Outdoor live tank SF$_6$ circuit breaker
Type EDF SK
ABB’s Power technologies offer electric, gas and water utilities as well as industrial and commercial customers a wide range of products, system and service solutions for power generation, transmission and distribution including complete electrics, generation plants, utility automation and bulk power transmission.

ABB’s power technologies cover the entire voltage range including indoor and outdoor circuit breakers, air and gas insulated switchgear, disconnectors, capacitor banks, reactive power compensators, power and distribution transformers as well as instrument transformers.

Ongoing research and development and constant innovation ensures that ABB products, systems and solutions remain at the cutting edge of technology and at the same time are safe to use and environmentally friendly.
The EDF SK is a live tank SF₆ Autopuffer™ circuit breaker designed for 36 – 84kV range and with a rated breaking current up to 31.5kA.

In the most common version, the circuit breaker is operated with one operating mechanism. In case of single pole operation each pole is supplied with its own operating mechanism.

**Main features and advantages**

The EDF SK circuit breaker is based on the latest developments in arc research and offers the following advantages:

- Restrike-free interruption of capacitive currents due to high inherent dielectric strength of SF₆ gas and optimised contact movement
- Low over-voltages when switching inductive currents due to optimum quenching at current zero
- High dielectric strength even when SF₆ gas is at atmospheric pressure due to wide contact gap
- Low operating energy - reduced mechanical stress on breaker and low reaction forces on the foundation
- High making capacity even in the case of parallel connected capacitor banks
- High seismic capability due to optimised pole and structure design
- Easy installation and commissioning. Each circuit breaker is pre-tested and shipped to site in the form of few easily inter-connected units

### Design

The circuit breaker pole includes the breaking unit, the support insulator and the pole linkage housing. The three poles of the breaker are mounted on a common support frame with the operating mechanism arranged below the same frame.

The three breaker poles have a common gas system. For operations up to −50°C, the system is filled with a mixture of SF₆ gas and Nitrogen gas. When the SF₆ and Nitrogen gas mixture is used the breaking capacity is normally reduced one IEC step for e.g. 31.5 to 25 kA.

The operating reliability and service life of an SF₆ circuit breaker is dependent on the maintenance of SF₆ gas pressure and neutralisation of the effects of moisture and decomposed products in the gas. The above is achieved by:

- Double O-rings of Nitrile rubber used for sealing purposes with excellent results
- Each breaking unit is provided with an absorber that absorbs moisture and gaseous decomposed products
- Interruption capability is a function of SF₆ gas density. A density monitor consisting of a temperature-independent pressure switch is provided in the circuit breaker
- Temperature-dependent pressure variations of SF₆ gas are compensated by hermetically sealed reference gas volume. An alarm signal is triggered when pressure drops due to loss of gas

### Operating mechanism, type FSA

The circuit breaker is operated by a motor charged spring operating mechanism, which is installed in a splash-proof painted cubicle.

- One FSA is used for three-pole operation
- Three FSAs are used when single pole operation is required

### Options

- Brown/Grey insulators
- Silicon rubber insulators
- For installation of current transformers, type IMB:
  - Brackets for IMB
  - Primary connection between CT and the EDF SK

### Quality and sustainability

To ensure consistent and high product quality all components are subjected to stringent quality tests prior to manufacturing. To guarantee trouble-free functioning, comprehensive electrical and mechanical routine tests are carried out on the poles and operating mechanism after the product is fully assembled.

All ABB India manufacturing facilities are ISO:9001 and ISO:14001 certified.
Dimensions

EDF SK 1–1, 36 to 84 kV, 2 column stand, 3 pole operation

Dimensions in mm

EDF SK 1–1, 36 to 84 kV, 2 column stand, 3 pole operation

Dimensions in mm

EDF SK 1–1, 36 to 84 kV, 2 column stand, 1 pole operation

Dimensions in mm
Technical data

Values complying with IEC 62271-100 and ANSI C37

<table>
<thead>
<tr>
<th>EDF SK 1 – 1</th>
<th>36</th>
<th>52</th>
<th>72.5</th>
<th>84</th>
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<tbody>
<tr>
<td>Rated Voltage</td>
<td>IEC kV</td>
<td>36</td>
<td>52</td>
<td>72.5</td>
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<tr>
<td></td>
<td>ANSI kV</td>
<td>38</td>
<td></td>
<td>72.5</td>
</tr>
</tbody>
</table>

Power frequency withstand voltage

– 1 min dry | IEC kV | 70 | 95 | 140 | 140 |
– 1 min wet | IEC kV | 70 | 95 | 140 | 140 |
– 1 min dry | ANSI kV | 105 | 160 |
– 10 sec wet | ANSI kV | 105 | 140 |

Lightning impulse withstand voltage (LIWL)

– Full wave 1.2/50 µs | ANSI kV | 200 | 250 |
– Chopped wave 2 µs | ANSI kV | 258 | 452 |
– Chopped wave 3 µs | ANSI kV | 230 | 402 |

Creepage distance to earth\(^1\)\(^2\) | mm | 1390 | 1390 | 1995 | 1995 |
Creepage distance across break\(^1\)\(^3\) | mm | 1995 | 1995 | 1995 | 1995 |

Rated normal current | A | 2500 | 2500 | 2500 | 2500 |

Rated breaking current \(^2\) at 50 Hz | kA | 31.5 | 31.5 | 31.5 | 25 |
| at 60 Hz | kA | 31.5 | 31.5 | 31.5 | - |

First pole to clear factor | 1.5 |

Making current \(^3\) at 50Hz | kA | 79 | 79 | 79 | 62.5 |
| at 60Hz | kA | 82 | 82 | 82 | - |

Duration of short circuit | s | 3 |

Closing time | ms | 60 |

Opening time | ms | 35 |

Total break time | ms | 55 |

Dead time | ms | 300 |

Rated reclosing time, 60 Hz ANSI cycles | 20 |

Rated operating sequence | IEC and ANSI | O – 0.3 sec – CO – 3 min – CO |
| ANSI | CO – 15 sec – CO |

1) Other values on request. 2) Tolerance according to IEC 233. 3) 100% SF₆ gas.

Data and illustration without engagement. We reserve the right to make changes in the course of technical development.

Transportation and erection

The EDF SK circuit breaker is transported as a complete unit filled with SF₆ gas to a slight overpressure. As the circuit-breaker is assembled and routine tested in the factory, the erection work at site is minimal and can easily be done in a day.

Filling of the SF₆ gas to specified working pressure can be facilitated by using the following pressurising equipment:

– A special control valve for connection of SF₆ gas bottle and a 20m long hose with connector

– Complementary control valve for connection to Nitrogen gas (bottle for mixed gas filling)

Please note that deviation for gas connection may occur based on local standards.

Shipping data

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of cases</th>
<th>Total Volume</th>
<th>Total Gross weight</th>
<th>Total Net weight</th>
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<tbody>
<tr>
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<td>3.8</td>
<td>1123</td>
<td>873</td>
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<td>incl. one op. mechanism and support columns</td>
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