Raychem
Energy Division **Report**

Title: **PERFORMANCE REPORT OF RAYCHEM HEAT SHRINKABLE, HIGH VOLTAGE TERMINATION SYSTEMS TYPE HVT (Pre 1985) AND TYPE NHVT TO IEEE STANDARD 48-1975**		Pages: 9 Enclosures:
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REVISION RECORD

Rev.	Page	Paragraph	Description	Date
1	Cover	-	Retitled report to prevent confusion between present day HVT's and older HVT's.	3/30/87
	-	-	Added Table of Contents	3/30/87
	All	-	Indicated revision on each page	3/30/87

APPROVALS (Type and sign name)

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1	3/30/87	N/A	Milo Anderson	Ken Baker	Peter Larsson

CONTENTS

SCOPE

This report summarizes a series of tests performed by the Technical Services and Product Development Laboratories of the Raychem Corporation. The purpose of these tests was to establish the performance of a heat shrinkable high voltage cable termination system (Type HVT) to the requirements of IEEE Standard No. 48, "Standard for High Voltage Alternating Current Cable Terminations".

CONCLUSIONS

The test report results indicate that all performance parameters of the Raychem Type HVT cable termination system meet or exceed IEEE No. 48 requirements for a Class 1 termination for all insulation classes through 15kV. 25kV and 34.5kV indoor terminations meet or exceed all IEEE No. 48 requirements for Class 1 terminations except the impulse test which yields results of 125 and 150kV crest respectively. Outdoor terminations meet all IEEE No. 48 requirements up to and including 34.5kV insulation class.

SAMPLE DESCRIPTION

All tests were carried out on terminations installed, per standard installation instructions, on shielded power cables rated appropriately for the insulation class of the termination under test. A wide variety of cable constructions and sizes from various manufacturers were included in the testing sample, resulting in a wider variation in test results than if any one cable type had been used.

TEST METHODS

Because the construction of the HVT termination system is identical for indoor and outdoor terminations, all tests were run in sequence on the same sample set. The proper number of heat shrinkable skirts were added to the indoor terminations prior to the wet withstand and outdoor impulse testing.

TEST SEQUENCE

1. Corona Extinction Level
2. 60 Second Dry Withstand (60HZ)
3. 6 Hours Dry Withstand (60HZ)
4. 15 Minute Dry Withstand (D.C.)
5. Impulse Test - Indoor Termination
6. 10 Second Wet Withstand
7. Impulse Test - Outdoor Termination

TEST RESULTS

1. Corona Extinction Voltage Test

   IEEE No. 48 Section 7.4.1 (e)

   Detection Sensitivity - 3.0 picocoulombs

Termination Insulation Class	Specification Requirement	Specimen Number	Test Results
5-8.7kV	7.5kV	1	11.0kV
		2	12.0kV
		3	18.0kV
		4	12.0kV
15kV	13.0kV	1	45.0kV
		2	50.0kV
		3	50.0kV
		4	48.0kV
25kV	21.5kV	1	50.0kV
		2	29.0kV
		3	40.0kV
		4	44.0kV
34.5kV	30kV	1	56.0kV
		2	56.0kV
		3	50.0kV
		4	42.0kV

TEST RESULTS (Cont'd)

2. 60 Second Dry Withstand (60HZ)

IEEE No. 48 Section 7.4.1 (a)

Termination Insulation Class	Specification Requirement (kV rms)	Specimen Number	Test Results Passed	Failed
5-8.7kV	35.0	1	X	
		2	X	
		3	X	
		4	X	
15kV	50.0	1	X	
		2	X	
		3	X	
		4	X	
25kV	65.0	1	X	
		2	X	
		3	X	
		4	X	
34.5kV	90.0	1	X	
		2	X	
		3	X	
		4	X	

TEST RESULTS (Cont'd)

3. 6 Hour Dry Withstand (60HZ)
IEEE No. 48 Section 7.4.1 (c)

Termination Insulation Class	Specification Requirement (kV rms)	Specimen Number	Test Results Passed	Failed
5-8.7kV	25.0	1	X	
		2	X	
		3	X	
		4	X	
15kV	35.0	1	X	
		2	X	
		3	X	
		4	X	
25kV	55.0	1	X	
		2	X	
		3	X	
		4	X	
34.5kV	75.0	1	X	
		2	X	
		3	X	
		4	X	

TEST RESULTS (Cont'd)

4. 15 Minute Dry Withstand (D.C.)

IEEE No. 48 Section 7.4.1 (h)

Termination Insulation Class	Specification Requirement (kV Peak)	Specimen Number	Test Results Passed	Failed
5-8.7kV	65.0	1	X	
		2	X	
		3	X	
		4	X	
15kV	75.0	1	X	
		2	X	
		3	X	
		4	X	
25kV	105.0	1	X	
		2	X	
		3	X	
		4	X	
34.5kV	140.0	1	X	
		2	X	
		3	X	
		4	X	

TEST RESULTS (Cont'd)

5. Impulse Test - Indoor Termination (No Skirts)

IEEE No. 48 Section 7.4.1 (f)

Wave Shape - 1.2 x 50 μ second

Termination Insulation Class	Specification Requirement (kV Crest)	Specimen Number	Test Results*
5-8.7kV	95.0	1	95
		2	95
		3	95
		4	95
15kV	110.0	1	110
		2	110
		3	110
		4	110
25kV	150.0	1	125
		2	125
		3	125
		4	125
34.5kV	200.0	1	150
		2	150
		3	150
		4	150

*Samples were subjected to both positive and negative impulses per the specification requirements with the lowest withstand value being recorded.

TEST RESULTS (Cont'd)

6. 10 Second Wet Withstand - Outdoor Termination (60HZ)

IEEE No. 48 Section 7.4.1 (b)

Termination Insulation Class	Specification Requirement (kV rms)	Specimen Number	Test Results Passed	Failed
5-8.7kV	30.0	1	X	
		2	X	
		3	X	
		4	X	
15kV	45.0	1	X	
		2	X	
		3	X	
		4	X	
25kV	60.0	1	X	
		2	X	
		3	X	
		4	X	
34.5kV	80.0	1	X	
		2	X	
		3	X	
		4	X	

TEST RESULTS (Cont'd)

7. Impulse Test - Outdoor Termination

IEEE No. 48 Section 7.4.1 (f)

Wave Shape - 1.2 x 50 μ second

Termination Insulation Class	Specification Requirement (kV Crest)	Specimen Number	Test Results*
5-8.7kV	95.0	1	130
		2	130
		3	130
		4	130
15kV	110.0	1	220
		2	220
		3	220
		4	220
25kV	150.0	1	240
		2	240
		3	240
		4	240
34.5kV	200.0	1	250
		2	250
		3	250
		4	250

*Samples were subjected to both positive and negative impulses per the specification requirements with the lowest withstand value being recorded.