

## TechTopics No. 63

### Recovery of SF<sub>6</sub> gas from type SIMOSEC switches at end-of-life condition

The type SIMOSEC air-insulated load interrupter switch design uses a hermetically sealed, welded, stainless steel switch enclosure to house the three-position switch, which is the heart of the product. The switch enclosure is filled with SF<sub>6</sub> (sulfur hexafluoride) gas, which allows for an extremely compact switch, and leads to exceptionally long switching life for the switch. Since the switch enclosure is hermetically sealed, there is no need to replenish the SF<sub>6</sub> gas over the life of the equipment.

However, the life of electrical equipment is not unlimited, so at some point the user will decide to retire the equipment. At this time, the SF<sub>6</sub> gas in the switch enclosure must be extracted and recycled. SF<sub>6</sub> is a very potent greenhouse gas, and must not be simply released to the atmosphere.

The purpose of this issue of TechTopics is to describe the basic method for extraction of the SF<sub>6</sub> gas from the sealed enclosure. While this method is used by Siemens, competent firms specializing in SF<sub>6</sub> gas recovery and recycling will likely have similar techniques of their own that accomplish the objective of recovery of the SF<sub>6</sub> with near-zero loss of gas to the atmosphere. The suppliers of SF<sub>6</sub> gas have established programs to take back used SF<sub>6</sub> gas and either recondition (recycle) it, or if not feasible, to destroy it in a manner acceptable to the U.S. Environmental Protection Agency.

Typically, the amount of gas in the switch enclosure is 0.5 kg at a pressure of 150 kPa (21.9 psi absolute or 7.3 psi gauge).



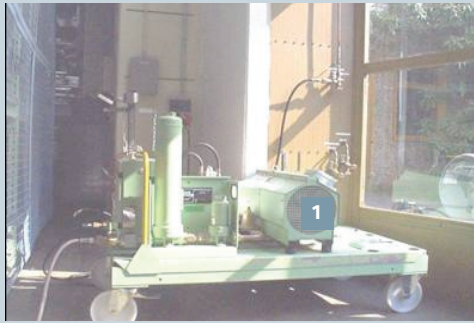
1. Connect drill to shaft
2. Black handles
3. SF<sub>6</sub> extraction fitting
4. Switch housing
5. Weld studs
6. Hose connection point

For purposes of illustration, the switch housing is shown removed from the switchgear enclosure, but it is not necessary to remove the switch housing from the switchgear in order to extract the gas.

Step 1: Spot weld three weld studs to the stainless steel enclosure, located so as to match the mounting holes in the SF<sub>6</sub> extraction fitting (refer to Figure 1).

Step 2: Mount the SF<sub>6</sub> extraction fitting to the switch housing, using the O-ring gasket between the fitting and the housing to provide a gas-tight seal (refer to Figure 1).

Figure 1: SF<sub>6</sub> extraction fitting mounted on switch housing



1. Vacuum pump

- Step 3: Attach the suction hose from the vacuum pump to the SF<sub>6</sub> extraction fitting. Attach the exhaust hose from the vacuum pump to the cylinder in which the gas to be recycled will be stored. Then, start the pump (refer to Figures 1, 2 and 3).
- Step 4: Attach a standard portable drill to the end of the drill bit on the SF<sub>6</sub> extraction fitting.

Figure 2: Vacuum pump for extraction of gas



1. Cylinder for storage of gas to be recycled

- Step 5: Start the drill and press the black handles together to apply pressure on the drill bit. Drill a hole into the stainless steel enclosure.
- Step 6: Detach the portable drill, and withdraw the center shaft (the drill bit) to its extended position.
- Step 7: Continue operating pump until residual gas pressure is approximately 20 mbar (2 kPa). At this point, close the valve on the gas cylinder, turn off pump and disconnect hoses. Remove the SF<sub>6</sub> extraction fitting from the switch housing.
- The remaining gas in the switch housing will be approximately 2/150 of the original 0.5 kg, or approximately six to seven grams of gas that cannot be recovered.

Figure 3: Gas storage cylinder

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