

**TEST REPORT**

approuvé par  
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Ing. AQ

**OFFICIEL**  
TEST REPORT NR 96/1021

Report no. 04523.000-HVL 96-1242  
Client GEC ALSTHOM T&D Balteau S.A.  
Rue de Magnée 54  
4610 Beyne-Heusay  
Belgium

Reference request of August 6, 1996

Concerning switching impulse withstand test  
Date October 22, 1996  
Place KEMA High-Voltage Laboratory, Arnhem,  
the Netherlands

Object current transformer  
Type CTH 550/6  
Manufacturer GEC ALSTHOM T&D Balteau S.A.

**REQUIREMENTS**

The requirements as specified in the standard IEC 185 (1987).

**TEST PROGRAMME**

The programme was specified in consultation with the client and was as follows:  
switching voltage withstand test, wet, according to clause 14.3 of IEC 185.

**SUMMARY AND CONCLUSION**

The results obtained relate only to the work ordered and to the material tested.  
The tests were passed successfully.  
The specified requirements were met.

Author C. de Ligt

KEMA Nederland B.V.

This B-report consists of:  
8 pages  
1 appendix

  
H.W. Kempen  
KEMA High-Voltage Laboratory

Arnhem, October 30, 1996

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**MATERIAL DATA**

Designation	oil-insulated current transformer
Manufacturer	GEC ALSTHOM T&D Balteau S.A.
Type	CTH 550/6
Serial no.	1996/50060-06

A copy of the rating plate is represented in appendix A page 1. A drawing of the transformer with its physical dimensions is represented in appendix A page 2.

**PERSONS ATTENDING THE TEST**

Mr. E. Debounoux	GEC ALSTHOM T&D Balteau S.A.
Mr. P. Cronin	GEC ALSTHOM T&D Balteau S.A.
Mr. D.R.J. Hillier	GEC ALSTHOM T&D Balteau S.A.
Mr. B. Gemmel	Scottish Power
Mr. B. Pryor	Scottish Power

**THE TEST WAS CARRIED OUT BY**

Mr. C. de Ligt	KEMA Nederland B.V.
Mr. A.B.G.M. ten Have	KEMA Mederland B.V.

**PURPOSE OF THE TEST**

Purpose of the test was to verify whether the material complies with the specified requirements.

## **DESCRIPTION AND RESULTS OF THE TEST**

### **MEASUREMENT UNCERTAINTY**

The last page of this report contains a table with measurement uncertainties. Unless otherwise indicated in the report, the measurement uncertainty of the results presented are as indicated in this table.

### **SWITCHING IMPULSE VOLTAGE WITHSTAND TEST, WET ACCORDING TO CLAUSE 14.3 OF IEC 185**

The current transformer was subjected to a switching impulse test with a voltage of 1175 kV. The test was performed with positive polarity only according to amendment 2 of IEC 185, 1995-08. Fifteen consecutive impulses, corrected for atmospheric conditions of temperature and air pressure, were applied.

During the tests the current transformer was placed under artificial rain. The wetting procedure was in accordance with Sub-clause 8.1 of IEC Publication 60-1. Appendix 1 page 1 represents the transformer under test.

The test voltage was measured with a RC divider and digitizer. The wave shape of the switching impulse is represented in figures 1 and 2 of appendix 1 and amounted to approximately 250/2500  $\mu$ s and fulfilled the specified requirement.

The results are summarized in appendix 1 page 2, the oscillograms of the applied lightning impulse voltages in appendix 1, figures 3 up to and including 7 inclusive all applied pre-shots. No disruptive discharge occurred nor other evidence of insulation failure was detected. The requirements were met.



KEMA photograph number 962-0244/2

Current transformer under test (switching impulse voltage withstand test).

## Results of dielectric tests.

Test object                      current transformer, make GEC Alsthom T&B Balteau S.A.  
    type CTH 550/6, serial no. 1996/50060-06  
 Date                                October 22, 1996

### Atmospheric conditions

Temperature                      20 °C  
 Pressure                         1022 hPa  
 Humidity                         10 g H<sub>2</sub>O/m<sup>3</sup>

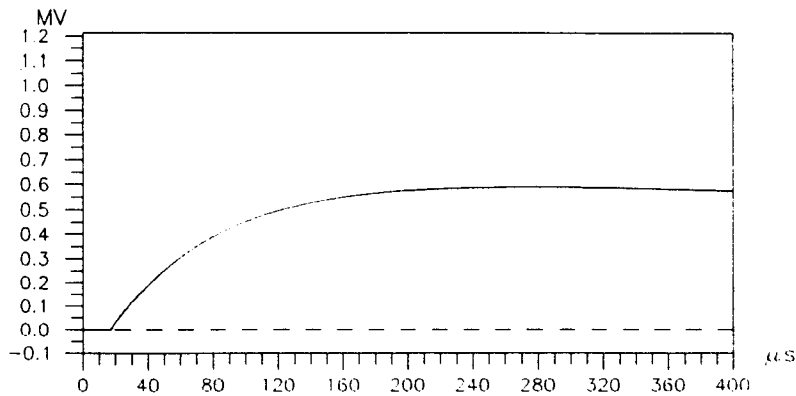
### Artificial rain

Specific resistivity              100 Ωm

	top	middle	bottom
Horizontal intensity	2 mm/min	1.9 m/min	1.9 mm/min
Vertical intensity	1.5 mm/min	1.5 mm/min	1.3 mm/min

test	test voltage and number of impulses	oscillograms	results
switching impulse test	590 kV  710..940..1060..1060 kV 1120 kV      2 impulses + 1175 kV 15 impulses	wave shape approx. 250/2500 μs figure 1 and 2 of appendix 1 figure 3 of appendix 1 figure 4 of appendix 1 figures 5, 6, and 7 of appendix 1	passed

## Appendix 1 page 3

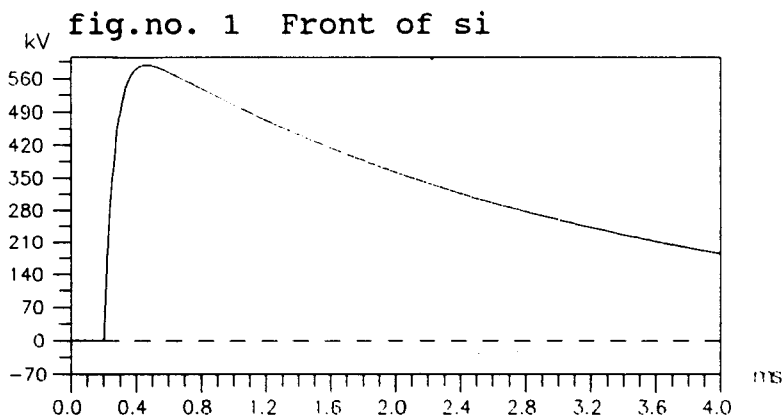


PEAKVALUE:

591 kV

Date: 96-22-10

Time: 10:43

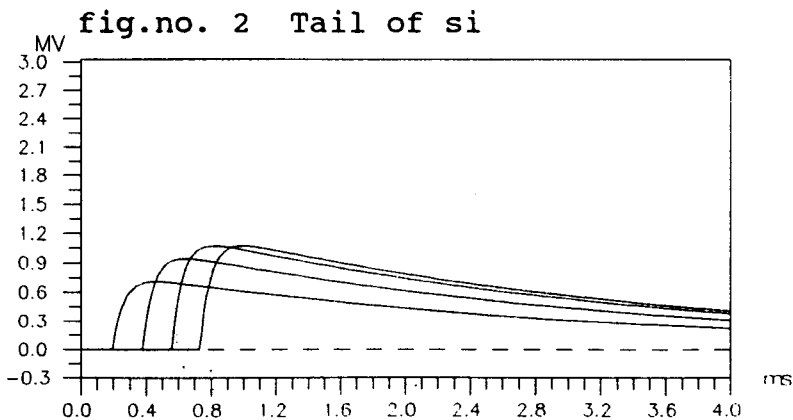


PEAKVALUE:

589 kV

Date: 96-22-10

Time: 10:45



PEAKVALUES:

708 kV

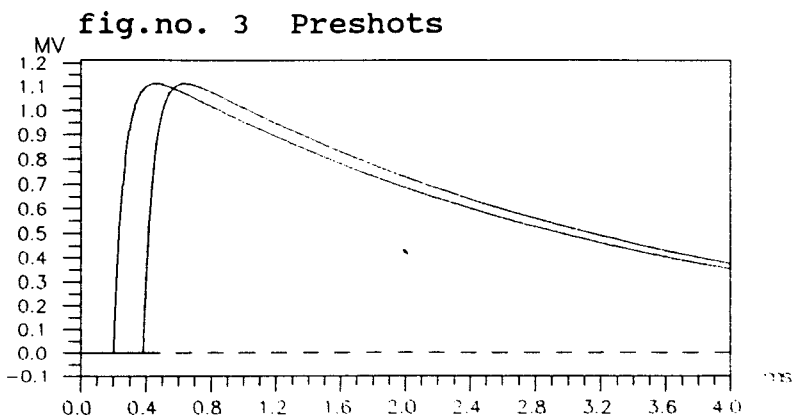
936 kV

1064 kV

1067 kV

Date: 96-22-10

Time: 10:52



PEAKVALUES:

1113 kV

1113 kV

Date: 96-22-10

Time: 10:56

fig.no. 4 Preshots at 1120 kV

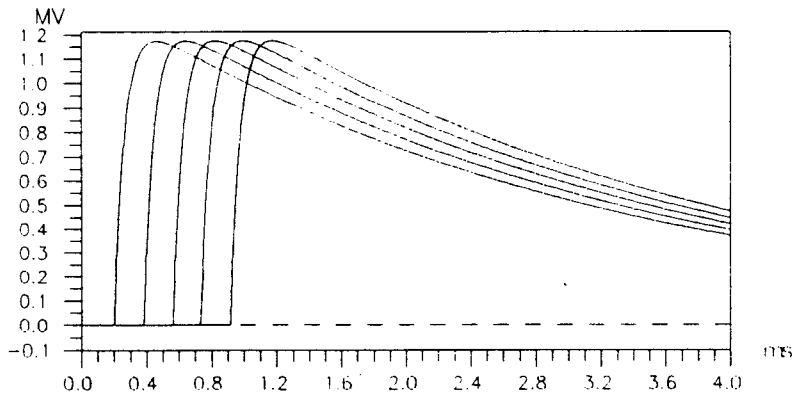


fig.no. 5 Shot 1 .. 5 at 1175 kV

**PEAKVALUES:**

1174 kV  
1174 kV  
1175 kV  
1175 kV  
1175 kV

Date: 96-22-10

Time: 11:02

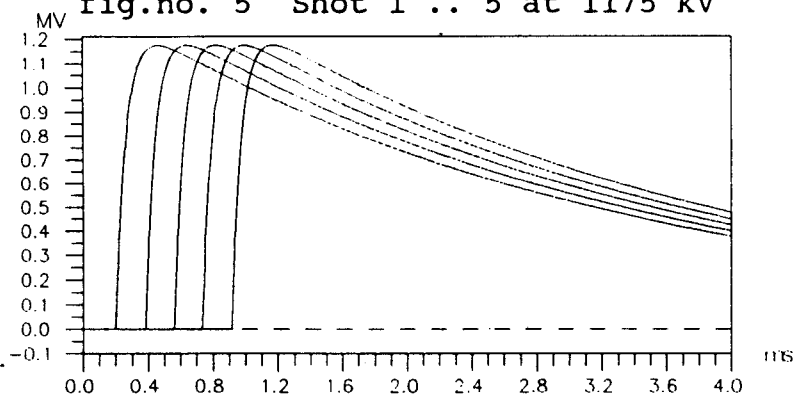


fig.no. 6 Shot 6 ..10 at 1175 kV

**PEAKVALUES:**

1175 kV  
1177 kV  
1175 kV  
1175 kV  
1178 kV

Date: 96-22-10

Time: 11:07

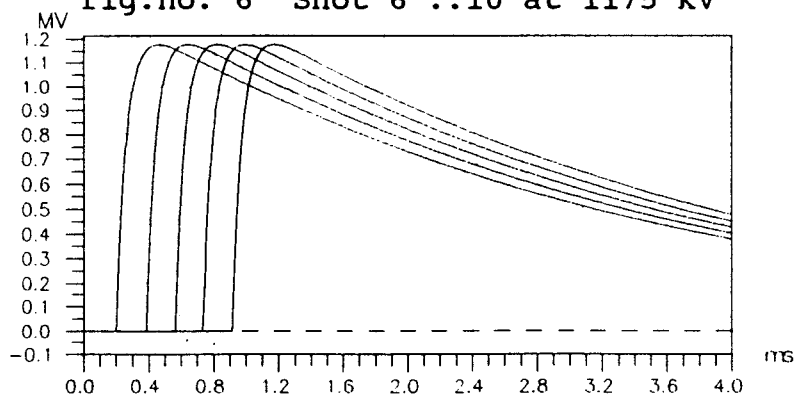


fig.no. 7 Shot 11..15 at 1175 kV

**PEAKVALUES:**

1178 kV  
1178 kV  
1178 kV  
1175 kV  
1178 kV

Date: 96-22-10

Time: 11:11

The measurement uncertainties in the results presented are as specified below unless otherwise indicated

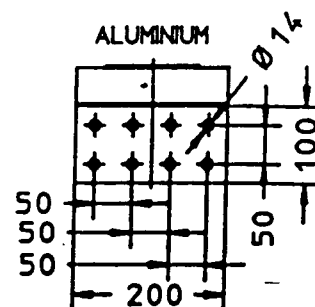
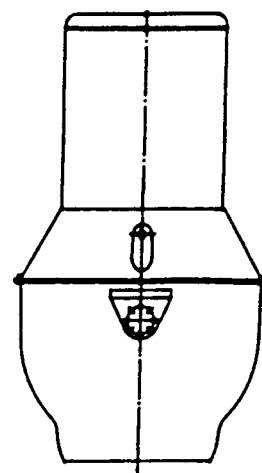
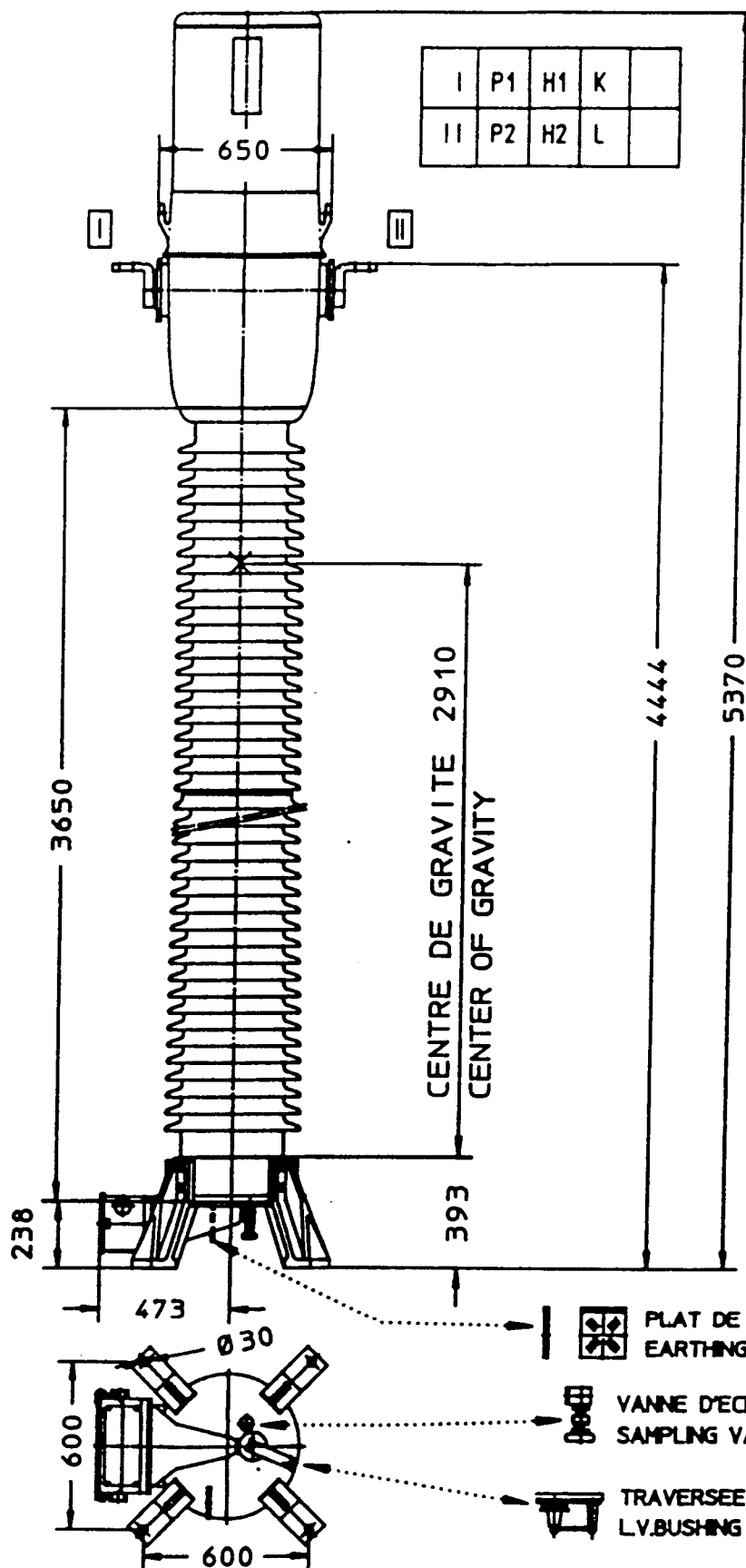
measurement	measurement uncertainty
dielectric tests and impulse current tests	peak value: $\leq 3\%$ time parameters: 10%
capacitance measurement	0.3%
$\tan \delta$ measurement	$\pm 0.5\% \pm 5 \cdot 10^{-5}$
partial discharge measurement	$< 10 \text{ pC}$ : 2 pC 10 - 100 pC: 5 pC $> 100 \text{ pC}$ : 10 pC
measurement of impedance ac-resistance measurement	$\leq 1\%$
measurement of losses	$\leq 1\%$
measurement of insulation resistance	$\leq 10\%$
measurement of dc resistance	1 $\mu\Omega$ - 5 $\mu\Omega$ : 1% 5 $\mu\Omega$ - 10 $\mu\Omega$ : 0,5% 10 $\mu\Omega$ - 200 $\mu\Omega$ : 0,2%
radio interference test	2 dB
calibration of current transformers	1 x 10 <sup>-4</sup> li/lu en 150 $\mu\text{rad}$
calibration of voltage transformers	1 x 10 <sup>-4</sup> Ui/Uu en 150 $\mu\text{rad}$
measurement of conductivity	5%
measurement of temperature	-50 °C - -40 °C : 3 K -40 °C - 125 °C : 2 K 125 °C - 150 °C : 3 K
tensile test	1%
sound level measurement	Type 1 meter as per IEC 651 and ANSI S1.4.1971
measurement of voltage ratio	0.1%



<div>▼ GEC ALSTHOM</div>		CURRENT TRANSFORMER 550/680-3/1550-1175 kV STAND. IEC 185 + BS 7626		CTH550/6 ----- 1996/50060			
<div>+O P1P2 SCHEMAT. DIAGRAMS +O 1S1 - 1S2 - 1S3 +O 2S1 - 2S2 - 2S3 +O 3S1 - 3S2 - 3S3 +O 4S1 - 4S2 - 4S3</div>		PRIM. P1- P2 TERMIN.	I.th = 50 kA-1 s. I.dyn = 125 kA I.n = 1000-2000 A . EXT = 200 %	RATIOS	VKP≥V.	Rct75≤Ω	Io≤mA.
		1S1-1S2	1000/1	1500	2.25	60	
		1S1-1S3	2000/1	3000	4.50	30	
		2S1-2S2	1000/1	1500	2.25	60	
		2S1-2S3	2000/1	3000	4.50	30	
		3S1-3S2	1000/1	285	2.25	60	
		3S1-3S3	2000/1	570	4.50	30	
		4S1-4S2	1000/1	285	2.25	60	
		4S1-4S3	2000/1	570	4.50	30	
RATED CONTINUOUS THERMAL PRIMARY CURRENT = 4000 A							
UNUSED SECONDARIES MUST BE SHORT-CIRCUITED AND GROUNDED							
F = 50 Hz (50060:AA)		SERIAL Nr =		OIL TYPE A = 375 Kg TOTAL WEIGHT= 1630 Kg			
HERMETICALLY SEALED - OPENING FORBIDDEN - POSITION 1							

RATING PLATE MADE IN ANODISED ALUMINIUM - ALPHOT PROCESS  
FASTENED WITH 4 HOLES AT 8 mm FROM EACH SIDE  
DIMENSIONS = 148 mm X 74 mm X 0.8 mm  
SCALE = 1/1  
LIGHT BACKGROUND - BLACK WRITING

RATING PLATE					
DATE	REV	ORDER	QTY	TYPE	DRAWING
14-10-96 (MAI. '94)	3	50060	6	CTH550/6	3 - 50060:AA



Poids total :  
Total weight: 1630 Kg

Huile :  
Oil : 375 Kg.

E 365 GS/6

Transformateur de courant  
Current transformer

CTH 550

H6064c

REVISION

1  
2  
3  
4

REPORT.  
NON

**GEC ALSTHOM**

BALTEAU

/diok2/Huile/CTH/Encombrement

TCH X R&D X PTH X GCH X

Beyne-Huicoy  
BELGIQUE

ECHELLE  
1/25

DESSINE  
OP

VU

REMPLE PAR

DATE  
10.4.96.

PLAN  
N°

5351619