

# the electrical digest

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## SEALING OIL AND GAS LEAKS IN TRANSFORMERS AND CIRCUIT BREAKERS

Oil leaks in electrical apparatus constitute a potential fire risk and a threat to the operation of the power system. From the public's point of view, oil leaks represent a major environmental hazard due to possible PCB contamination.

Leaks in gas filled switchgear are even more important because the loss of gas pressure could jeopardize system safety under fault clearing conditions. Gas recharging is expensive and inconvenient.

Previous attempts to seal oil leaks have been thwarted by the inability of sealing compounds to follow the cyclical thermal expansion and contraction patterns of the equipment. Furthermore, the high injection pressures necessary to force the compound into the leak often distorted the lightweight flanges and stressed the retaining bolts beyond normal limits, generally with disastrous results.

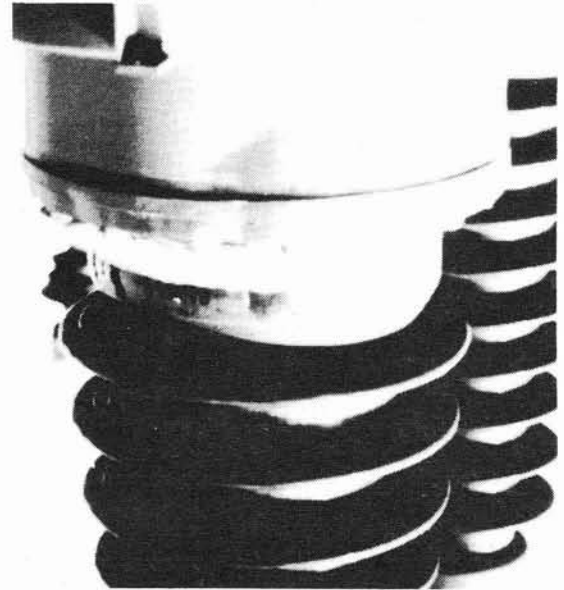
These limitations in existing repair methods had long been recognized by Brosz and Associates and were among the many reasons that they selected advanced leak sealing technology and specialized compounds for application across Canada.

For sealing oil leaks in transformers, a two-part system was developed. The area around the leak is first mechanically cleaned with a wire brush, or preferably by sandblasting. All traces of residual surface oil are removed with a special solvent. The leak is then stopped by the application of a fast setting epoxy emergency formulation. After the epoxy has set, the area is coated with a proprietary hybrid polyurethane leak sealing compound.

The polyurethane material sets but remains flexible with a strong adhesive bond to the metal and the epoxy. The result is an effective long life seal. The same repair procedure can be used with slight modification to seal oil leaks in tanks, welds, flanges, unions, couplings and drain plugs.

The system can also be used to seal serious oil leaks. In this particular case a small drain valve is installed at the low point of the epoxy plug. The valve remains open and provides a direct path for the oil to escape while the epoxy hardens. The valve is closed and the whole area, including the valve, is coated with the polyurethane compound.

For areas inaccessible to hand application methods, the leak area is first cleaned by sandblasting. An extremely rapid curing material is then applied by means of plural component spray equipment for an effective seal.



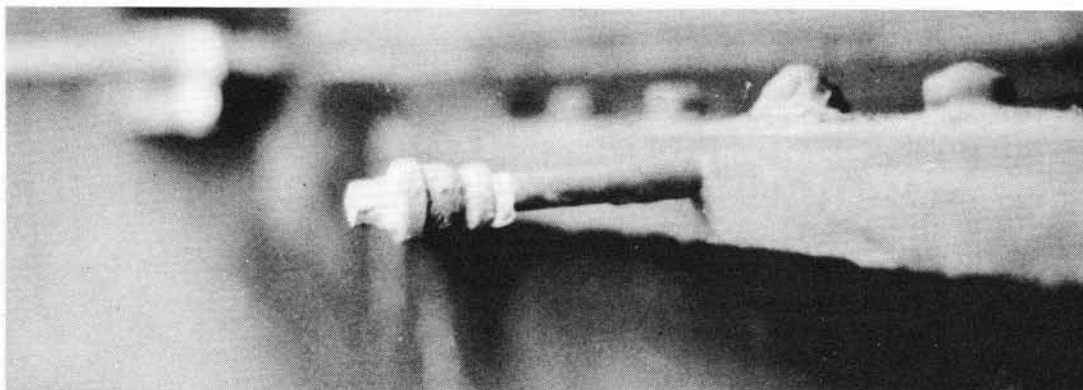
Repair of leaking bushing on a 115kV, SF<sub>6</sub> gas filled circuit breaker.

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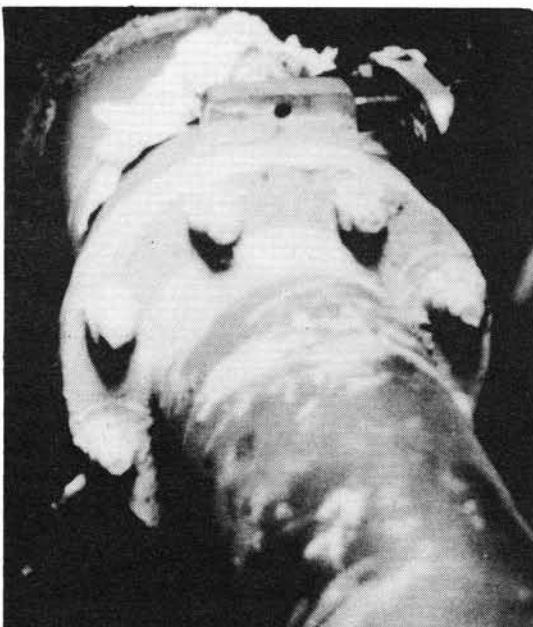
# BROSZ AND ASSOCIATES

ELECTRICAL POWER SYSTEM ENGINEERING, TECHNICAL FIELD SPECIALISTS AND FORENSIC ENGINEERS

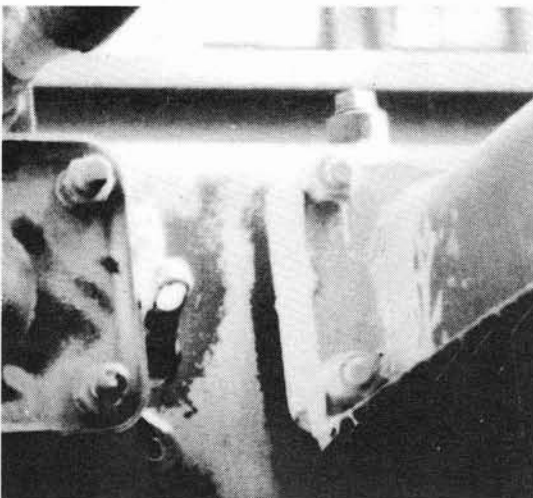
B&A



*Serious leak on a transformer main cover gasket was repaired using a field-installed bleed-off drain.*



*Leaking flange and bolts repaired on a large transformer.*



*Transformer radiator flange repaired with sealant.*

Brosz and Associates also has available specialized compounds and procedures to seal leaks in SF<sub>6</sub> gas filled circuit breakers and switch-gear. These leaks are generally caused by two common factors. One is the relative movement of the ceramic bushing during switch operation, and the other is localized corrosion on the flanges due to the electrolytic action between two dissimilar metals when exposed to the weather.

Careful preparation of the metal, preferably by sandblasting, is essential before any repairs can be made. A sealant of 100 percent solids hybrid polyurethane is then applied to cover the whole flange including the bolts. This prevents the gas from escaping and makes a rainproof joint unaffected by temperature changes in either equipment or climate.

The special sealant materials prevent the loss of oil or gas from the equipment thus protecting both the environment and the power system. The sealants provide an efficient bond to the metals and other materials, yet they are easy to remove by sandblasting during equipment overhaul.

Brosz and Associates specialized sealing techniques can also be applied to concrete containment basins and curbs around oil filled transformers and oil storage areas. Containment areas must be provided to reduce the spread of fire by burning oil and to prevent ground contamination by leaking PCBs.

The compounds are formulated to seal concrete surfaces in areas exposed to extreme climatic conditions, and pedestrian and vehicular traffic. Above all they are impervious to, and unaffected by oils. Slip resistance over the entire area is secured by means of a light application of quartz. Special procedures have been developed to seal the various types of curbs such as block, concrete, brick and angle iron.

The full range of leak sealing products and services are available from Brosz and Associates.