# S&S Medium Voltage Circuit Breaker Retrofit, Replacement, Spare Part and Annual Maintenance Services

## Retrofit of Medium Voltage Circuit Breakers

Retrofit of Medium Voltage Circuit Breakers provides an economical solution to the replacement and upgrading of obsolete air breakers. Directly replacing the worn or obsolete air breaker with a new retrofitted vacuum breaker provides exacting mechanical and electrical interchangeability.

**S&S Power Switchgear** has more than 40 years of experience on this particular field. Retrofit provides many advantages:

**Direct replacement with minimal downtime**. The breaker is complete and ready for immediate insertion into existing switchgear cubicle.

**Extends useful life of present switchgear**. The majority of wear considerations of switchgear is related to the draw out breaker, which encompasses the interrupters, primary bushings, and operating mechanism. By replacing the air breaker and inspection of the switchgear cubicle, the useful life span of the switchgear can be greatly extended.

**No disassembly of existing cables and wiring**. As the breaker is a direct replacement, replacement of the racking mechanism and secondary disconnect on the cubicle are not required, minimizing cost and down time.

**Interrupting the arc in vacuum**. This eliminates the need for large, heavy and expensive arc chutes. Arc interruption in vacuum does not produce hot ionized gases or other arcing byproducts because the main contacts are confined to a sealed bottle, making it a safer breaker.

**Eliminates asbestos arc chute**. The new retrofitted breaker eliminates personnel exposure to asbestos fibers, commonly present in air breakers.

**Improved interrupting rating time**. The average interrupting time for Medium Voltage Air Breakers is 6 to 8 cycles. Later production breakers were 5 cycles. By converting to vacuum breaker, the average interrupting time for the new retrofit breaker can be improved to 3 to 5 cycles.

**Upgrade MVA ratings**. In many cases the original MVA rating of the breaker can be upgraded. As an example, in most cases to upgrade from 500 MVA to 750 MVA requires only minor changes. This provides an easy solution when customers need to upgrade the short circuit capacity.

**Better performance and lower maintenance costs**. Vacuum breakers are generally simpler in design and have less powerful operating mechanism that tend to have longer, more trouble free life than their air break counterparts. Some vacuum breakers have no suggested maintenance below 10,000 no-load operations, 5,000 load operations, and 15 full rated fault current operations. Also, retrofit helps to avoid the difficulty of finding spare parts for obsolete air breakers, improving the reliability of the complete switchgear.

**Assured Quality Control**. Retrofit projects are built according to strict internal standards derived from ANSI/IEEE and *PEARL*. All breakers have documented records for building and testing and have been racked to stationary cells to verify correct operation.

**Mechanical Interlocks**. All interlocks are designed and built to conform with original configuration. All interlocks are checked in structures built to original documentation to assure minimal interface issues in the field for breaker interchangeability.

**Tested to applicable standards**. Each breaker is required to go through a testing protocol that include electrical and mechanical operations, BIL, High Potential, Vacuum Bottle Integrity, Insulation Resistance (Megger), Contact resistance (DUCTOR), Dissipation Factor, Min/Max control voltage, anti-pump function and Time Travel Analysis. The facilities of **Circuit Breaker Sales Co., Inc**. have all the testing capabilities to perform each of the mentioned tests.

**Use of proper procedures, components and tools**. This eliminates alignment issues of interlocks and primary and secondary disconnects at installation due to breaker misalignment and assures that the breaker is interchangeable between equally rated compartments. The use of the correct components, proper lubes and specially designed tools assures the quality of the product and the safe operation of the retrofitted breaker.

**Experienced Personnel**. Every one of the retrofit projects are Engineered and performed by personnel with years of experience in this particular field. **Circuit Breaker Sales Co., Inc.** has an extensive library of technical information with original documentation for most of the manufacturers and models. This ensures excellent mechanical and electrical performance of the retrofitted breakers and allows us to offer one (01) year warranty on parts and labor.

## TECHNICAL REQUIREMENTS FOR A RETROFIT PROJECT

Complete and accurate information is required to evaluate a retrofit project. The information on both circuit breaker and equipment (switchgear) nameplates are required.

Original Breaker Data:

| | |
|---|---|
| Manufacturer | |
| Type | |
| Rated KV | |
| Cont. Amps | |
| Rated MVA | |
| Max. KV | |
| Int. Amps | |
| BIL KV | |
| MAX Amps | |
| Frequency | |
| Close Amps | |
| Interrupting time | |
| K Factor | |
| Control voltage (Close/Trip) | |

The customer must provide the following additional information:

**1. -** Wiring diagram for the electrical operation of the breaker.

**2. -** Actual dimensions of the original breaker (elevation drawings could be needed).

**3. -** Front, back and side pictures of the original breaker (either digital pictures or good paper copies) showing mechanical interlocks, primary and secondary disconnects.

**4. -** Drawings or front pictures of the cubicle or cell of the original breaker. It's very important to provide information of mechanical interlocks, auxiliary switch operators, secondary disconnect coupler and ground connectors.

**Note:** Circuit Breaker Sales Co., Inc. reserves the rights to ask the customer for any other information to evaluate the feasibility of any retrofit project.