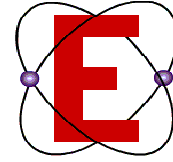


Certified Test Report



ERMCO Components Inc.

8.3/15KV 9F54VDE Expulsion Fuse Interrupting Test

Report No. ECI-042103EXF

March 2003

B1-5A

Purpose of Test

To verify that 8.3KV/15KV rated 9F54VDE type fuse links to be manufactured by ERMCO Components Inc. will perform according to published ratings.

Method of Test

Fuses were installed in the High Voltage bushings in an oil filled Pole Type transformer tank. Two bushing units were used with one bushing having the fuse installed and the other bushing used to complete the circuit.

Test Conditions

The tests were conducted in the outdoor test facility at the F. Gano Chance Research Laboratory in Centralia, MO. Circuits were constructed using the generator and standard components available at the laboratory. The circuits had X/R values between 4 and 5. Fuses were tested at 8.3KV and 15 KV. The 8.3KV setups produced 3500 Amperes; the 15KV 2000 Amperes. Both values are asymmetrical resulting from closing the circuits to provide maximum asymmetry. A backup breaker was set to interrupt in 5 cycles in case of fuse failure.

Tests Performed

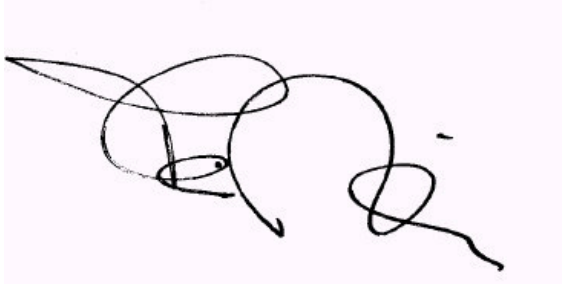
A total of 12 tests were performed: 3 on fuse model 9F54VDE104, 3 on 9F54VBE404 and 6 on 9F54VDE604.

Test Results

In all cases the fuse interrupted the short circuit current after less than 2 cycles of current. No re-strikes occurred during the remaining cycles. The transformer cover vented as per it's design intent and the bushings maintained their integrity.

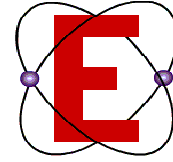
Conclusion

The 9F54VDEx04 series of expulsion fuses are suitable for application in Pole Type transformers when mounted in porcelain high voltage bushings with the end of the bushing and the fuse immersed in transformer oil.



Finn Hassing
Senior Product Engineer

Certified Test Report



ERMCO Components Inc.

8.3/15KV 9F54VDE Expulsion Fuse Melting Test

Report No. ECI-021204EXF

February 2004

Purpose of Test

The purpose of this series of tests was to verify that the 9F54VDE series of bushing mounted expulsion fuses have melt time characteristics as shown on published curves.

Method of Test

The fuse to be tested was mounted in a high voltage bushing using methods identical to the industry practice. The bushing was mounted in a pole type transformer cover which in turn was installed on top of a transformer tank which was filled with oil to immerse the fuse per specification. The wire end of the fuse was attached to a second bushing mounted on the transformer tank to allow for completion of a circuit through the fuse. The bushings were connected to a regulated current source and instrumentation to measure current and time to melt was applied. To perform the actual test the power source was programmed for a specific current, power applied and time to melt and actual current measured and recorded.

Results

The results as recorded are shown in the table below:

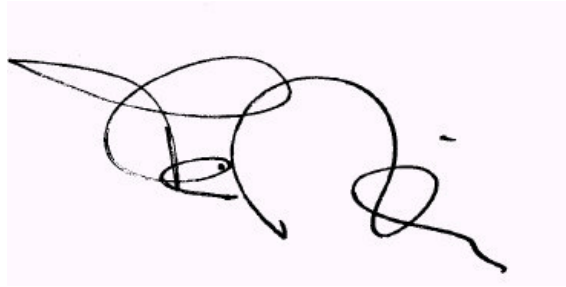
Fuse Number	Curve Number											
	1		2		3		4		5		6	
	Amp	Sec	Amp	Sec	Amp	Sec	Amp	Sec	Amp	Sec	Amp	Sec
1	12.8	21	17	4	45	0.3	48	0.7	49	1.5	50	3
2	12	21.5	21	2	44	0.25	33	1.7	50	1.6	48	3.4
3	12.6	21.6	22	1.7	44	0.3	36	1.7	50	1.5	51	3
4	20	0.4	22.4	2.5	23	4	27.5	4.7			54	2.5
5	24	0.42	30	0.6	26.4	2.5	28.3	3.4			43	10
6	23	0.45	44	0.2			28.2	3.7			44	5.7
7	15	4	21	1.6			43	0.8				
8			45	0.2			37	1.6				
9			28	0.7			40	0.9				

Analysis of Results

In order to analyze the results each pair of current versus time was compared to GES-8304C and GES-8314B. All test values fell between the minimum melt and the maximum total clearing curves.

Conclusion

Due to the limitations of the test equipment it was not possible to perform a comprehensive test series as would have been required to establish the complete curve for each fuse. Since the fuses tested incorporate identical elements and similar construction and dimensions as the fuses which were tested to establish the curves originally our judgment is that the data obtained was sufficient to fulfill the purpose of the test which was to verify the TCC curves of the 9F54VDE fuses.



Finn Hassing
Senior Product Engineer