ISSUE 34

Transformer Topics

FERRANTI-PACKARD LIMITED
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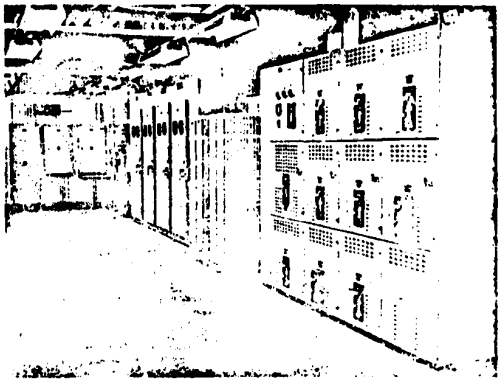

TYPICAL INDOOR ASKAREL FILLED TRANSFORMER AND SWITCHGEAR INSTALLATION. LOCATED ON SECOND FLOOR ABOVE OFFICES AND WORK AREAS OF AIR CANADA SERVICE AND MAINTENANCE HANGER, TORONTO INTERNATIONAL AIRPORT.

THE USE OF ASKAREL IN POWER TRANSFORMERS

Electrical apparatus is often, of necessity, installed in areas where fire or explosion would endanger life and property. The need for a non-flammable insulating and cooling liquid has long been established.

For over 40 years polychlorinated biphenyls (PCBs) have been used in the U.S. and Canada for these applications, being the most suitable liquid available. The particular PCB liquid for transformers has the generic name "askarel". Askarel is an inert compound, chemically stable, fire resistant, heat stable, non-corrosive and has high dielectric strength.

PCBs have also been used extensively for many other industrial and consumer applications.

During the past three years evidence has accumulated to indicate that PCBs have become widely dispersed throughout the environment and that they can have adverse ecological and toxilogical effects. It follows that some have advocated discontinuing the use of PCBs entirely, regardless of the application. A closer examination of the facts suggests a different but still safe solution which supports continued use in certain electrical apparatus, particularly transformers and capacitors.

Two major facts supporting the continued use of "askarel" in transformers are:

1. Transformers are "closed systems" and with the now well established housekeeping, handling and disposal procedures, risk of contamination from this source is extremely small. (The Monsanto Corporation provides disposal centres for "waste" askarel and will also supply information upon request concerning all phases of handling and disposal.)
2. There is no known practical substitute for askarel, nor is there likely to be in the foreseeable future.

It should be noted that PCBs have had many non-electrical applications in the past, making containment difficult and losses into the environment certain. These applications include uses in such products as plasticizers, hydraulic fluids and lubricants, surface coatings, inks, adhesives, pesticide extenders and the microencapsulation of dyes for carbonless duplicating paper. All such applications have been discontinued in North America.

An inter-departmental task force under the direction of the United States President's Office of Science and Technology has prepared a report "Polychlorinated Biphenyls and the Environment" dated May, 1972. This report strongly favours the continued use of PCBs for transformer and capacitor applications and a ban on all other industrial and consumer uses listed previously. (Such a ban has been in effect since 1971 on a voluntary basis by the sole North American producer, Monsanto Corporation).

For those wishing a copy of the complete report, it may be obtained by writing to: National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Va. 22151, Price $6.00.

The following two references are taken from this report because of their particular significance:

Page 4 The use of PCBs should not be banned entirely. Their continued use for transformers and capacitors in the near future is considered necessary because of the significantly increased risk of fires and explosions and the disruption of electrical service which would result from a ban on PCB use. Also, continued use of PCBs in transformers and capacitors presents a minimal risk of environmental contamination. The Monsanto Company, the sole U.S. producer has reported voluntarily eliminating its distribution of PCBs to all except manufacturers of electrical transformers and capacitors.

Page 78 The only present alternatives to askarel-insulated transformers are mineral oil-insulated transformers or dry-type transformers (either those open to the atmosphere or those that are gas-filled and sealed).

A. MINERAL OIL-INSULATED TRANSFORMERS

1. If one disregards safety considerations, there are no technical reasons why mineral oil-insulated transformers could not be directly substituted for PCB insulated transformers. The size of the unit would be unchanged; the weight and cost would be less.

2. But one cannot disregard safety considerations, which are often embodied in legal codes. Obviating the safety hazards involves serious economic and space constraints, that would occur either by the use of protective vaults, or use of insulated buses (with the transformer located outdoors). Either solution, if space is available, could cost $5,000 – $50,000 per transformer (additional).

B. DRY-TYPE TRANSFORMERS

In most locations, dry-type transformers (either those open to the atmosphere or those that are gas-filled and sealed) could not be directly substituted for PCB insulated transformers. There are several restrictions to such a direct substitution:

1. The reliability of dry-type transformers is less than that of comparably rated liquid-insulated transformers. An Edison Electric Institute survey of failures in network transformer banks showed a 7 percent per year failure rate for dry-type units compared to 0.2 percent for liquid-insulated units.

2. Furthermore, liquid-insulated transformers have a much greater overload capability.

3. Some dry-type transformers are larger by 10 to 30 percent than comparably rated liquid-insulated units, and most are more expensive.

4. Dry-type transformers are noisier by 5 – 10 db than are liquid-insulated transformers.

5. Open dry-type transformers which are cheaper than sealed dry-type transformers, cannot be used in certain corrosive or hazardous atmospheres, e.g., on furnace or on electrostatic precipitators near hot stacks. Clearly there is no substitute for PCB-filled transformers where fire protection is required.

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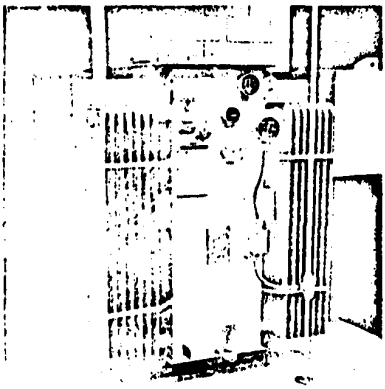
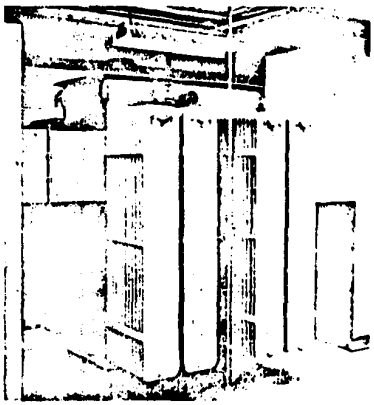


500 KVA 13800Δ–2400Y/1385 VOLT, INDOOR
ASKAREL FILLED
SPECIAL APPLICATION TRANSFORMER



2000 KVA 13800Δ–600Y/347 VOLT, INDOOR
ASKAREL FILLED
POWER AND LIGHTING TRANSFORMER