**Radiography**
Reduce O&M costs and verify integrity of SF$_6$ gas circuit breakers & GIS

**Application**
ABB is pleased to offer a fast, non-intrusive tool to inspect SF$_6$ gas circuit breakers and gas insulated switchgear (GIS). This method of non-destructive testing uses Radiography, or x-ray technology, to inspect the condition of equipment.

Radiography allows us to view circuit breaker interrupter contacts, PTFE nozzles, hardware, resistor switches, rupture disks, tank castings, mechanism latches, and springs. All during a non-intrusive maintenance procedure and before a failure occurs. All at a cost that is much lower than traditional maintenance methods. Radiography eliminates the need to schedule a full maintenance crew, crane, manlift, SF$_6$ gas cart, and vacuum pump, to “see” the interrupters in your circuit breaker or GIS.

**Benefits**
- Overall lower cost to discover the general condition of the breaker.
- Outage time reduced from days to hours.
- Non-invasive internal inspection.
- No disassembly required.
- Increased reliability from not exposing the internals to atmosphere.
- Extensive review of internal components.
- Extend internal maintenance cycles.

**Description**
Once all standard safety protocols are reviewed and implemented, the source and film are placed according to the Standard Operating Procedures in order to ensure best image quality. The image is then captured on a phosphor screen/film and scanned into a computer. Any adjustments needed are completed on the computer and additional images are then taken if necessary. Images can be stored on a CD in any image file format. Images can then be taken and compared either electronically or on hard copy.

Deliverables include:
- Labor and equipment to shoot and record all images necessary for interrupter evaluation.
- Software to enhance images.
- Evaluation and recommendation of findings (On site and within final report).

In order to most comprehensively maintain your breaker, other ABB-recommended, non-invasive maintenance procedures, such as SF$_6$ decomposition analysis, IR Imaging, and SF$_6$ Leak Detection, should be coupled with regular external tests, as defined by the latest Instruction Book issues.

ABB offers you the only complete and most cost-effective solution to verifying the integrity of your circuit breakers and GIS.
Radiography timetable
Utilization of radiography can uncover detrimental wear and tear, abnormal conditions, and degradation of component integrity in a fraction of the time when compared to a traditional internal inspection.

Estimated outage time comparison

<table>
<thead>
<tr>
<th>Breaker type</th>
<th>Radiography</th>
<th>Traditional internal inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 kV &amp; 145 kV</td>
<td>2 hours</td>
<td>2 days</td>
</tr>
<tr>
<td>245 kV</td>
<td>3 hours</td>
<td>3 days</td>
</tr>
<tr>
<td>362 kV</td>
<td>3 hours</td>
<td>4 days</td>
</tr>
<tr>
<td>550 kV</td>
<td>6 hours</td>
<td>5 days</td>
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</tbody>
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Industry leaders
ABB High Voltage Service is the most experienced service organization performing radiography on ABB and other brands of OEM equipment. Our customers rely on this experience to pinpoint problems and suggest maintenance options to maintain or improve equipment reliability based on the engineer’s findings.

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