

$$I_{Asym} = I_{Sym} \times \sqrt{1 + 2(DC\%)^2} \quad \text{--- (1)}$$

$I_{Sym}$  = Sym. Interrupting Rating of VD4

How to find DC%

VD4 is made for IEC 62271 (IECB) - 100. Therefore  
 $f = 50\text{Hz}$ . These IEC CB's are made for  $X/R = 14$   
 @  $50\text{Hz}$  (20 ms)

$$DC\% = e^{-\left(\frac{T_{OP} + T_r}{\tau}\right)} \quad \text{--- (2)}$$

where  $T_{OP}$  = opening time of VD4  $\approx 40\text{ms}$  (Typical)

$T_r$  = Half cycle relay time =  $10\text{ms}$

$\tau$  = DC Time Constant =  $\frac{(X/R)}{2\pi f} = 45\text{ms}$

By substituting in (2)

$$DC\% = e^{-\left(\frac{40+10}{45}\right)} = \underline{\underline{32.9\%}}$$

This is the % DC component a VD4 CB can break at  $50\text{Hz}$ .

By substituting eq<sup>n</sup> ①

$$I_{Asym} = I_{sym} \times \sqrt{1 + 2 (dc\%)^2} \text{ kA}$$

$$I_{sym} = 40 \text{ kA Typical}$$

$$I_{Asym} = 40 \text{ kA} \times \sqrt{1 + 2 (0.329)^2}$$
$$= 40 \text{ kA} \times 1.1$$

$$I_{sym} = \underline{\underline{44.0 \text{ kA}}}$$

This is the actual s/c current the CB is breaking at the location.

NOTE:

After doing your s/c study and if you found the x/R ratio  $> 14$ , then you have to calculate  $I_{Asym}$  accordingly. If calculated  $I_{Asym}$  is too high then

- ① delay the tripping time of relay, after considering all aspects.
- ② Go to a uprated breaker