g POWER/VAC® Application Update

February 14, 2003 *Issue No. 3*

INTRODUCTION –

This is the third installment in the "POWER/VAC Application Update" series. Our intent is to inform you of the current design enhancements, providing application tips and other information necessary to assist you in selling, applying and engineering POWER/VAC Switchgear.

SUBJECT # 7 – Power/VAC Breakers Now Meet ANSI C37.06 - 2000

I am pleased to announce that we have successfully completed testing of our Power/VAC breakers to the new ANSI C37.06-2000 Preferred Ratings. We can now meet your customer's needs, whether they be specified on the older "MVA", or new "KA" basis. Breakers will be available with UL & CSA labels. Our Quotation and Ordering Systems are being upgraded to reflect this enhancement. The new ratings are listed in the table below.

NEW POWER/VAC Power Circuit Breaker Characteristics

Symetrical Ratings Basis **ANSI C37.06 (2000)**

Rated Values									
Voltage		Insulation Level		Current				Current	
Rated Maximum rms Voltage (kV) (1)	Rated Voltage Range Factor, K	Rated Withstand Test Voltage		Continuous rms Current Rating at 60Hz (amperes) (2)	Short Circuit rms Current Rating (at Rated Max. kV) (kA) (3)	Rated Interrupting Time (Cycles)	Rated Permissible Tripping Delay, Y (Seconds)	2 Sec Short time Current Carrying Capability (kA)	Close and Latch Peak 2.6K x short circuit current rating (kA)
		Low Frequency rms Voltage (kV)	Crest Impulse Voltage (kV)						
4.76	1.0	19	60	1200-4000	31.5	5 or 3	2	31.5	82
4.76	1.0	19	60	1200-4000	40	5 or 3	2	40	104
4.76	1.0	19	60	1200-4000	50	5 or 3	2	50	130
4.76	1.0	19	60	1200-4000	63 *	5 or 3	2	63	164
8.25	1.0	36	95	1200-4000	40	5 or 3	2	40	104
8.25	1.0	36	95	1200-4000	50 *	5 or 3	2	50	130
8.25	1.0	36	95	1200-4000	63 *	5 or 3	2	63	164
15	1.0	36	95	1200-4000	20	5 or 3	2	20	52
15	1.0	36	95	1200-4000	25	5 or 3	2	25	64
15	1.0	36	95	1200-4000	31.5	5 or 3	2	31.5	82
15	1.0	36	95	1200-4000	40	5 or 3	2	40	104
15	1.0	36	95	1200-4000	50	5 or 3	2	50	130
15	1.0	36	95	1200-4000	63	5 or 3	2	63	164

Notes:

1 Maximum voltage for which the breaker is designed and upper limit of operation.

2 4000A rating is forced-air cooled, indoor constrcution only. 3500A must be derated in outdoor construction.

3 Within the limitations stated in ANSI C37.04-1999, 5.8.

* Exceeds ANSI C37.06-2000 preferred ratings.

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SUBJECT # 8 – Enhanced Operator Safety – Use Remote Racking Option

Our Customers are increasing the focus on improved electrical safety for their operators and technicians. The current revisions to ANSI C37.20.7 – IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults, and NFPA 70E – Electrical Safety Requirements for Employee Workplaces emphasizes the concern for operator safety while racking circuit breakers in and out of the connected position, and opening or closing a circuit breaker, both typically performed while standing in front of the equipment. While Arc Resistant construction is one solution we offer, remote controls can provide a simpler, possibly more cost effective option, and can be retrofitted to existing equipment.

GE Burlington offers a Remote Racking Operator, either as part of the initial equipment or as a field installable option. The device easily attaches to the front of a Power/VAC breaker door (door bracket required). It contains a 120VAC gear motor and drive socket, that connects to the standard breaker racking shaft in the breaker compartment, and a hand held control box on a 20' cord. Once attached and connected to a 120VAC source, the operator can stand a safe distance from the equipment, and easily rack a Power/VAC breaker in or out of position, with the doors closed. Another option we can provide, is to wire the breaker control switches along with the racking controls to a remote panel. This provides complete breaker control from a remote panel, removing the operator from an area of potential hazards. More information on the Remote Racking Operator is available in GEK-86130A. The picture on the next page is of a remote breaker control and synchronizing panel, currently being manufactured in our Switchgear Shop, which provides this increased operator safety.

Example of a panel currently under manufacture, for remote breaker controls, furnished by Burlington.

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SUBJECT # 9 Use of 90°C Cables & Ampacity in Power/VAC

Power/VAC MetalClad Switchgear has ampacity ratings based on thermal limits established by testing. The tests are performed per ANSI C37.20.2 to confirm that the bus does not exceed 65°C temperature rise over a 40°C ambient, with the ambient in cable compartments not exceeding 65°C. Typically we do not make test connections with cable, but with solid copper bus. A 65°C temperature rise over a 40°C ambient equals 105°C maximum hot-spot temperature, and our Switchgear and insulation systems are designed for this maximum temperature. Based on the design capabilities of Power/VAC Switchgear, the use of 105°C cable at 105°C ampacity, would not affect the Switchgear design and ratings.

HOWEVER, ANSI C37.20.2-1999, section 5.5 limits the maximum hot-spot cable termination to 85°C, and NEC-2002 100.14 (C) limits the cable sizing to 75°C ampacity for terminations over 100A.

Often, 90°C ampacities are needed for derating when feeders pass though high ambients. Another reason for 90°C ampacities is conductor fill in conduit. If there are more than three current carrying conductors in a conduit, the ampacities are reduced by a multiplying factor. For four to six conductors, the factor can be 0.8. By using the 90°C conductor ampacity (providing the conductor is so rated), the derating does not result in as large a conductor. The ampacity at the termination, however, must meet the 75°C ampacity per NEC.

In any case, Power/VAC is not recommended for use with cable conductors rated at 90 deg C. ampacity, per current Industry Standards. This includes main lug assembles in switchgear where the lugs themselves are marked 90 deg. C, as well as components such as medium voltage circuit breakers, enclosed switches and starters. This information is located in ANSI 37.20.2-1999, Table 3 and NEC-2002 100.14 (C) and 310.60 (B).

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