University of Tehran

High Voltage Laboratory

Test Report

No: UTHV/891122

Lightning impulse Voltage Test on 33kV
Current Transformer
Pars shar barez company production

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Test Report No UTHV/891122

Test Object:	**Current transformer 33kV**
Type:	**MC365**
Serial Number:	**N/A**
Manufacturer:	**Pars shar Barez Co.**
Test Performed on order of:	**Pars shar Barez Co.**
Test Scope:	Type Test
Test Procedure:	Lightning Impulse Voltage test according to standard IEC 60060
Test Object Supplied on:	March 2011
Test Performed During:	March 2011
Test Result:	Indicated in Report The test result refers to the tested object only.

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High Voltage Laboratory

Lightning Impulse Voltage Test on 33kV Current transformer

High Voltage Laboratory Participants:

Test leader: **Salman Mohseni**

Head of Laboratory: **H. Mohseni, Prof.**

Associate Dean: **K.Setarehdan, Dr.**

University of Tehran
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Tehran, March 2011

Lightning Impulse Voltage Test on 33kV Current transformer

Contents **pages**

Annexes

This Report contains, 13 numbered pages
12 figures
2 tables

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1. Description of test object

The test object was Current Transformer made by Pars Shar Barez Company

2. Scope of tests agreed upon

The accepted testing method was conforming to international standards:
IEC 60060 "

3. Dry Lightning impulse withstand voltage test

The purpose of the dry impulse withstand voltage test is to confirm that the insulator withstand the lightning overvoltage's that may occur in service.

Impulse voltage is produced by an impulse voltage generator in the laboratory. For insulators, the impulse voltage must be with positive and negative polarity, with the front time (T_1) equal to 1.2±30% μs and with the time to half value (T_2) equal to 50±20% μs. Figure 1 shows the waveform of an impulse voltage.

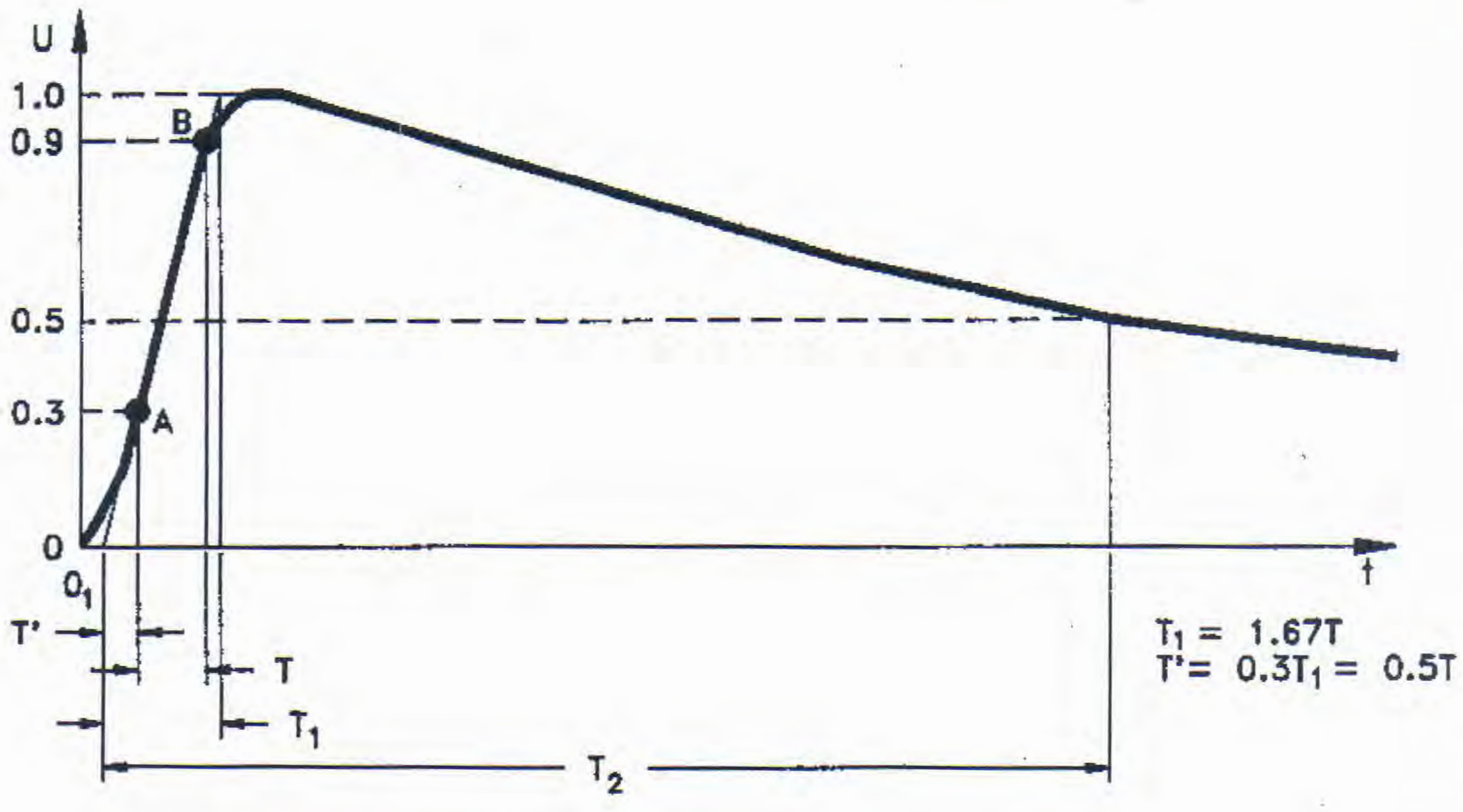

Figure 1: The waveform of an impulse voltage

This arrangement was composed of four stages of impulse generator system Marx, 1.8 MV, 90 kJ made by HIGHVOLT (Germany). The figure 2 shows the scheme. Impulse shape was recorded with the transient recorder made by Dr. Strauss (Germany), cooperating with capacitive divider. The test procedure includes five impulses with positive polarity and five

impulses with negative polarity. The test is OK, if flashover does not occur more than twice in each polarity.

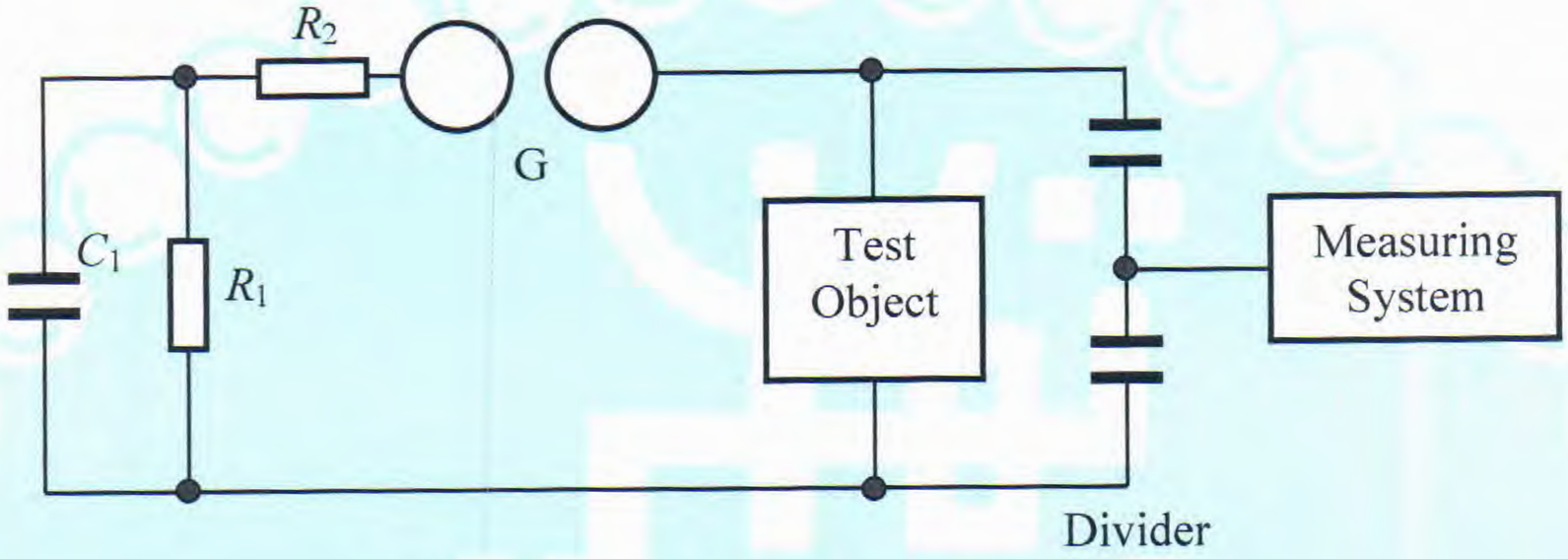

Figure 2: Scheme of impulse generator and measuring system

Correction factor for the atmospheric conditions of the laboratory was **0.856**.

Table 1 show the parameters of positive voltage waveforms which applied to the insulator.

Table 1: Parameters of positive voltage waveform

No.	U_p (kV)	T_1 (μs)	T_2 (μs)	remark
1	169.6	1.12	51.7	Without flashover
2	169.6	1.12	51.6	Without flashover
3	169.7	1.12	51.7	Without flashover
4	169.5	1.11	51.7	Without flashover
5	169.6	1.12	51.5	Without flashover

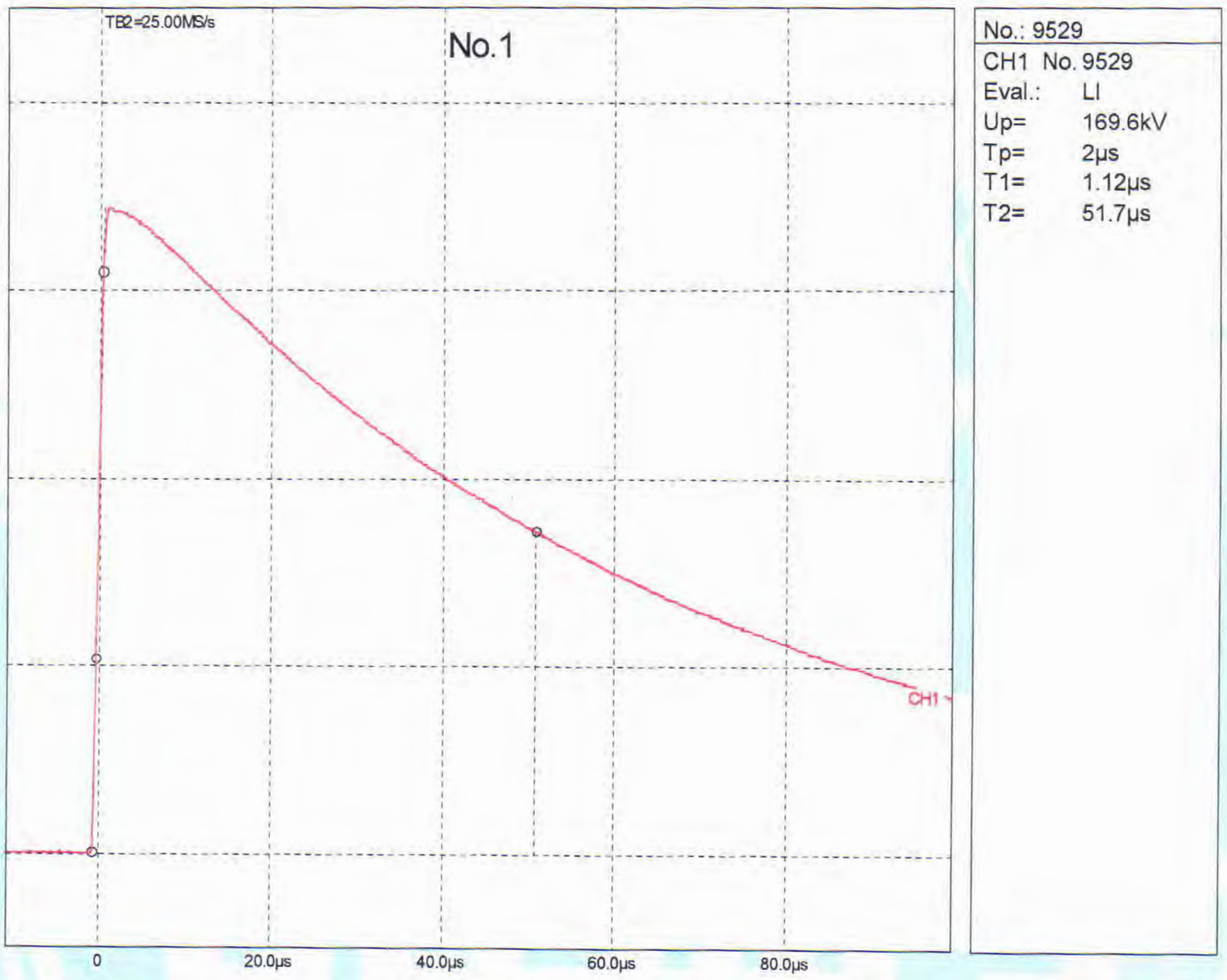

Figure3: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =169.6 kV, T_1=1.12 µs, T_2=51.7 µs

Figure 4: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =169.6 kV, T_1=1.12 µs, T_2=51.6 µs

Lightning Impulse Voltage Test on 33kV Current transformer

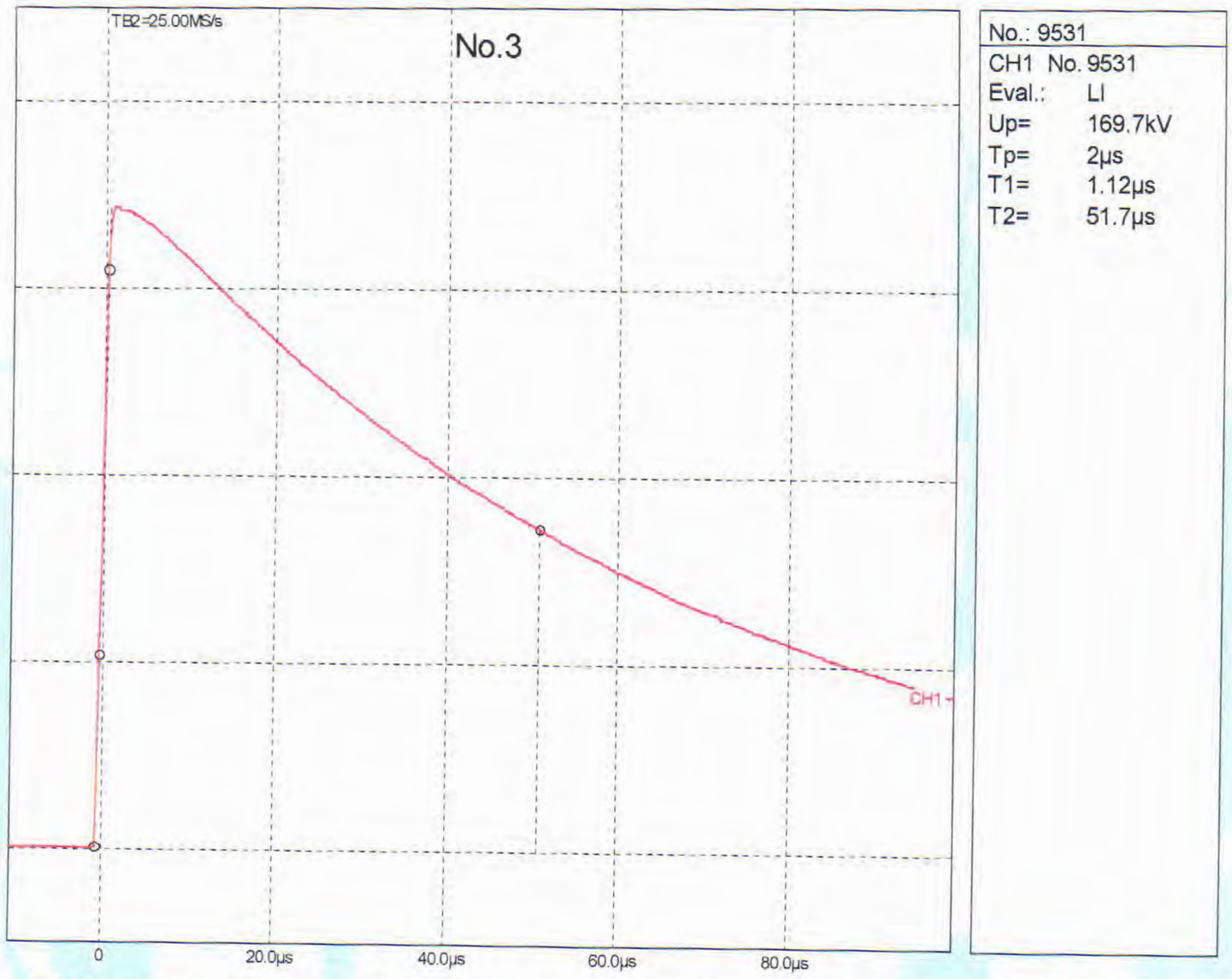

Figure 5: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =169.7 kV, T_1=1.12 µs, T_2=51.7 µs

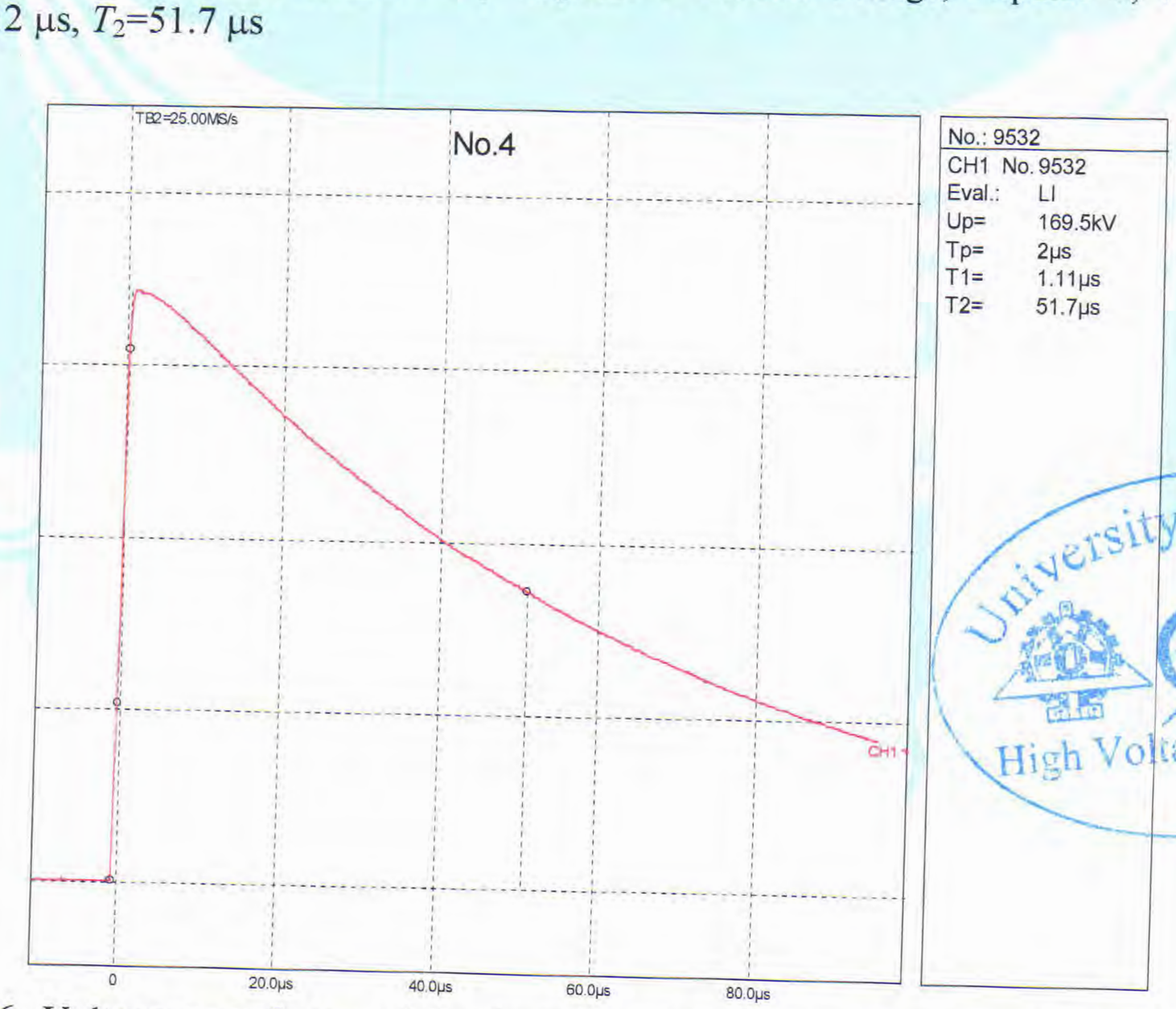

Figure 6: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =169.5 kV, T_1=1.11 µs, T_2=51.7 µs

Lightning Impulse Voltage Test on 33kV Current transformer

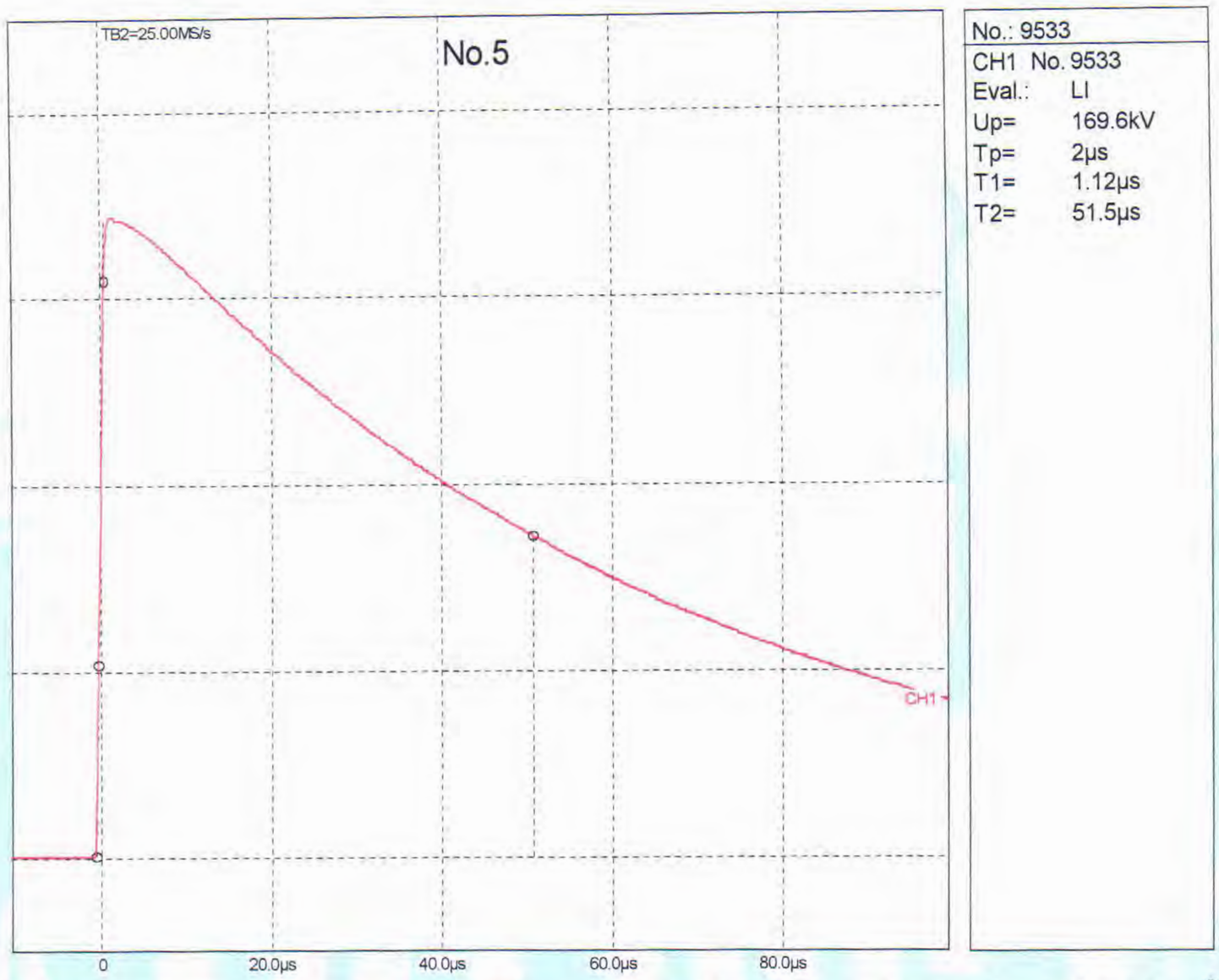

Figure 7: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =169.6 kV, T_1=1.12 µs, T_2=51.5

Table 2 shows the parameters of negative voltage waveforms which applied to the insulator.

Table 2: Parameters of negative voltage waveform

No.	U_p (kV)	T_1 (µs)	T_2 (µs)	remark
1	-169.4	1.12	51.6	Without flashover
2	-169.4	1.13	51.6	Without flashover
3	-169.3	1.11	51.7	Without flashover
4	-169.5	1.13	51.6	Without flashover
5	-169.6	1.12	51.6	Without flashover

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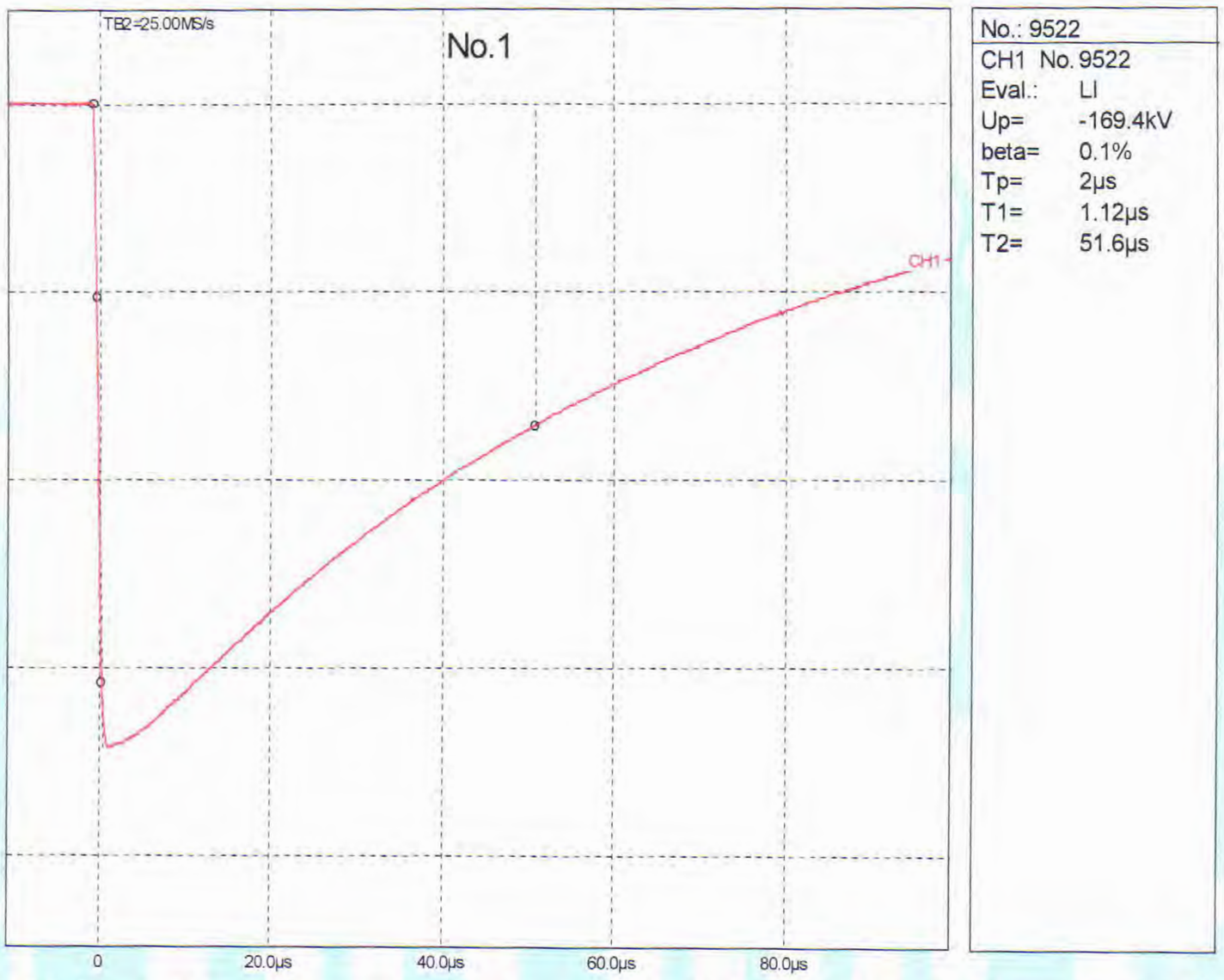

Figure 8: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =-169.4 kV, T_1=1.12 µs, T_2=51.6

Figure 9: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =-169.4 kV, T_1=1.13 µs, T_2=51.6

Lightning Impulse Voltage Test on 33kV Current transformer

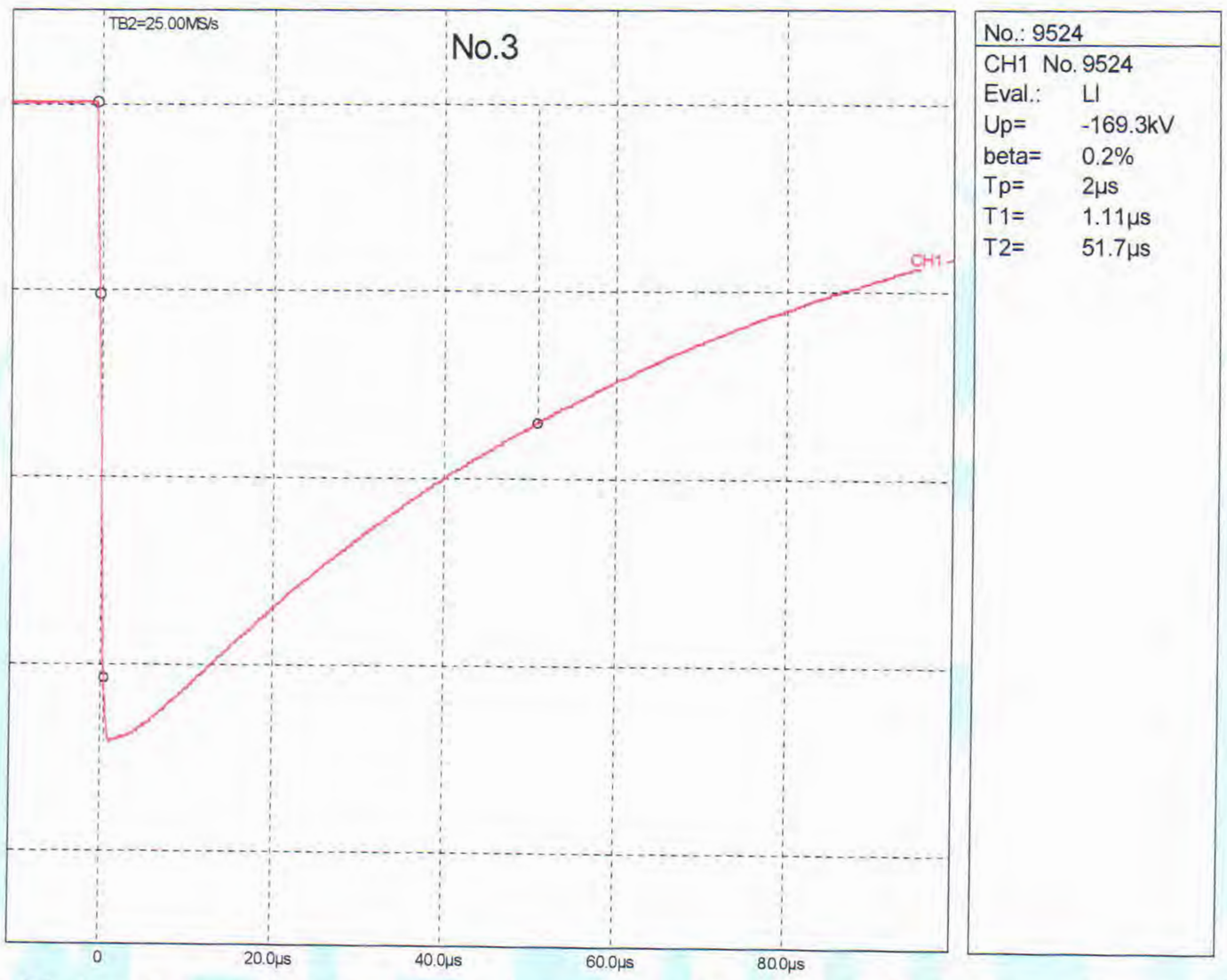

Figure 10: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =-169.3 kV, T_1=1.11 µs, T_2=51.7

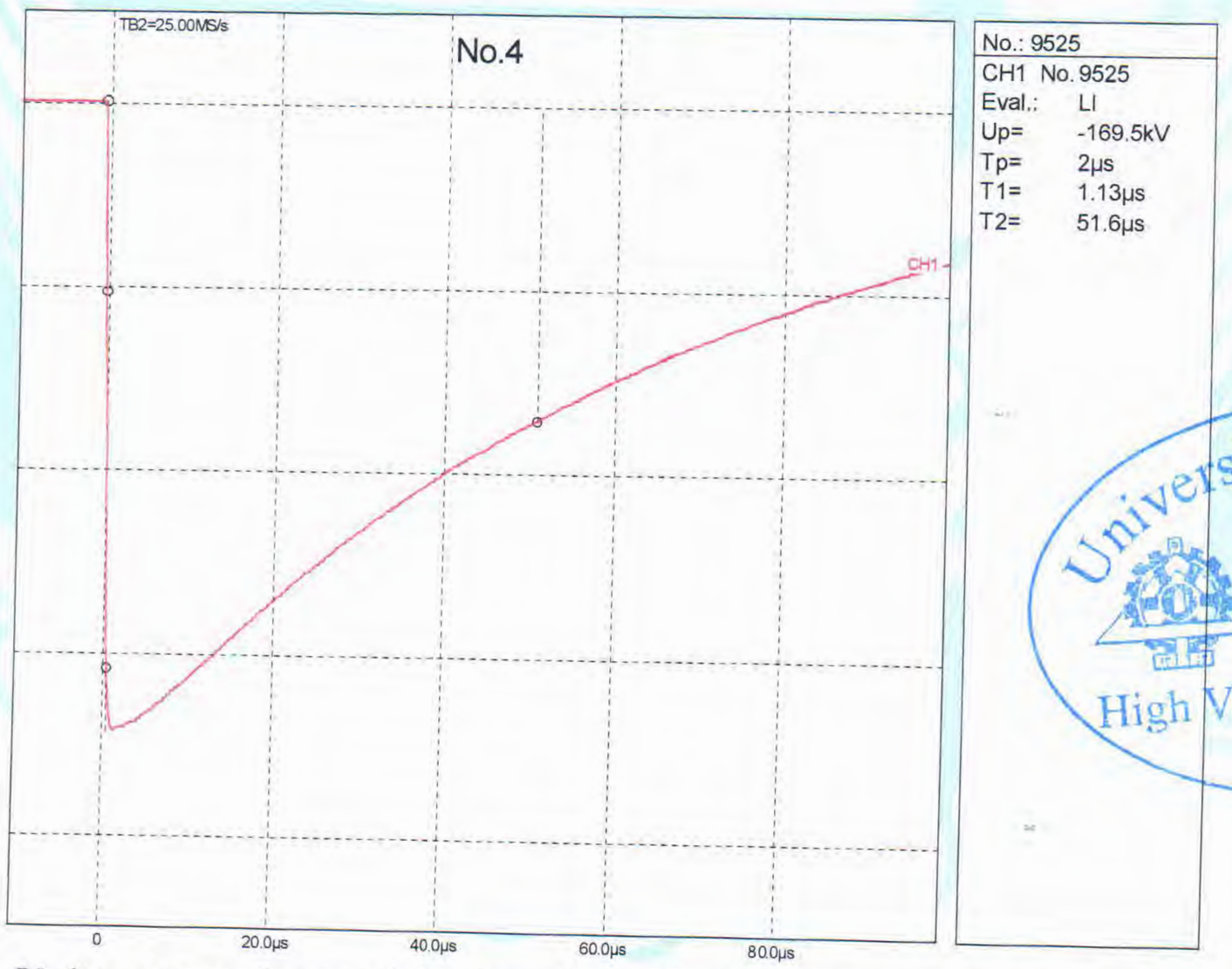

Figure 11: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =-169.5 kV, T_1=1.13 µs, T_2=51.6

Lightning Impulse Voltage Test on 33kV Current transformer

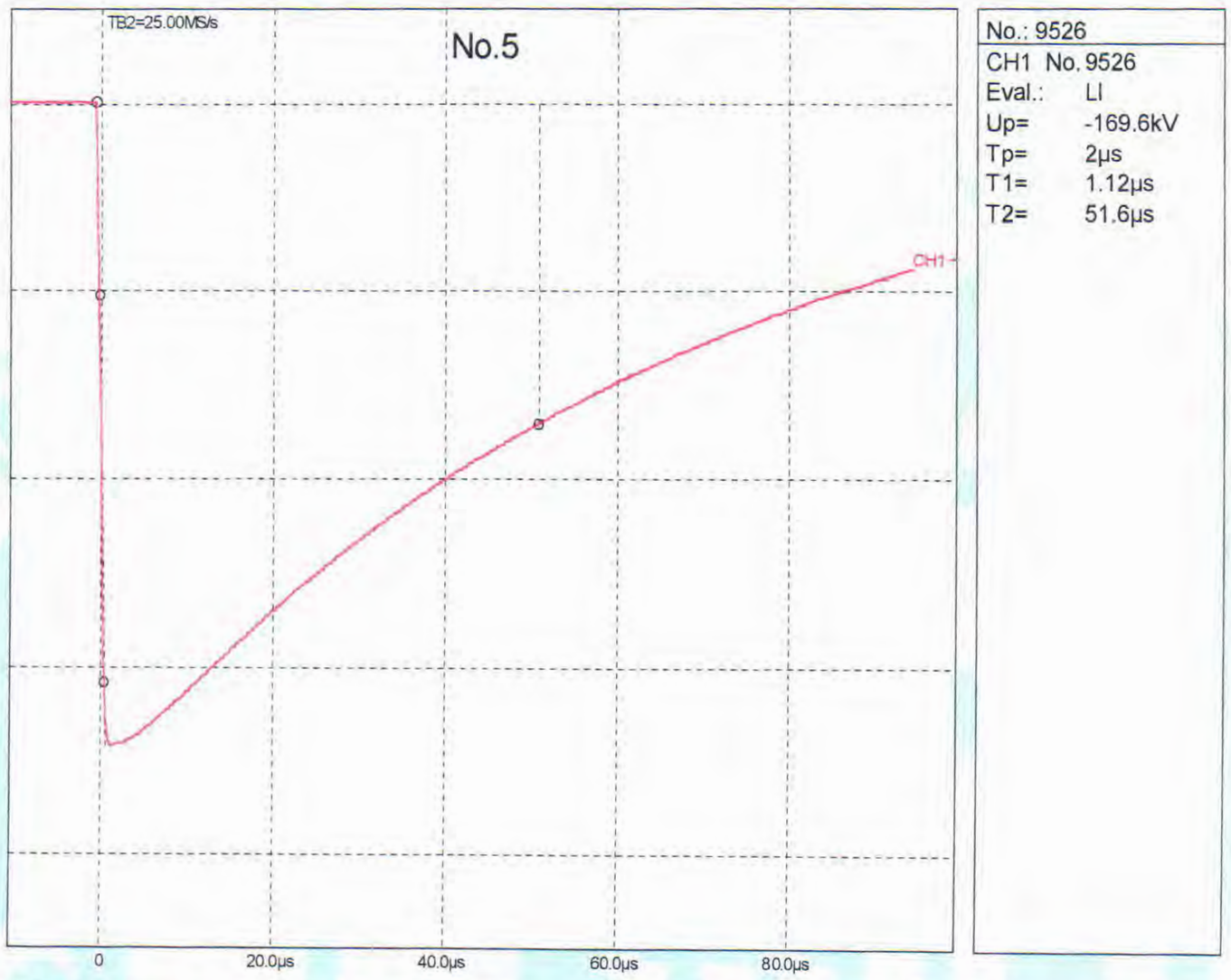

Figure 12: Voltage waveforms of dry impulse withstand voltage, impulse 1; $\hat{V}$ =-169.6 kV, T_1=1.12 µs, T_2=51.6

The dry positive impulse withstand voltage is +169.7kV.

The dry negative impulse withstand voltage is -169.6kV.

4. Summery

All tests have got satisfactory results

Annex 1
Certificate of Impulse measuring system

DEUTSCHER KALIBRIERDIENST DKD

Kalibrierlaboratorium für elektrische Messgrößen / Hochspannungsmesseinrichtungen

Calibration laboratory for electrical measuring quantities / high voltage measuring systems

Akkreditiert durch die / *accredited by the*
Akkreditierungsstelle des DKD bei der
PHYSIKALISCH-TECHNISCHEN BUNDESANSTALT (PTB)

HIGH VOLT HIGHVOLT Prüftechnik Dresden GmbH

DKD-K-24501

Kalibrierschein
Calibration Certificate

Kalibrierzeichen
Calibration label

536
DKD-K-24501
01-12

Gegenstand *Object*	Messsystem für 1800 kV Blitzstoß- und 1300 kV Schaltstoßspannung *1800 kV-Lightning Impulse Voltage / 1300 kV Switching Impulse Voltage Measuring System*
Hersteller *Manufacturer*	HIGHVOLT Prüftechnik Dresden GmbH Hochspannungsgeräte Porz GmbH Dr. Strauss Systemelektronik GmbH
Typ *Type*	SMCF 440/1800 / H 391 / TR-AS 100-10
Fabrikat/Serien-Nr. *Serial number*	882 392 / 882 393 / 501
Auftraggeber *Customer*	University of Teheran Institute of Electrical Engineering Kargar Shomali IR-14399 Teheran - Iran
Auftragsnummer *Order No.*	521 320
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	22
Datum der Kalibrierung *Date of calibration*	2001-12-02

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Der DKD ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DKD is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

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Stempel *Seal*	Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
Deutscher DKD-K-24501 Kalibrierdienst	2001-12-14	Dr.-Ing. Maucksch	Dr.-Ing. Maucksch

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