

Field Testing

A high voltage DC test made before placing a new cable system in service will normally reveal gross imperfections such as mechanical damage during installation or improperly installed accessories. It is not expected to reveal deterioration due to ageing in service.

At any time during installation, a “proof test” may be made at a voltage not exceeding that shown in the table below applied for five consecutive minutes.

After installation and before the cable is placed in regular service, an “acceptance test” may be made at a voltage not exceeding that shown in the table below applied for 15 consecutive minutes.

After the cable has been completely installed and placed in regular service, a “maintenance test” may be made at any time within the first five years of service at a voltage not exceeding that shown in the table below applied for five consecutive minutes. There is some evidence that DC testing of aged cross-linked polyethylene cables can lead to early cable failures and, therefore, testing after this time in service is not recommended.

These tests should only be undertaken by persons familiar with the use of high voltage equipment and appropriate safety precautions. If any equipment is included beyond the cable terminations, the dielectric strength of such equipment must be taken into consideration when establishing the test voltage.

CAUTION: After performing DC testing, appropriate procedures should be followed to adequately discharge the cable system, otherwise, unsafe residual voltage potential could be a hazard to personnel.

The maximum permissible leakage current can be calculated with the formula below. Note that this does not include terminal leakage.

DC FIELD TEST VOLTAGES

Rated Voltage Phase to Phase (kV)	Conductor Size (AWG or kcmil)	Nominal Insulation Thickness (mm)		Maximum DC Field Test Voltage (kV)			
				During / After Installation		First 5 years	
				A	B	A	B
5	8-1000	2.29	2.92	28	36	9	11
8	6-1000	2.92	3.56	36	44	11	14
15	2-1000	4.45	5.59	56	64	18	20
25	1-2000	6.60	8.13	80	96	25	30
28	1-2000	7.11	8.76	84	100	26	31
35	1/0-2000	8.76	10.7	100	124	31	39
46	4/0-2000	11.3		132		41	

Column A = 100% insulation level
Column B = 133% insulation level

$$\text{Leakage current} = \frac{\text{DC Test Voltage (kV)}}{\text{Insulation Resistance (M}\Omega\text{)}} \times 10^3 \text{ A}$$

$$\text{Insulation Resistance} = k/L \times \log_{10} (D/d) \times 10^3 \text{ M}\Omega$$

Where:

D = Diameter over insulation

d = Diameter over conductor

L = length of conductor under test, m

k = 6000 GΩ·m