

Betr: Dynamic forces during a short circuit event

barry

para:

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Mostrar detalhes

Dear sir,

I hope that the information below, give answer to your question.

$F = 0.17 \times I_{kp}^2$ <p>S</p>	<p>F = Short-circuit strain in Newton per meter (N/m)</p> <p>I_{kp} = Short-circuit current (peak) in (kA) (rms x2,5)</p> <p>S = Distance between cables centre to centre in meters</p>
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Calculation for short circuit strain of single phase cables (examples)

Outer diameter of cable: 26 mm

Shock short circuit current: $I_s = 65 \text{ kA}$

Distance between cables: 75 mm = 0,075 m

The dynamic short circuit strain is being calculated from a shock short circuit current and the geometric description of the cable. The 3 phased short circuit is being looked into, because the fastening of the cable for the maximum possible short circuit current as well as the short circuit strain is to be explained.

$$F = \alpha \cdot \frac{\mu_0}{2\pi} \cdot l \cdot \frac{I_s^2}{a}$$

F = dynamic short circuit strain (N)

= factor for the radial guidance strength at 3 phased short circuit = $\frac{\sqrt{3}}{2}$

μ_0 = permeability constant $4 \cdot \pi \cdot 10^{-7} \frac{Vs}{Am}$

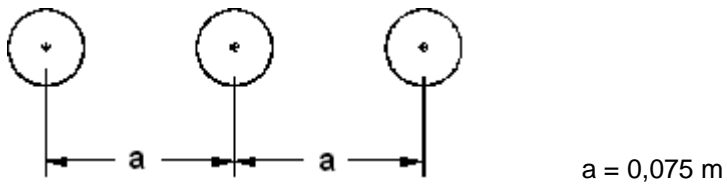
l = distance between two clamps in meters

I_s = maximum short circuit in kA

a = centre to centre distance between cables in centimetres

$$\alpha \cdot \frac{\mu_0}{2 \cdot \pi} = 1,73 \cdot 10^{-7} \frac{Vs}{Am}$$

Single mounting



In order to find the short circuit strain per meter, one reads $l = 1$.

$$F_k = 1,73 \cdot 10^{-7} \frac{V_s}{Am} \cdot 1 \cdot \frac{(65.000A)^2}{0,075m}$$

$$F_k = 9.746 \frac{N}{m}$$

The admissible distance between the clamps is being calculated from the short circuit strain (F_k) per m and the admissible strength (F_{zul}) of the cable clamp.

$$l_{max} = \frac{F_{zul}}{F_k}$$

l_{max} = maximum admissible distance between clamps

F_{zul} = admissible strength of the cable clamp (mechanical short circuit resistance)

F_k = short circuit strain per m

Cable clamp: SE 26-38

$$F_{zul} = 10.000N$$

$$l_{max} = \frac{10.000N}{9.746 N/m}$$

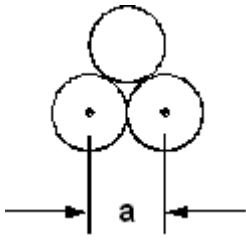
$$l_{max} = 1,02m$$

Recommendation

Use of the SE26-38 with a cable distance of approx. 60 – 70 cm because of the cable flexibility in case of short circuit.

The first cable clamp should always be mounted directly at the end of the connection.

Three-foil mounting



Axial distance between 2 cables = Cable diameter = 30 mm
 $a = 0,03 \text{ m}$

In order to find the short circuit strain per meter, one reads $I = 1$.

$$F_k = 1,73 \cdot 10^{-7} \frac{V_S}{Am} \cdot 1 \cdot \frac{(23kA)^2}{0,03m}$$

$$F_k = 3050 \frac{N}{m}$$

The admissible distance between the clamps is being calculated from the short circuit strain (F_k) per m and the admissible strength (F_{zul}) of the cable clamp.

$$l_{max} = \frac{F_{zul}}{F_k}$$

l_{max} = maximum admissible distance between clamps

F_{zul} = admissible strength of the cable clamp (mechanical short circuit resistance)

F_k = short circuit strain per m

Cable clamp: Triple 27-38

$$F_{zul} = 12.500N$$

$$l_{max} = \frac{12.500N}{3050N/m}$$

$$l_{max} = 4,10m$$

Recommendation

Use of the Triple 27-38 with a cable distance of 80 – 100 cm because of the cable flexibility in case of short circuit.

The first cable clamp should always be mounted directly to the end of the connection

With kind regards,

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