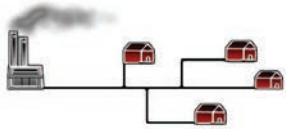
Impulse Test – A simulated lightning strike. The tester "zaps" each bushing with the rated nameplate BIL (Basic Insulation Level) voltage. The tester can look at the wave of the impulse on a scope and determine if the unit passes or fails. A properly built and vacuum-processed coil will pass through the high voltage without internal damage to the transformer.

Induce Test – A "stress test" on the high-voltage section of the coil that ensures each high-voltage layer is properly insulated from the others; conducted by energizing the transformer at above-normal voltage and frequency.

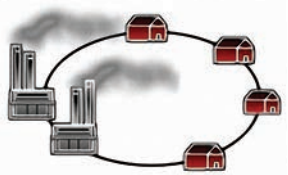
kVA – A volt-ampere (VA) is the voltage times the current (amps) feeding an electrical load. A kilovolt-ampere (kVA) is 1000 volt-amperes. It indicates the amount of power that can be safely obtained from a transformer. In general, the larger the kVA, the larger the transformer.

Series and Parallel – Components in a series are connected in a single path, so the same current flows through all components. Components connected in parallel are connected so the same voltage is applied to each component.

Radial, Loop & Network Systems – Distribution system designs that can be used alone or in combinations. The Radial distribution system is the cheapest to build, and is widely used in sparsely populated areas.



A radial system has only one power source for a group of customers. A power failure, short-circuit, or a downed power line would interrupt power on the entire line which must be fixed before power can be restored.

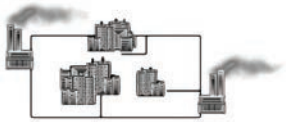


A loop system, as the name implies, loops through the service area and returns to the original point. The loop is usually tied into an alternate power source. By placing switches in strategic locations, the utility can supply power to the customer from either direction.

If one source of power fails, switches are thrown (automatically or manually), and power can be fed to customers from the other source.

The loop system provides better continuity of service than the radial system, with only short interruptions for switching. In the event of power failures due to faults on the line, the utility has only to find the fault and switch around it to restore service. The fault itself can then be repaired with a minimum of customer interruptions.

The loop system is more expensive than the radial because more switches, conductors and transformer bushings are required, but the resultant improved system reliability is often worth the price.



Network systems are the most complicated and are interlocking loop systems. A given customer can be supplied from two, three, four, or more different power supplies. Obviously, the big advantage of such a system is added reliability. However, it is also the most expensive. For this reason it is usually used only in congested, high load-density municipal or downtown areas.

Phase – Single-phase current travels along a conductor (wire) in a single sine-wave pattern, and is typical household current. Three-phase is supplied on 3 condutors, each carrying current that is displaced from the other by 120 degrees. Three-phase is the method used to transfer power on the electrical grid and may be supplied to industrial consumers where large motors and other heavy loads are present.

Ratio – The electrical relationship of the numbers of turns in windings. Find by dividing the number of high-voltage turns by the number of turns in the secondary winding. Example: one winding of a two-winding transformer has 10 times the number of turns as the other winding, so the voltage across the first winding will be 10 times times the voltage across the second winding.

Regulation – The percentage change in the output voltage from no-load to full-load with respect to its full load voltage, when the voltage supplied to the primary remains constant.

Transformer Types – There are two basic types of transformers. **Pole-mount** (also called overhead or aerial) units are mounted overhead, attached to utility poles. Power is fed from the utility source to the primary on lines strung between the poles. Secondary voltage lines run from the transformer along the same poles and down to the consumer's structure. Transformers that are fed by lines buried in the ground are called **underground** units. They may be *pad-mounts* (installed on the ground's surface) or *submersibles* (installed in vaults below grade level). Power from underground transformers is distributed to consumers via lines buried underground.