Plug and switch system (PASS) Hybrid switchgear

- All functions of a bay combined in a single module
- Operating and interrupting functions in SF$_6$ gas for utmost reliability and safety
- Compact and easy to install
- Efficient use of available space
- Flexible substation layouts
- Prefabricated and pre-assembled bays minimise installation time
- Reduced footprint as compared to AIS, lessens civil work

The concept
For many existing substations that have outlived their operational life, a one-to-one replacement of conventional AIS components like circuit breakers and disconnectors is not economically advisable. On the other hand completely new substations have to meet tight requirements in term of occupied space, environment and availability. Substation extensions require high flexibility on primary equipment, to cope with existing control systems, lack of available space and limited down time.

PASS is the ideal primary equipment to meet all of the above scenarios and is the result of a different thinking: that is, the performance of the substation as a complete system. PASS switchgear limits the number of equipment to what is really necessary to assure the best functionality of the bay; its modular design ensure all possible substation layouts can be realized.

Maximum flexibility
PASS is based on ABB’s extensive experience in building both Air-insulated Switchgear (AIS) and Gas-insulated switchgear (GIS).

PASS can be also described as “Performance and Save Space”. Any substation layout can be met by making efficient use of available space. Performance is guaranteed by the wealth of experience in research and development, manufacturing and operations of switchgear which constitute the basis of ABB know-how.

The key features of PASS is its compact and modular design which encompasses several functions in one module:
- circuit breaker
- disconnector
- earthing switch
- current and voltage measurements
- SF$_6$ density monitoring
Standards

PASS switchgear is manufactured according to the following standards:

For enclosure: CENELEC EN 50052
For quality assurance: ISO 9001, ISO 9002, ISO 9003
For switchgear and associated equipment:
- High voltage switchgear IEC 60694
- SF₆ metal enclosed switchgear IEC 62271-203
- Bushings IEC 60137
- Current transformers IEC 60044 - 1
- Disconnector/earthing switch IEC 62271 - 102
- Circuit breaker IEC 62271 - 100

In PASS all live parts, excluding busbars are encapsulated in a grounded aluminium tank which is filled with pressurised SF₆ gas. Each pole has its own enclosure to increase availability and safety. The enclosures are of cast and aluminium construction.

An example of SLD for single busbar bay with PASS

<table>
<thead>
<tr>
<th>Technical parameter</th>
<th>M00</th>
<th>M0</th>
<th>M0S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage (kV)</td>
<td>72.5</td>
<td>145</td>
<td>245</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>2500</td>
<td>3150</td>
<td>3150</td>
</tr>
<tr>
<td>Breaking current (kA)</td>
<td>31.5*</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>AC test voltage (kV)</td>
<td>160</td>
<td>275</td>
<td>460</td>
</tr>
<tr>
<td>Impulse test voltage – BIL (kV)</td>
<td>350</td>
<td>650</td>
<td>1050</td>
</tr>
</tbody>
</table>

* 40kA on request

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