

TechTopics Topic: Interrupter Switch Technology Comparison  
SIMOSEC SF<sub>6</sub> Switch – Conventional Air Switches

In TechTopics No. 53, we discussed the characteristics of SF<sub>6</sub> (sulphur hexafluoride) gas which make it advantageous for use in medium and high voltage electrical equipment. This issue of the TechTopics series will discuss this issue further by comparing the features of conventional medium voltage load interrupter switches operating in air with those of operating in an SF<sub>6</sub> gas environment.


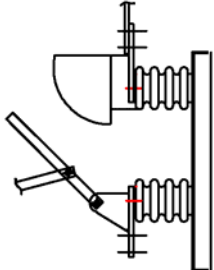
The table on the next page shows some of the major characteristics of medium voltage load interrupter switches that influence the application or the space required. Of course, the table data for air switches is generic, and the specific data for a particular vendor of air switches can vary significantly. The air switch dimensions shown are for the most common (15kV 600A) switch, and the dimensions for a 27kV switch are significantly greater. Even though typical data is used for the air switch, the table is considered valid for an overall understanding.

From the data in the table, we make these observations:

- Endurance: the switching endurance of the SIMOSEC SF<sub>6</sub> switch is significantly higher than that of an air switch that merely meets the ANSI C37.22 endurance requirements
- Environmental: The switching performance does not deteriorate in adverse environments since the SIMOSEC SF<sub>6</sub> switch is isolated from the atmosphere
- Size: the SIMOSEC SF<sub>6</sub> switch (without operator) is over 90% smaller than the basic air switch, allowing for a great reduction in space for the overall SIMOSEC switchgear installation
- Maintenance: maintenance required for the switch itself is essentially eliminated

This comparison illustrates the superiority of the SIMOSEC SF<sub>6</sub> load interrupter switch in comparison to traditional load interrupter air switches.

T. W. (Ted) Olsen  
Manager, Technology

Characteristic	SIMOSEC SF <sub>6</sub> Switch	MV Air Switches
Switching Life <ul style="list-style-type: none"> <li>Mechanical</li> <li>Electrical</li> </ul>	 <p>High – 1000 operations</p> <p>Very High – 100 operations at 600A</p>	 <p>Low – ANSI C37.22 requires:</p> <ul style="list-style-type: none"> <li>500 operations up to 15kV</li> <li>350 operations at 27kV.</li> </ul> <p>Low – ANSI C37.22 requires:</p> <ul style="list-style-type: none"> <li>50 operations up to 4.76kV</li> <li>30 operations for 4.8--15kV</li> <li>10 operations for 15 – 27kV</li> </ul>
Environmental	Welded stainless steel switch enclosure, sealed-for-life, isolated from contaminants	Switch in air, exposed to contaminants, corrosive influences, dust, dirt
Size	Very small <ul style="list-style-type: none"> <li>Basic 600A switch module for up to 27.6kV (without enclosure) is about 14"D x 8"W x 9"H (0.6 cubic feet)</li> </ul>	Large <ul style="list-style-type: none"> <li>Typical basic switch module (15kV 600A) without enclosure is about 28"D x 25"W x 26"H (10.5 cubic feet)</li> </ul>
Visible isolation	Yes <ul style="list-style-type: none"> <li>Large viewing window for verification of position (CLOSED – OPEN – GROUNDED)</li> </ul>	Yes
Functionality	<ul style="list-style-type: none"> <li>Integrated fault-making (make-proof) grounding for outgoing feeder cables</li> <li>Inherently prevents simultaneous CLOSED &amp; GROUNDED positions.</li> </ul>	No integral grounding capability
Operation Means	<ul style="list-style-type: none"> <li>Manual spring operator (std)</li> <li>Motorized spring operator (opt)</li> <li>Motorized spring stored-energy operator (opt)</li> </ul>	<ul style="list-style-type: none"> <li>Manual spring operator (std)</li> <li>Motorized spring stored-energy operator (opt)</li> </ul>
Mechanism Force	Very low <ul style="list-style-type: none"> <li>Small moving mass</li> <li>Short travel distance</li> <li>Easier operation</li> <li>Increased reliability</li> </ul>	High <ul style="list-style-type: none"> <li>High moving mass</li> <li>Long travel distance</li> <li>Harder operation</li> <li>Lower reliability</li> </ul>
Gas Handling	None: <ul style="list-style-type: none"> <li>Switch enclosure sealed-for-life</li> <li>No gas handling during maintenance</li> </ul>	Not applicable
Gas Leakage	Less than 0.1% per year <ul style="list-style-type: none"> <li>Welded stainless steel gas enclosure</li> <li>Switch enclosure sealed-for-life</li> <li>Bushings welded to enclosure</li> <li>No sliding or rotating seals</li> </ul>	Not applicable
Maintenance of switch module	Extremely low: <ul style="list-style-type: none"> <li>Switch enclosure sealed-for-life</li> <li>No contact inspection or replacement</li> <li>No lubrication for operating mechanism</li> <li>Insignificant contact erosion during switching</li> <li>No arc chutes</li> </ul>	High <ul style="list-style-type: none"> <li>Switch operates in air</li> <li>Switch needs adjustment, inspection</li> <li>Operating mechanism requires lubrication</li> <li>Arcing contacts subject to erosion</li> <li>Arc chutes subject to degradation</li> </ul>