Short-Circuit Switching Capacity Definition

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What is the switching capacity?

The **switching capacity** is the r.m.s value of a current at a given power factor $\cos \varphi$ as well as a given rated voltage at which a switchgear or a fuse can still shut-off under specified conditions in an operationally safe way.

Both the **short-circuit making capacity** as well as the short-circuit breaking capacity of circuit breakers must be larger than or equal to the prospective short-circuit current at the place of installation.

If this is not the case, then a suitable backup protection (*for example a fuse*) should be provided to ensure the required switching capacity of the device combination.

Data regarding devices for backup protection are given in the technical documentation.

**Rated short-circuit making capacity** $I_{cm}$

The **rated short-circuit making capacity** $I_{cm}$ is a quantity that according to regulations must be in a certain ratio to the rated ultimate short-circuit breaking capacity $I_{cu}$ and that has to be guaranteed by the device manufacturer.

This is not a variable that must be considered by the user, however it ensures that a circuit breaker is in the position to connect onto a short-circuit and to *disconnect it subsequently*. 
Rated short-circuit breaking capacity $I_{cu}$ and $I_{cs}$

IEC 60947-2 makes distinction between the **rated ultimate short-circuit breaking capacity** $I_{cu}$ and the **rated service short-circuit breaking capacity** $I_{cs}$:

- **Rated ultimate short-circuit breaking capacity** $I_{cu}$

  $I_{cu}$ is the **maximum breaking capacity** of a circuit breaker at an associated rated operational voltage and under specified conditions. $I_{cu}$ is expressed in $kA$ and must be at least as large as the prospective short-circuit current at the site of installation.

  Circuit breakers that have switched-off at the level of the ultimate short-circuit breaking capacity, are reduced serviceable afterwards and should at least be checked regarding functionality. There may be changes in the **overload trip characteristic** and increased temperature rise due to the erosion of contact material.

- **Rated service short-circuit interrupting capacity** $I_{cs}$

  $I_{cs}$ values are usually lower than the values for $I_{cu}$. Circuit breakers that have been switching-off at the level of the service short-circuit breaking capacity continue to be serviceable afterward.

  In plants in which interruptions to operations must be kept as short as possible, product selection should be carried-out based on $I_{cs}$.

- **Breaking capacity of fuses**

  The same applies to fuses as to circuit breakers with respect to the $I_{cu}$: at the given rated operational voltage, the rated breaking capacity must be at least as large as the prospective short-circuit current at the site of installation.

  **Resource:** Low-Voltage Switchgear and Controlgear – Allen-Bradley

Source: