

# Transformer Testing

[www.IndustrialTests.com](http://www.IndustrialTests.com)



## Transformer Services

### Acceptance Test

Before energizing a transformer, test its condition. This will serve as a means of comparison during future maintenance checks, and can help determine if corrective measures are required. The most common tests you should make before a unit is energized are:

- Insulation Resistance with Megometer
- Test of oil dielectric strength
- Core to Ground insulation
- Turns Ratio check
- Winding Resistance check
- Insulation Power Factor
- Gas-analysis of oil

### TTR (Turn to Turn Ratio) Test

Each winding of a transformer contains a certain number of turns of wire. The turns ratio is defined as the ratio of turns of wire in the primary winding to the number of turns of wire in the secondary winding. Turns ratio can be expressed using the equation:

$$\text{Turns ratio} = N P / N S$$

where  $N P$  = number of turns on the primary coil  
 $N S$  = number of turns on the secondary coil

### Power Factor Testing

Power Factor measurements are an indication of the dielectric loss level in the insulation. This measurement is advantageous in that it is independent of the insulation thickness and the areas of the applied electrodes. The dielectric loss in the insulation will cause heating in the insulation. Power Factor measurements are also an indication of the moisture content of the insulation. Moisture is an enemy of transformer insulation.

## Analysis of Gases Dissolved in Oil

### DGA Testing

The detection of low energy incipient faults in transformers is an important protective maintenance technique to enable users to forestall gradual damage to transformers which can result in complete power outages. These faults in most cases cannot be detected electrically; however, they do result in gradual deterioration of solid and liquid insulation in the area of the fault. This deterioration can be caused by a defective joint, a poor connection, improperly placed materials, etc. and will generate gases; all of which become soluble in the insulating oil to varying degrees.

## General Oil Testing

Many users of transformers do not have the necessary facilities for testing insulating oil. In order that these users may be able to make the periodic tests recommended, Industrial Tests has established an oil testing service to provide careful test by experienced engineers and a prompt report of test results. The following laboratory testing are available:

- Acid Number
- Interfacial Tension
- Dielectric Breakdown
- Power Factor 60Hz at 25 deg C
- Color
- Pour Point and Viscosity
- Specific Gravity
- Moisture Content



Industrial Tests, Inc.  
4021 Alvis Court, Suite 1  
Rocklin, CA 95677



**Call (916) 632-8378 for Service**