TechTopics No. 76

We are often asked to provide estimated heat generation data for our equipment. This issue of TechTopics provides estimated heat generation for Simosec load interrupter switchgear equipment.

The heat generation data given in the table is based on the operation at the maximum currents shown, and includes the losses of the main bus. For the table, a main bus current of 600 A has been assumed in all cases. Since the heat generation of the main bus is low (35 watts per section), this condition is conservative but not excessively so.

To estimate the heat generated for a multiple-section lineup of equipment, add the heat generation for each section from the table. Heat generation by space heaters should be assumed to be continuous.

The heat generated is dominated by the heat generation in the fuses. To illustrate, consider a section with 5.5 kV fuses and maximum full load current (FLC) of 100 A.

From Table 1, an unfused switch section (at 600 A) would generate 215 W. At 100 A, this section would generate 215 x $(100/600)^2$ = 6 W (by the ratio of the squares of the currents). The fused switch at 100 A has heat generation of 350 W. Nearly all of the heat generation is due to the fuses, and only about 2 percent is due to the switch and main bus. This example is illustrative for typical fuse sizes used, but if the maximum FLC increases, the portion of the heat generation attributable to the fuses decreases due to a larger conductor cross-section in the fuses.

For a worst-case example of 600 A maximum FLC in a 5.5 kV fuse, the total heat generation is 650 W, with 215 W from the switch and main bus, so that about 33 percent of the heat generation is from the switch and main bus (instead of 2 percent as in the previous example).

Heat generation estimation for Simosec load interrupter switchgear

Answers for energy.

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Table 1: Approximate full-load heat generation (in watts (W)) for type Simosec load interrupter switchgear

Section description	Fuse rating					
	5.5 kV		15.5 kV / 17.5 kV		27.6 kV	
	Maximum FLC (A)	Watts	Maximum FLC (A)	Watts	Maximum FLC (A)	Watts
Fused switch section (includes main bus)	40 A and below	125 W	30 A and below	175 W	25 A and below	200 W
	41 A - 80 A	200 W	31 A - 75 A	425 W	26 A - 40 A	300 W
	81 A - 150 A	350 W	76 A - 430 A	750 W	41 A - 90 A	450 W
	151 A - 240 A	500 W	----	----	91 A - 156 A	700 W
	241 A - 600 A	650 W	----	----	----	----
Unfused switch section (includes main bus)	215 W @ 600 A					
Blank section (main bus only)	35 W @ 600 A					
Auxiliary section (with control power transformer (CPT))	35 W (main bus) plus transformer heat generation, assumed not higher than 5% of CPT kVA rating (in watts)					
Space heaters	75 W per section (375 mm or 500 mm wide) or 100 W per section (750 mm wide)					

Footnotes:

1. Conversion factor: watts x 3.415179 = BTU/hour
2. Maximum FLC (A) = maximum full-load continuous current of the circuit.

For more information, please contact your local Siemens representative.

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E50001-E710-A135-X-4A00