Simplified guidelines for sizing batteries for medium-voltage switchgear

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1. Size the switchgear battery on the basis of 1-minute discharge ampere rate (1-minute discharge rate) down to 1.75 V/Cell for Lead-Acid and 1.14 V/Cell for Ni-Cd batteries. Determine 1-minute discharge rate from guidelines 2, 3, or 4 below, as applicable. Use VCP-W close and trip current values from guideline 7.
2. In controlling circuit breakers equipped with automatic reclosing relays, figure 1-minute rate of the control battery to be equal to the sum of the closing currents of the breakers up to a maximum of four breakers and 50% of the total currents above that number of breakers.
3. In controlling circuit breakers without automatic reclosing relays, figure 1-minute rate of the battery to be equal to the sum of the tripping currents up to a maximum of four breakers and 50% of the total currents above that number of breakers.
4. In controlling circuit breakers equipped with differential protection, or other means that involves multiple tripping, figure 1-minute rate of control battery to be equal to the sum of tripping currents of all breakers operating simultaneously.
5. After the 1-minute discharge rate of the battery has been determined from guidelines 2, 3, or 4 above, divide it by ambient temperature derating factor and aging factor to arrive at the required 1-minute discharge rate.

a. Ambient temperature	Ni-Cd	Lead Acid
77 Deg F	1.0	1.0
32 Deg F	0.7	0.67
0 Deg F	0.5	0.5
b. Battery aging factor	0.8	0.8

6. Select the battery designed for high discharge rate applications. Look up the battery discharge characteristic tables in the manufacturer's catalog and select the type of cell that has 1-minute discharge rate to final 1.14 V/Cell for Ni-Cd and 1.75 V/Cell for Lead-Acid, that is equal to or greater than the required rate calculated under guideline 5 above. Finally, specify number of cells as follows:

Control voltage	Ni-Cd battery	Lead-Cal battery
48 Vdc	37 cells	24 cells
125 Vdc	92 cells	60 cells
250 Vdc	184 cells	120 cells

7. VCP-W circuit breaker trip and close currents:

	48 V	125 V	250 V
CLOSE	16 A	7 A	4 A
TRIP	16 A	7 A	4 A

8. Indicating lights (typically 20 mA each) are ignored.
9. If other steady-state or emergency loads are involved, more elaborate calculations must be performed in accordance with IEEE® Std.485.

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