Step 2: Design of an assembly and design verification

Determining the rated short-time withstand current (Icw) of a circuit of an assembly

A switchgear assembly must be designed such that it withstands the thermal and dynamic stresses resulting from the short-circuit current. The maximum short circuit current at the connection point of an assembly must be determined on site.

The panel builder must specify the rated short-time withstand current Icw of the connection point in his documentation, e.g. in the circuit diagram or technical document.

The original manufacturer of the switchgear system, e.g. HENSEL, is responsible for the verification of the short circuit withstand capacity of the system components, e.g. the Icw value of the busbars. Rated short-circuit withstand current is determined by the values Icw, Icp, Icu.

**Step 1:**
Determining the transformer power and determining the value Icw*

The Icw* can be determined by reading table 1.

**Step 2:**
Determining the rated short-time withstand current Icw of the main distribution board (MDB)

Determining the lowest rated short-time withstand current Icw of the device installed in the main distribution board.

**Step 3:**
Determining the rated short-time withstand current Icw of the sub-distribution board (SDB)

Determining the lowest rated short-time withstand current Icw of the device installed in the sub-distribution board.

### Table 1:
Excerpt from HENSEL main catalogue

<table>
<thead>
<tr>
<th>Rated power of the transformer, Sr in kVA</th>
<th>Rated current at rated voltage, Un = 400 V a.c. in A</th>
<th>Initial short-circuit current Ii at Un = 4% in kW</th>
<th>Initial short-circuit current ic at Un = 6% in kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>144</td>
<td>3.610</td>
<td>2.406</td>
</tr>
<tr>
<td>160</td>
<td>230</td>
<td>5.776</td>
<td>3.850</td>
</tr>
<tr>
<td>250</td>
<td>360</td>
<td>9.025</td>
<td>6.015</td>
</tr>
<tr>
<td>315</td>
<td>455</td>
<td>11.375</td>
<td>7.583</td>
</tr>
<tr>
<td>400</td>
<td>578</td>
<td>14.450</td>
<td>9.630</td>
</tr>
</tbody>
</table>

**Path of the short-circuit current from the transformer to the short-circuit**

**Transformer:**

- **ICW:**
  - 15kA ≥ 9.025kA

**Table 2:**
Rated short-circuit withstand current of installation device in HENSEL distribution boards

<table>
<thead>
<tr>
<th>Installation device in HENSEL distribution boards</th>
<th>Short-circuit withstand capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busbar 250A / 400A</td>
<td>ic = 15kA / 1s</td>
</tr>
<tr>
<td>Circuit breaker 250A / 400A</td>
<td>ic = 50kA</td>
</tr>
<tr>
<td>Switch disconnector 250A</td>
<td>ic = 50kA</td>
</tr>
<tr>
<td>MCCB 160 A / 250 A</td>
<td>ic = icu = 36kA / 415 V a.c.</td>
</tr>
</tbody>
</table>

Other values can be obtained from the device manufacturers or in the HENSEL main catalogue.

**MDB**
Determining the rated short-time withstand current Icw of the MDB

The rated short-time withstand current Icw of the MDB must be equal to or greater than the short-circuit current Icw* of the transformer:

Icw (MDB) ≥ Icw* (transformer)

In this analysis, the cable attenuation between the transformer and MDB is not considered. The cable attenuation can mean a reduction of the short-circuit current Icw*. The prospective short-circuit current Icw at the installation site of the MDB is smaller because of the cable attenuation than Icw* of the transformer.

The rated short-time withstand current of the assembly results from the rated short-time withstand current of the installed equipment and busbars.

The original manufacturer, such as HENSEL, specifies these values in the technical data.

The respective lowest value determines the maximum rated short-time withstand current Icw of the main distribution board.

The panel builder must specify this value in the documentation of the assembly!