

Voltage Drop

Due to low impedance, the voltage drop of busduct system is lower compared to conventional cable system. Therefore, busduct system is a more efficient power transmission media as compared to conventional cable system.

Voltage Drop Calculation :

$$\Delta V = \sqrt{3} \cdot I (R \cos \phi + X \sin \phi)$$

$$R = R_0 \times \frac{1 + \alpha \left(55 \times \left(\frac{I}{I_0} \right)^2 + 20 \right)}{1 + 75\alpha}$$

ΔV = Line-to-Line Voltage Drop (V/m)

I = Load Current (A)

I_0 = Rated Current (A)

$\cos \phi$ = Load Power Factor

$$\sin \phi = \sqrt{1 - \cos^2 \phi}$$

R = AC resistance at load current (Ω/m)

R_0 = AC resistance at rated current (I_0) (Ω/m)

α = Temperature coefficient of conductor at 20 °C
= 3.85×10^{-3} (Copper)

X = Reactance (Ω/m)

Voltage Drop

Busduct Rating	Conductor Width (Thickness=6mm)	50 Hz			Voltage Drop at Full Load Current					
		Resistance, R ($\mu\Omega/m$)	Reactance, X ($\mu\Omega/m$)	Impedance, Z ($\mu\Omega/m$)	Power factor ϕ at 50 Hz					
					1.00	0.95	0.90	0.85	0.80	0.75
400A	20mm	195.5	81.9	211.9	0.135	0.146	0.147	0.145	0.142	0.139
600A	30mm	142.9	54.2	152.8	0.149	0.159	0.158	0.156	0.153	0.149
700A	40mm	99.3	45.2	109.1	0.120	0.131	0.132	0.131	0.129	0.127
800A	45mm	88.7	43.3	98.7	0.123	0.135	0.137	0.136	0.134	0.132
1000A	60mm	67.3	33.1	75.1	0.117	0.129	0.130	0.129	0.128	0.125
1250A	75mm	49.0	27.3	56.1	0.107	0.120	0.122	0.122	0.121	0.119
1600A	110mm	35.8	19.8	40.9	0.099	0.111	0.113	0.113	0.112	0.111
1800A	125mm	31.3	16.7	35.5	0.098	0.109	0.111	0.110	0.109	0.108
2000A	150mm	25.4	15.4	29.7	0.088	0.100	0.102	0.103	0.102	0.101
2200A	175mm	22.3	16.7	27.8	0.085	0.100	0.104	0.106	0.106	0.106
2500A	200mm	19.0	13.4	23.2	0.082	0.096	0.099	0.100	0.101	0.100
3000A	110mm	17.1	8.9	19.3	0.089	0.099	0.100	0.100	0.099	0.097
3500A	125mm	15.6	8.3	17.7	0.095	0.106	0.107	0.107	0.106	0.104
4000A	150mm	13.0	6.7	14.6	0.090	0.100	0.101	0.101	0.100	0.098
4500A	175mm	10.7	5.6	12.0	0.083	0.093	0.094	0.094	0.093	0.091
5000A	200mm	8.7	6.7	11.0	0.075	0.090	0.093	0.095	0.095	0.095
6300A	175mm	2.2	7.7	8.0	0.024	0.049	0.058	0.065	0.070	0.074