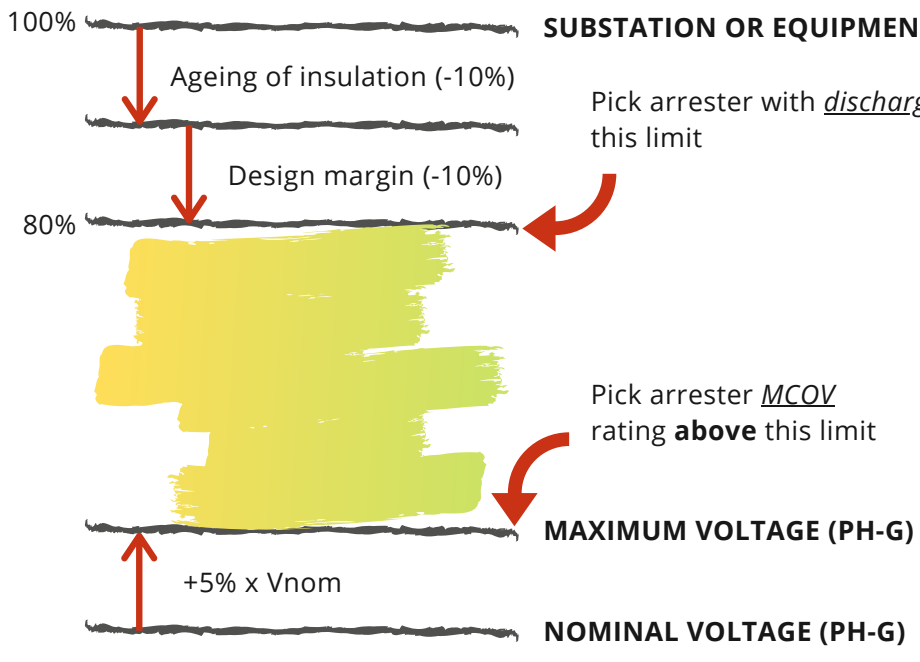
SPECIFYING LIGHTNING ARRESTER FOR SUBSTATIONS

Based on IEEE C62.22 Standard

STEP 1 - DISCHARGE VOLTAGE & MCOV



EXAMPLE

Substation BIL: 650kV
Nominal Voltage: 138kV Ph-Ph
Grounding: Low impedance

Specify arrester using below table

MCOV Calculations
Maximum voltage (PH-PH): 138 x 1.05 = 145kV
Maximum voltage (PH - G): 145/Sqrt(3) = 84kV

Choose MCOV >= 84kV

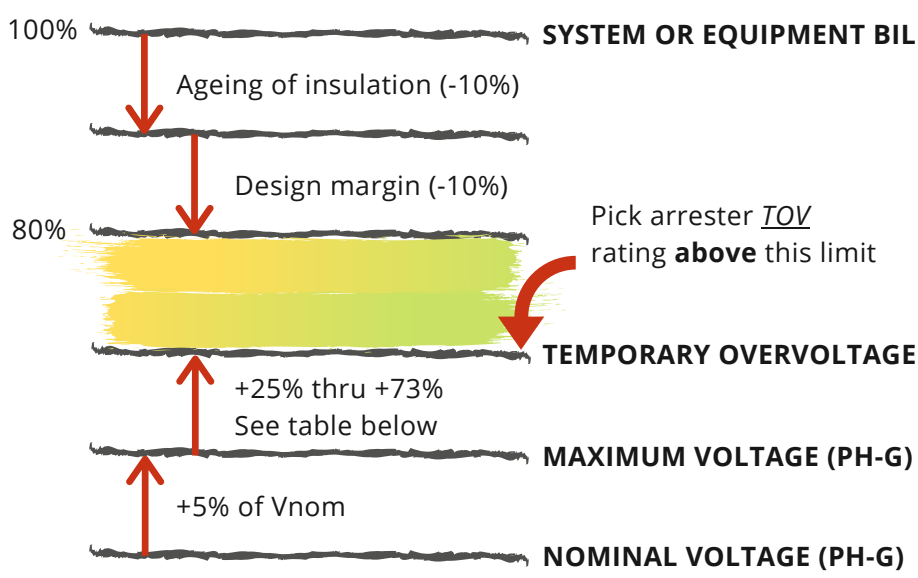
Discharge voltage calculations
Removing 20% from 650 yields - 520kV BIL

Choose discharge voltage <= 520kV

Using table, an adequate arrester has
86kV MCOV and 280kV discharge voltage @10kA

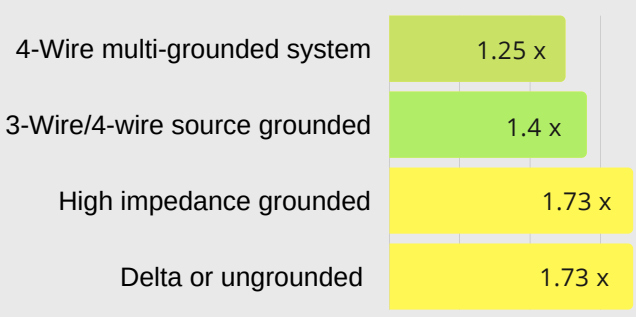
Max. System Voltage	Rated Voltage	Max. continuous operating voltage 1)		TOV capability 2)		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_m kV_{rms}	U_r kV_{rms}	U_c kV_{rms}	MCOV kV_{rms}	1 s kV_{rms}	10 s kV_{rms}	0.5 kA kV_{peak}	1 kA kV_{peak}	2 kA kV_{peak}	5 kA kV_{peak}	10 kA kV_{peak}	20 kA kV_{peak}	40 kA kV_{peak}
145	108	86	86.0	124	118	223	231	242	264	280	314	359
	120	92	98.0	138	132	247	257	269	294	311	349	398
	132	92	106	151	145	272	283	296	323	342	383	438
	138	92	111	158	151	284	295	309	338	358	401	458
	144	92	115	165	158	297	308	323	352	373	418	478

STEP 2 - TOV & ENERGY CLASS



TEMPORARY OVERVOLTAGE

Multiply maximum voltage (Ph-G) with multipliers that match your system neutral grounding.



ENERGY CLASS

During arrester operation, primarily due to a switching surge, the surge current generates heat. If the heat produced > heat dissipated, even after system restoration, the arrester fails.

IEEE C62.11 defines classes A thru N, with N having the highest energy rating.

Are you installing arresters at a location with excessive switching operation? Specify one with a higher energy class.

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