ORTA DOĞU TEKNİK ÜNİVERSİTESİ ELEKTRİK VE ELEKTRONİK MÜHENDİSLİĞİ BÖLÜMÜ
MIDDLE EAST TECHNICAL UNIVERSITY ELECTRICAL AND ELECTRONICS ENGINEERING DEPT.
1956

No: 14-03-01-511 (A)

Protart Elektrik ve Bilişim Tek. Dış Tic.A.Ş.
Lightning Catching Head Impulse Voltage Streamer Time Lag. Gain Measurements

TEST REPORT

25.08.2014

Middle East Technical University , Ankara

1. GENERAL

Firm Applied for the Test. : Protart Elektrik ve Bilişim Teknolojileri Dış Tic.A.Ş.
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Tests Requested : Lightning Catching Head Impulse Voltage Streamer Time Lag. Gain Measurements

Date of the Test : 19.08.2014

Test Laboratory : Middle East Technical University
High Voltage Laboratory , Ankara

Environmental Conditions : 26 °C , 688mmHg , % 61 Relative Humidity
(these values were observed not to change appreciably during the test.)

Equipment Tested : Protart Brand (E.S.E.) Lightning Catching Head

MODEL PROTART 30 Year : 2014 Series: Prototype
Dimensions : given in Fig. 2

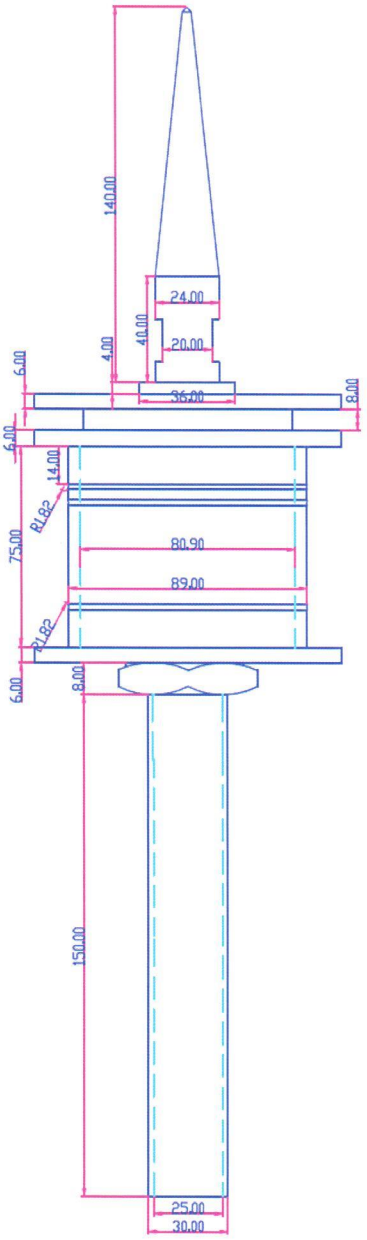
2. TEST STANDARDS

NFC17-102 (Appendix C) French Standard

3. APPLICATIONS OF THE TESTS

Tests were carried out using a high voltage electrode prepared according to the criteria mentioned in the related standart with dimensions ; edge radius R = 20 cm , diameter Φ = 300 cm and as the ground electrode , in the first case a simple catching rod and in the second case the sample active catching device (ESE) head. In each case 100 negative impulses of approximately 200 / 2000 µS (Rise time = 170 µS) waveform were applied and the streamer initiation time lags were recorded by DSO. The spacing between the cathing rod or device and the High Voltage plane electrode was set to 100 cm , the test impulse voltages were applied by means of a 1.2 MV , 20 kJoule impulse generator. The tests were applied using the ESE device under the test and a simple cathing rod of the same tip geometry and total length . Test set-up and the sample are shown in Figures.1 -2 and the results are given in Table.1

FIGURE 1. The Test system and the Sample under test.



PROTART 30

FIGURE.2. Test Sample Dimensions

TABLE.1

Catching Device	Time lag (μS) .		
	Minimum	Maximum	Average
SR	155	380	182
ESE samples			
Protart 30	145	290	224

Test Voltage oscillograms are given in Figures .3 , 4 , 5

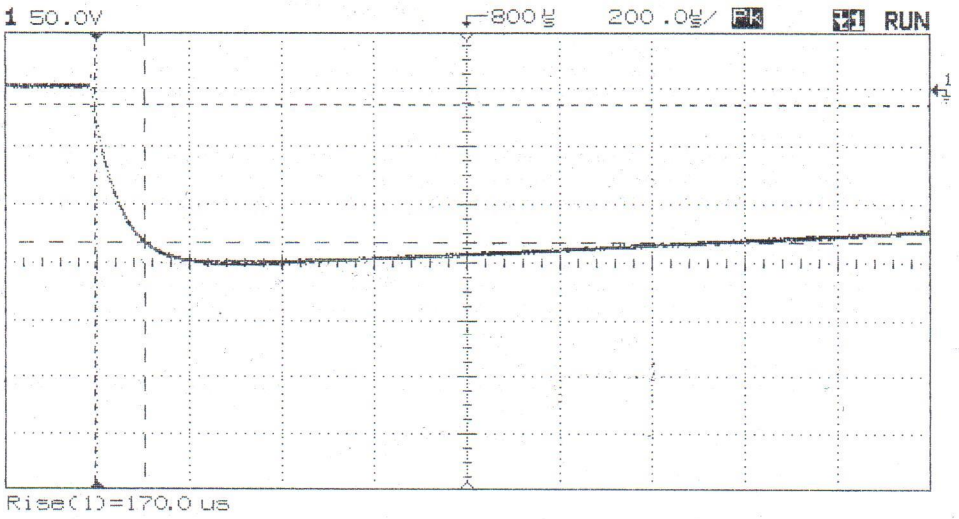


Figure.3. Impulse Test Voltage , V_{min} = - 965 kV

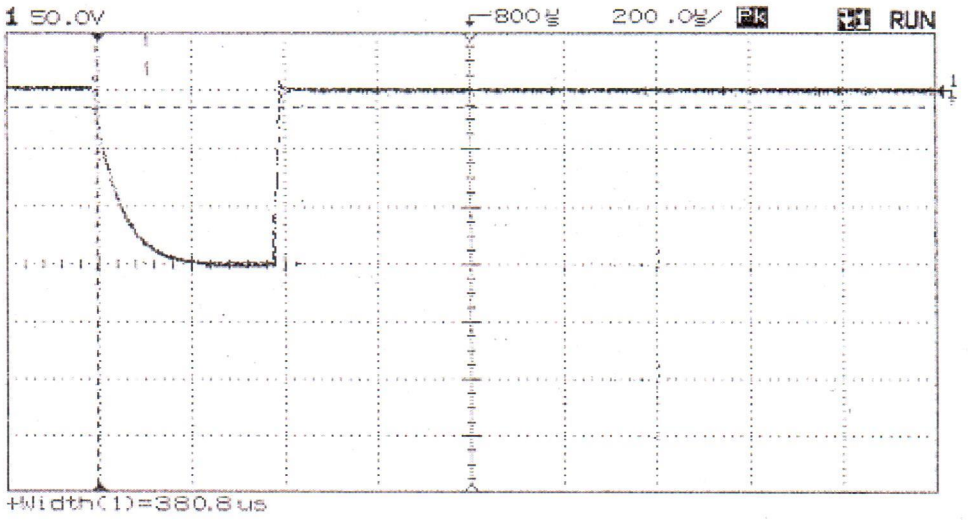


Figure.4. Impulse Test Voltage , SR Rod

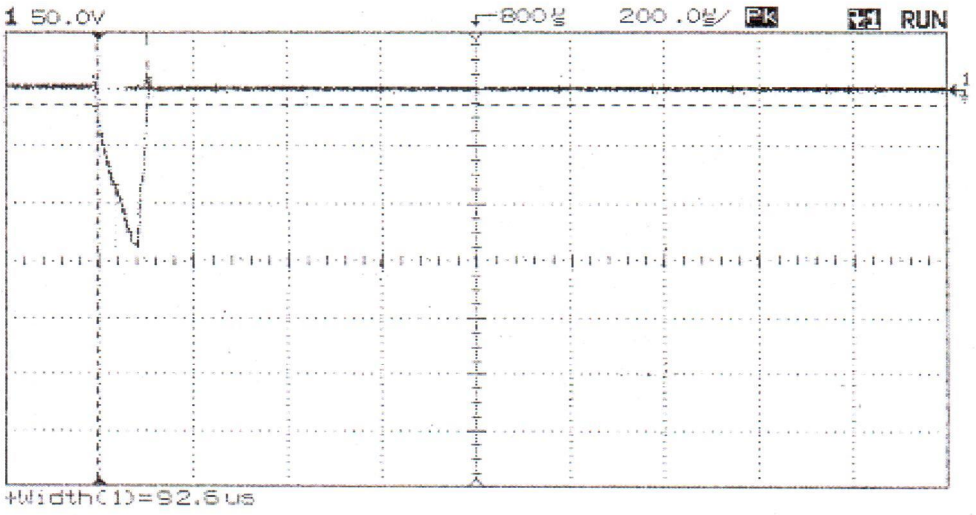


Figure.5. Impulse Test Voltage , ESE Sample

4. EVALUATION of THE TEST RESULTS

As described in NFC17-102 (Appendix C) , the average time lags are applied to the reference curve and the test curve and the difference between the corresponding values are obtained as the time lag gain for the ESE sample Model , Protart 30 $\Delta T = 57\ \mu S$,

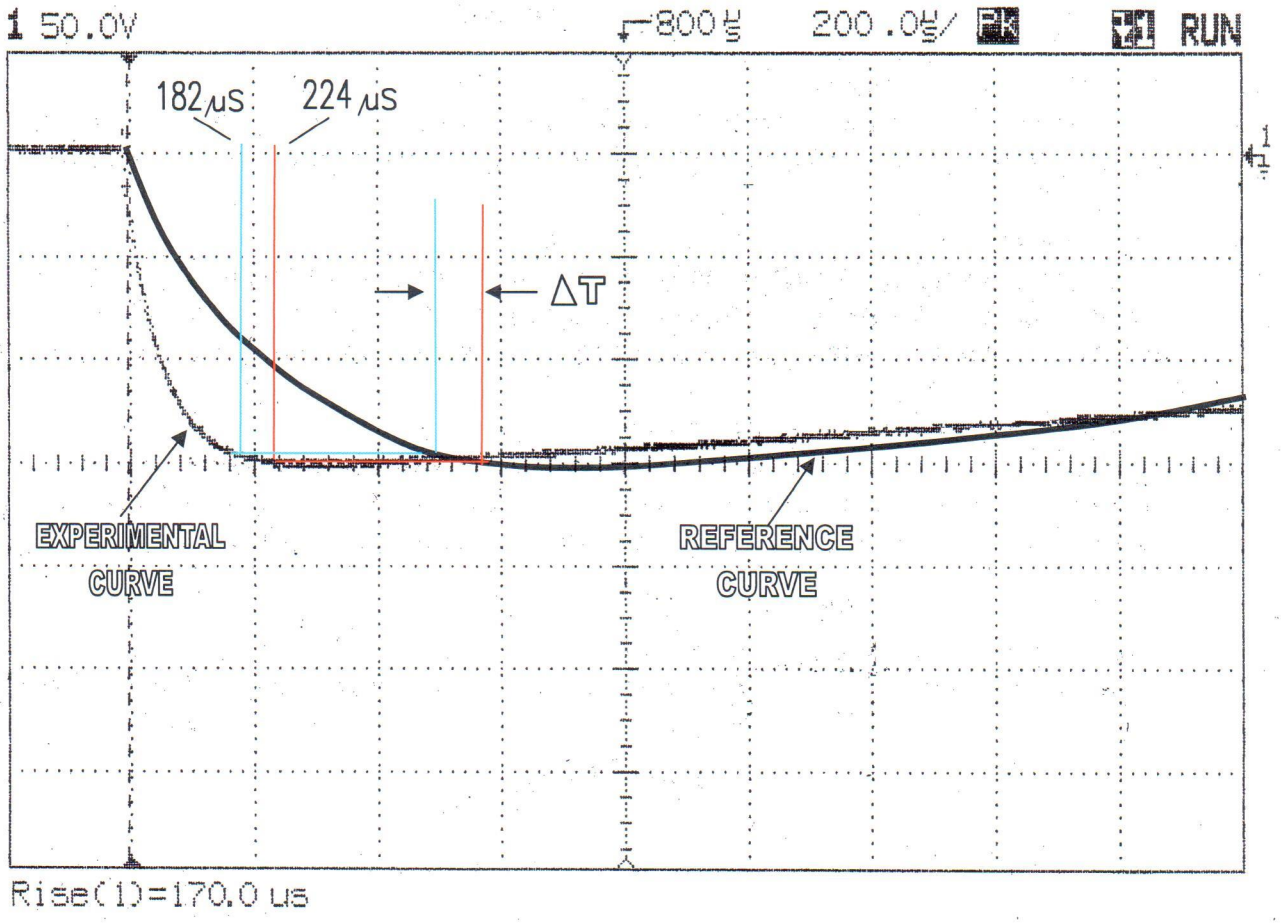


Figure.6. Streamer Time gain for the ESE Sample Model : Protart 30 ($\Delta t = 57\ \mu S$)

4. RESULTS

In context of the tests described above , it was determined that the ESE Sample has provided a certain time gain against the SR catching rod and therefore can be termed as ESE Lightning Catching Device according to the criteria described in **NFC17-102 (Appendix C)** .

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