

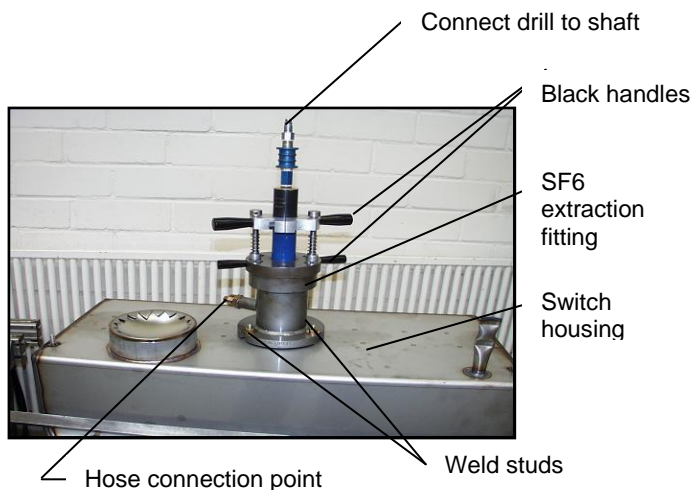
TechTopics Topic: Recovery of SF₆ Gas from SIMOSEC Switches at End-of-Life Condition

The 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 SF₆ (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 SF₆ 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 SF₆ gas in the switch enclosure must be extracted and recycled. SF₆ 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 SF₆ gas from the sealed enclosure. While this method is used by Siemens, competent firms specializing in SF₆ gas recovery and recycling will likely have similar techniques of their own which accomplish the objective of recovery of the SF₆ with near-zero loss of gas to the atmosphere. The suppliers of SF₆ gas have established programs to take back used SF₆ gas and either recondition (recycle) it, or if not feasible, to destroy it in a manner acceptable to the US Environmental Protection Agency.

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



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 SF₆ extraction fitting. (figure 1)

Step 2: Mount the SF₆ extraction fitting to the switch housing, using the O-ring gasket between the fitting and the housing to provide a gas-tight seal. (figure 1)

Figure 1:
SF₆ extraction fitting mounted on switch housing

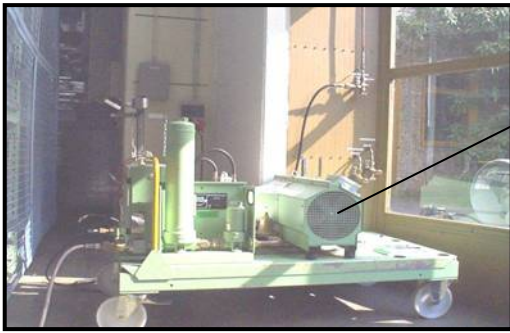


Figure 2:
Vacuum pump for extraction of gas

Step 3: Attach the suction hose from the vacuum pump to the SF₆ 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. (figures 1, 2, and 3)

Step 4: Attach a standard portable drill to the end of the drill bit on the SF₆ extraction fitting.

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 20mbar (2 kPa). At this point, close the valve on the gas cylinder, turn off pump, and disconnect hoses. Remove the SF₆ extraction fitting from the switch housing.

The remaining gas in the switch housing will be approximately 2/150 of the original 0.5kg, or approximately 6-7 grams of gas that cannot be recovered.



Figure 3:
Gas storage cylinder

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