

*Send  
documentation  
that is.*

Transformer Askarels  
Chamber of Electrical Manufacturers  
Mexico City

Our Mr. Jaime Lomelin indicated that you are mainly interested in discussion of the following subjects:

1. Properties of askarels and their measurements.
2. Use and handling of askarels (drying, filtration, etc.).
3. Power factor measurements.
4. Materials of construction for askarel transformers.
5. Maintenance of askarel transformers.

My following remarks are justifiably very simple and practical. If this leaves you with desire for more detailed discussion on any point, please interrupt me at any time with your question so that we do not lose your thought.

I. Properties of Askarels and Its Measurements

Transformer askarel fluids have high dielectric strength (45KV). They are chemically and thermally stable, non-corrosive, and free of burning up to their boiling point of 200°C. The arc formed gases are non-combustible.

Transformer askarel fluids can be used satisfactorily to at least 150°C., which exceeds by a wide margin the maximum temperatures allowed the Class A cellulosic insulations normally used in askarel transformers.

All property measurements are by ASTM Standard Procedures and correlated international methods.

The transformer maker and user need not become involved with more than a few simple measurements:

1. A simple hydrometer test will serve to identify the fluid by its relatively high density.
2. Simple dielectric strength determination will serve to judge the quality for transformer use. The dielectric strength by ASTM D877-49 should be at least 35KV, the minimum for new askarel. If the dielectric strength drops to 22 or lower KV then moisture should be tested.
3. The test for moisture is the ASTM D1533-60 Karl Fischer method.

These few tests are much simpler than the various procedures required to evaluate the condition of mineral oil used in transformers.

## II. Use and Handling of Askarels

If spilled on the skin it should be removed by washing with soap and water. Saturated clothing should be removed and laundered.

Prolonged breathing of the vapors at elevated temperatures should be avoided.

The fluid should be kept dry during storage and handling. When there is need to dry it, this is done by simply passing the fluid through a filter press fitted with dry blotter paper.

## III. Power Factor Measuring

The power factor determination of transformer askarel fluid is not a significant and reliable guide as is the case with power factor determination of transformer mineral oil.

It is usually best to understand the nature of the power factor of askarel rather than to waste a lot of time measuring this property. (See the Maintenance Guide, page 7, Table V).

If power factor is to be measured, it should be determined on the over-all transformer system.

## IV. Materials of Construction

1. Press Board - 100% Kraft Pulp, don't use rag insulation, from coils to ground and high voltage to low voltage insulation. Most satisfactory:

Rogers Paper - Rogers, Connecticut  
Spaulding Fiber Co. - New Rochester, New Hampshire  
West Virginia Pulp & Paper - Charleston, West Virginia

2. Turn Insulation for coil manufacture - Manila rope paper or Manila kraft paper from 0.0003 to 0.005 inches thick.

Manning Paper Co. - Troy, New York

3. Layer Insulation - 100% Kraft Paper, used between layers of wire within the coils, 0.003 to 0.030 inches thick.

Riegel Paper Co. - New York, New York  
Hollingsworth & Vose Paper Co. - Framingham, Mass.  
Mosinee Paper Co. - Mosinee, Wisconsin

4. Structural Insulation - Kiln dried hard Maple or Beach. For mechanical purposes.

5. Structural which also provides insulation where leads are attached, etc. - 100% Kraft Press Board laminated and bonded with Dextrin-glue or polyvinyl alcohol. (This is bonded in large sheets up to 2 inches thick and then cut to size, using preferably a Tungsten carbide saw.)

6. Lead Guides and Tap Supports - Tubing made from 100% Kraft paper bonded with Dextrin-glue.

7. Insulation Bolts and Nuts - for mechanical applications where voltage is involved are made from vulcanized fiber (zinc chloride gelatinized and regenerated cellulose).

Spaulding Fiber Co., Tonawanda, New York  
National Vulcanized Fiber  
Continental Fiber Co.

8. Insulation Tubes - such as used to support and insulate the low voltage coil from ground and support and insulate high voltage coil from low voltage coil--tubes are fabricated from 0.10 to 0.30 inch thick press board bonded with Dextrin-glue or polyvinyl alcohol. (It is preferred to have a discontinuous, i. e., herring-bone pattern of the glue to permit easy askarel impregnation of the tube and eliminate dry spots of low dielectric strength.)

9. Radial and Vertical Core Spacers - made from press board as described above.

10. Lead Insulation - Paper or bleached cotton tape (or both) applied in thickness to stand the voltage.

Anaconda, Hastings, New York  
Rome Cable, Rome, New York  
Phelps Dodge, Fort Wayne, Indiana

11. Electrical Steel Insulations - asphaltic and most of the synthetic varnishes are undesirable. Best is Carlite (fired on magnesium-iron phosphate) available on commercial steel.

Armco Steel, Butler, Pennsylvania  
Allegheny Steel, Pittsburgh, Pennsylvania

Alkophos (aluminum phosphate) from Monsanto is also a very satisfactory coating.

12. Tying Tapes - Bleached cotton or unvarnished glass tape.

13. Structural Steel for supporting coils, etc. - Shot blasted I and L beams.

14. Tank Steel - Low carbon shot blasted or chemically cleaned.

15. Adhesives r Dextrin-glue, polyvinyl alcohol, cellulose acetate, dewaxed garnet or orange shellac, or cured and properly selected phenolic and epoxy adhesives.

V. Maintenance of Askarel Transformers

The proper and simple maintenance is given in the booklet, "Monsanto Askarel, Inspection and Maintenance Guide."

Paul G. Benignus

ck