# Max and actual $Z_s$ values at Submain DB

Max $Z_s$ for 100A BS 88-2 is 0.46Ω (table 41.4)

Act $Z_s = Ze + (R_1 + R_2)$

$R_1 + R_2 = 0.524\,m\Omega/m\,(OSG.I1) + 3.08\,m\Omega/m\,(OSG.I1) =$
$= 0.524 + 3.08 = 3.604\,m\Omega/m$ ($6mm^2$ copper eq. used as per GN1)

$$R_1 + R_2 = \frac{(\text{Table I1. OSG}) \times L \times (\text{Table I3. OSG})}{1000} = \frac{3.604 \times 40 \times 1.28}{1000} = 0.18\,\Omega$$

$Z_s = 0.03\,\Omega + 0.1845\,(\text{not rounded}) = 0.21\,\Omega$

## Earth fault current:

$$I_a = \frac{U_o}{Z_s} = \frac{230V}{0.21\Omega} = 1095\ A$$

## Thermal constrains: (of earthing conductor)

$I_a = 1.095\,kA$
$t = 0.4s$ (Fig. 3A3(b))
$k = 100$ (54.3 table)

$$S = \frac{\sqrt{I_a^2 \times t}}{k} = \frac{\sqrt{1095^2 \times 04}}{100} = 6.96\,mm^2 > 6mm^2 \text{ of our armour copper eq.}$$

We need to run at least $4mm^2$ CPC along the supply cable with no mechanical protection.

## Thermal constrains: (for Live conductors with SC fault)

Can not be calculated as we dont know the sizes of of live conductors at the origin of installation.