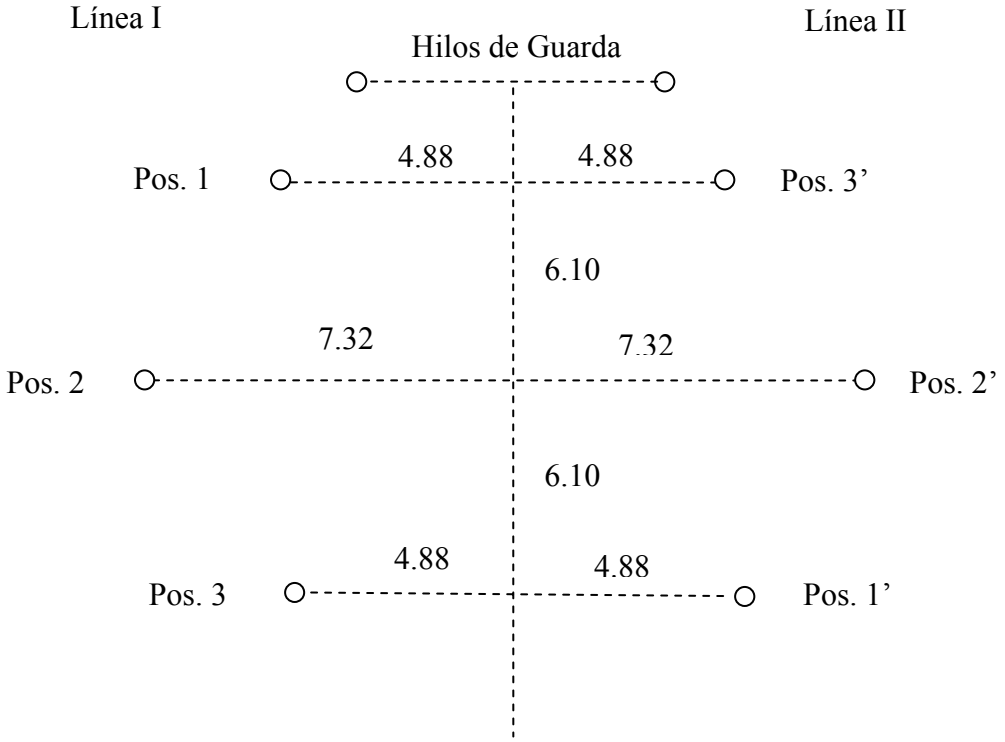
LINEA DOBLE DE 220 kV

Datos:

Tipo: Simplex
Conductor:
Denominación: Cóndor
Sección Total = 455.1 mm^2
" Aluminio = 402.84 "
" Acero = 52.26 "
Composición:
Aluminio: 54 x 3.10 mm diámetro
Acero: 7 x 3.40 mm diámetro
Diámetro Total = 27.76 mm
Resistencia (20ºC) = 0.0717 Ω / km (a.c.)
Resistividad del Terreno:
ρ = 5 -10 - 20 -50 – 100 - 200 – 500 – 1000 Ω m^2 /m

Línea Doble con Transposiciones
Apoyo Típico (Cotas en m.)



D_{12} = 6.57 m D_{23} = 6.57 m D_{31} = 12.20 m
$D_{11'}$ = 15.62 m $D_{12'}$ = 13.64 m $D_{13'}$ = 9.76 m
$D_{21'}$ = 13.64 m $D_{22'}$ = 14.64 m $D_{23'}$ = 13.64 m
$D_{31'}$ = 9.76 m $D_{32'}$ = 13.64 m $D_{33'}$ = 15.62 m

Impedancia de Secuencia Positiva:

$Z_1 = R_1 + jX_1$

Resistencia del Conductor Cóndor a 20ºC = 0.0717 Ω / km (Tabla)

Resistencia del Conductor Cóndor a 50ºC = 0.0829 Ω / km

$R_1 = 0.0829(\Omega / km)$

$X_1(\Omega / km) = 0.1447.\log_{10}\frac{DGM}{RGM}$

$DGM = \sqrt[3]{D_{12}D_{23}D_{31}}$
$D_{12} =$ 6.57 m $D_{23} =$ 6.57 m $D_{31} =$ 12.20 m
$DGM = 8.07m$

$RGM = 0.0112$ m (Tablas)

$X_1 = 0,4135(\Omega / km)$

$Z_1 = 0,0829 + j0,4135\ \Omega$ / km

7.2.3.3 Impedancia de Secuencia Negativa:

Igual a la Impedancia de Secuencia Positiva

Impedancia de Secuencia Cero:

$Z_0 = R_0 + jX_0$

$$Z_0\left(\Omega/km\right) = R_1 + 0.1482 + j0.4341.\log_{10} 93.09\frac{\sqrt{\rho}}{RGM_{3f}}$$

$R_1\left(\Omega/km\right)$, $\rho(\Omega\ \mathrm{m}^2/\mathrm{m})$, $RGM_{3f}(m)$

$R_1 = 0,0829\left(\Omega/km\right)$

$RGM_{3f} = \sqrt[9]{RGM_{1f}^3 D_{12}^2 D_{23}^2 D_{31}^2}$

$RGM_{1f} = 0.0112$ m

$D_{12} =$ 6.57 m $D_{23} =$ 6.57 m $D_{31} =$ 12.20 m

$RGM_{3f} = 0.9006$ m

$Z_0 = 0,2311 + j0,4341.\log_{10} 103,36\sqrt{\rho}\left(\Omega/km\right)$

$R_0 = 0.2311\left(\Omega/km\right)$

ρ	5	10	20	50	100	200	500	1000
X_0	1.0261	1.0915	1.1568	1.2432	1.3085	1.3739	1.4602	1.5256
X_0/X_1	2.48	2.64	2.80	3.01	3.16	3.32	3.53	3.69

ρ ($\Omega\ \mathrm{m}^2/\mathrm{m}$)
X_0 (Ω /km)

Impedancia Mutua de Secuencia Cero:

$$Z_{0m} = R_{0m} + jX_{0m}$$

$$\left(Z_{0m}\right)_{abc,a'b'c'}\left(\Omega / km\right) = 0{,}1482 + j0{,}4341.\log_{10} 93{,}09\frac{\sqrt{\rho}}{DGM_{abc,a'b'c'}}$$

$\rho(\Omega\ \mathrm{m}^2/\mathrm{m})$, $DGM_{abc,a'b'c'}(m)$

$$DGM_{abc,a'b'c'} = \sqrt[9]{D_{11'}D_{12'}D_{13'}D_{21'}D_{22'}D_{23'}D_{31'}D_{32'}D_{33'}}$$

$D_{11'} =$ 15.62 m $D_{12'} =$ 13.64 m $D_{13'} =$ 9.76 m
$D_{21'} =$ 13.64 m $D_{22'} =$ 14.64 m $D_{23'} =$ 13.64 m
$D_{31'} =$ 9.76 m $D_{32'} =$ 13.64 m $D_{33'} =$ 15.62 m

$DGM_{abc,a'b'c'} = 13.15$ m

$$Z_{0m}\left(\Omega / km\right) = 0.1482 + j0.4341.\log_{10} 7{,}08\sqrt{\rho}$$

$$R_{0m} = 0.1482\left(\Omega / km\right)$$

ρ	5	10	20	50	100	200	500	1000
X_{0m}	0.5207	0.5860	0.6514	0.7377	0.8031	0.8684	0.9548	1.0201
X_{0m}/X_1	1.26	1.42	1.58	1.78	1.94	2.10	2.31	2.47

ρ $(\Omega\ \mathrm{m}^2/\mathrm{m})$
X_0 $(\Omega$ /km)