KEMA
DE ZOETEN LABORATORIUM
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

REPORT OF PERFORMANCE

187-91

CLIENT	Transformateurs Balteau S.A., Beyne-Heusay, Belgium
MANUFACTURER	Transformateurs Balteau S.A., Beyne-Heusay, Belgium
APPARATUS	Current transformer
DESIGNATION	CTH 550
SERIAL No.	5138/9102
Balteau order No.	56447

RATINGS ASSIGNED BY THE MANUFACTURER

Voltage	550	kV
Frequency	60	Hz
Short-time withstand current	40	kA
Peak withstand current	113	kA
Duration of short-circuit	3	s
Secondary terminals	6 cores MR	
Primary current	4000	A
Secondary current	5	A
Burden	200	VA
Accuracy class	5 x C800 + 1 x 0.3 B 1.8	

The tests have been carried out in accordance with the client's instructions.

Date of tests 14th May 1991

The performance of the apparatus tested and the observations made during the tests have been recorded in the tables with test results and the oscillograms.

THIS REPORT CONSISTS OF:

Sheets	4
Circuit diagrams	1
Electromagnetic oscillograms	2
Drawings	2
Photographs	3
Information sheet	B70E

N.V. KEMA

H.W. Kemper

Arnhem, 30th May 1991

TYPE OF TEST	SHEET
Internal fault test	3

The tests were witnessed by :

Name	Company
Margreve, O.	Transformateurs Balteau S.A., Beyne-Heusay, Belgium

The tests were observed by :

Name	Company
Lusing, M.	N.V. KEMA, Arnhem

Drawings

The following drawings have been included on request of the client.
KEMA has not verified these drawings.

5331033	CURRENT TRANFORMER CTH 550
5331035	CURRENT TRANFORMER CTH 550

Photographs

118503	CT before test 910514-2007
118504	CT after test 910514-2007
118506	CT after test 910514-2007

KEMA

REPORT 187-91	TABLE WITH TEST CIRCUITS	SHEET 2

TEST CIRCUIT No.	S01						
Number of phases	1						
Power frequency Hz	49						
Generator neutral	not earthed						
Transformer connections	single phase						
Short-circuit point	earthed						
Circuit impedance Ω	0.3						
Power factor	< 0.1						
TRV control elements added: Capacitance in parallel C_1 µF							
TRV control elements added: Resistance in series R_1 Ω							
TRV control elements added: Resistance in parallel R_1 Ω							
TRV control elements added: Inductance in parallel with R_1 L_1 mH							
TRV control elements added: Time delay Capacitance C_d nF							
Prospective TRV: TRV peak value u_c kV							
Prospective TRV: Time co-ordinate t_3 µs							
Prospective TRV: Time delay t_d µs							
Prospective TRV: Based on kVrms							
Prospective TRV: Depression							
Prospective TRV: Rate-of-rise kV / µs							

TABLE WITH RESULTS OF INTERNAL-FAULT TESTS

REPORT 187-91	internal fault test (1)	TEST CIRCUIT S01	SHEET 3

Condition before tests: Arc initiation point : see drawing 5331033.
Current transformer new.
Current transformer mounted in vertical position and filled with oil.
Photograph 118503.

Test 910514-2005: checking of the prospective current.

Date and test	Test quantities: Applied voltage kV	Peak value of current kA	Symmetrical current: Beginning kA	Middle kA	End kA	Average kA	Duration s	Pressure bar(abs)	Energy MJ	Ignition point: on	Position	Arc voltage kVpeak			Physical behaviour: Emission of: Flame	Gas
910514 2005	12.0	57.5	40.8				0.221									
910514 2007	12.0	57.5	40.6		39.5		0.225		8.85			2.00 max			heavy (2)	heavy

Condition after tests: Aluminium base, porcelain and aluminium tank: undamaged.
Fire at top of head after the test. Photographs 118504 and 118506.
Ejected oil at the base of the CT.
Hole in aluminium dome of approximately 500 mm. The top aluminium sheet of the dome was torn into two pieces which fell on the ground within a radius of 3 m from the base of the CT. One of these pieces was found at 3 m from the CT while the second piece bounced and slid on the metal floor of the lab to stop at 12 m from the CT base.

(1) The purpose of the test is to observe the behaviour of the current transformer with paper mineral oil insulation when an internal insulation fault occurs.
(2) Emission of flame 9 ms after initiation of current.

KEMA

REPORT 187-91	CALIBRATION OF ELECTROMAGNETIC OSCILLOGRAM				SHEET 4
Time marking ▶	10 ms	ms	ms	ms	ms
	Test	Test	Test	Test	Test
Trace ▼ / Phase ▼	910514 2005,2007				
CURRENT OPENING COIL momentary A/mm					
CURRENT CLOSING COIL momentary A/mm					
VOLTAGE momentary kV/mm					
2	0.905				
CURRENT momentary kA/mm					
3	2.35				
AMPLIFIED VOLTAGE momentary V/mm					
4	99				
AMPLIFIED CURRENT momentary A/mm					
I^2t $10^3 \times A^2$ s/mm					
POWER MW/mm					
ENERGY MJ/mm					
5	0.334				
PRESSURE bar/mm					

☞ Trace No. 1 is indicated on each oscillogram. Traces are numbered from top to bottom except for travel recorders. ☜
For practical reasons travel recorder traces bear no number.

TEST-CIRCUIT DIAGRAM

REPORT No. 187-91

TEST CIRCUIT No. S01

CIRCUIT COMPONENTS

G = Generator
MB = Master Breaker
MS = Make Switch
PT = Power Transformer

R = Resistor
C = Capacitor
L = Inductance

TO = Test Object
AL = Artificial Line
AB = Auxiliary Breaker

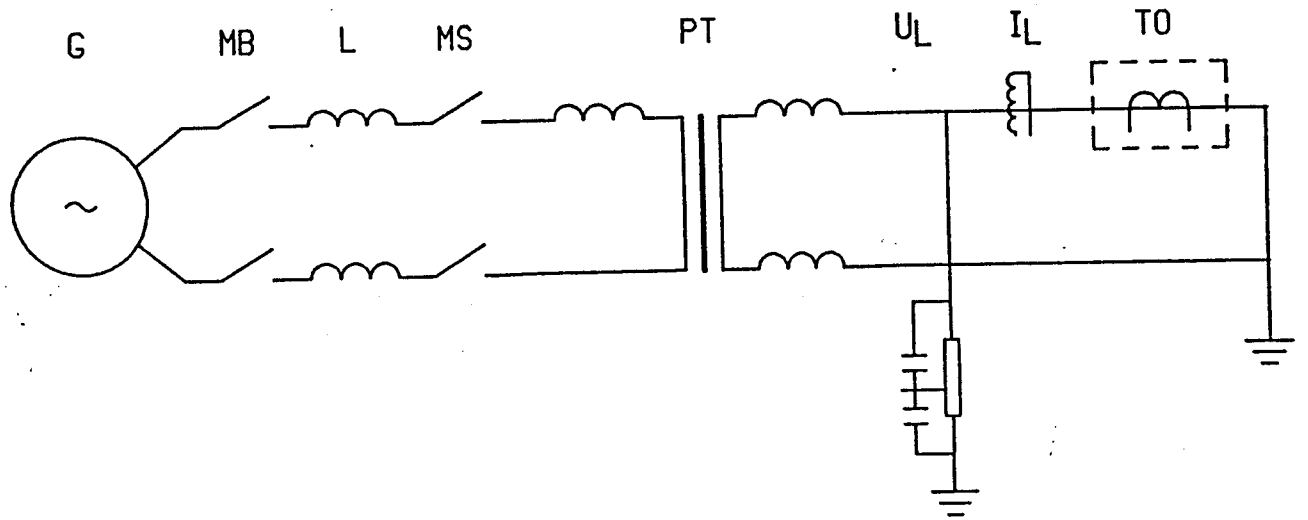
MEASUREMENTS

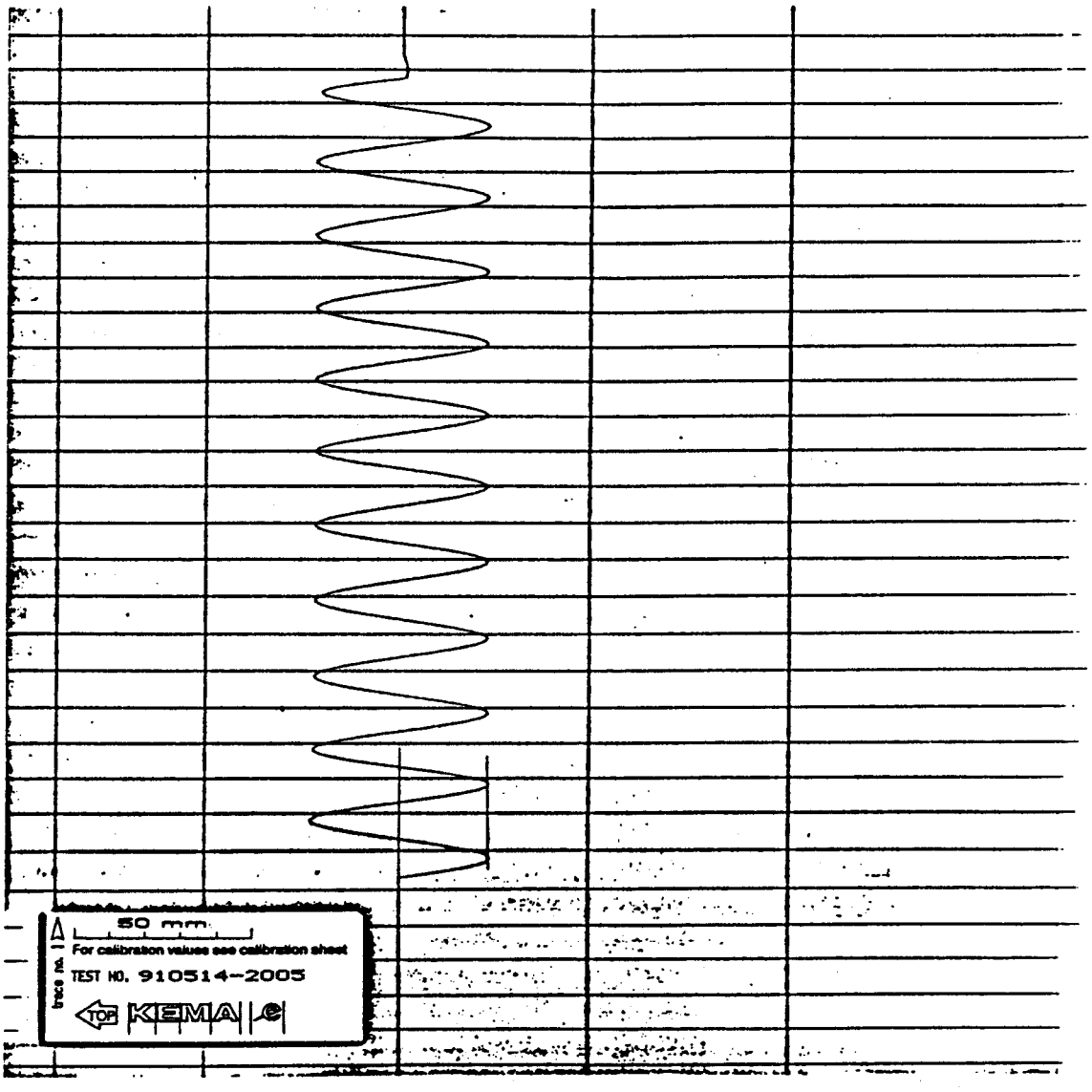
U = Voltage Measurement
I = Current Measurement

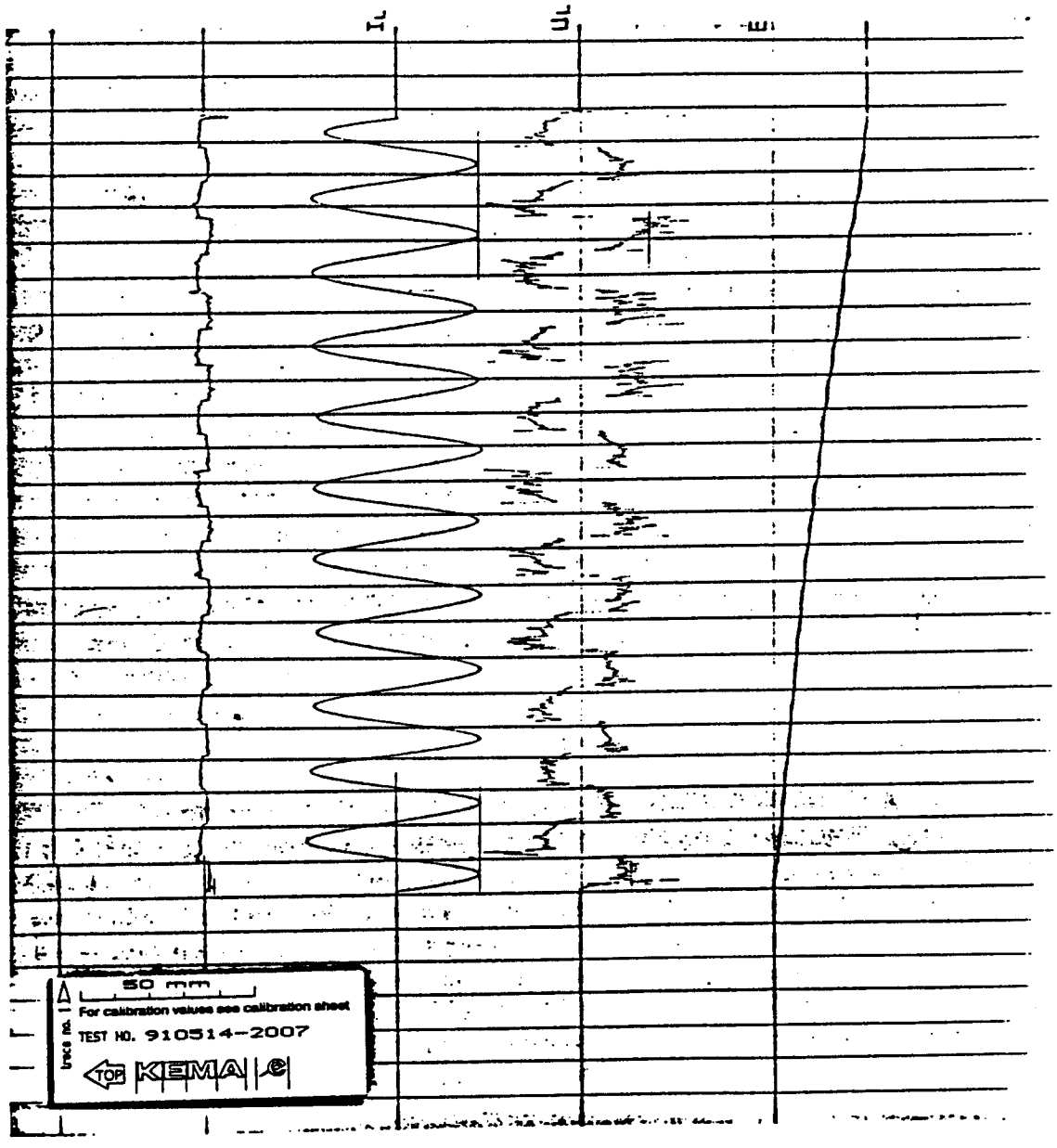
Suffix of U and I

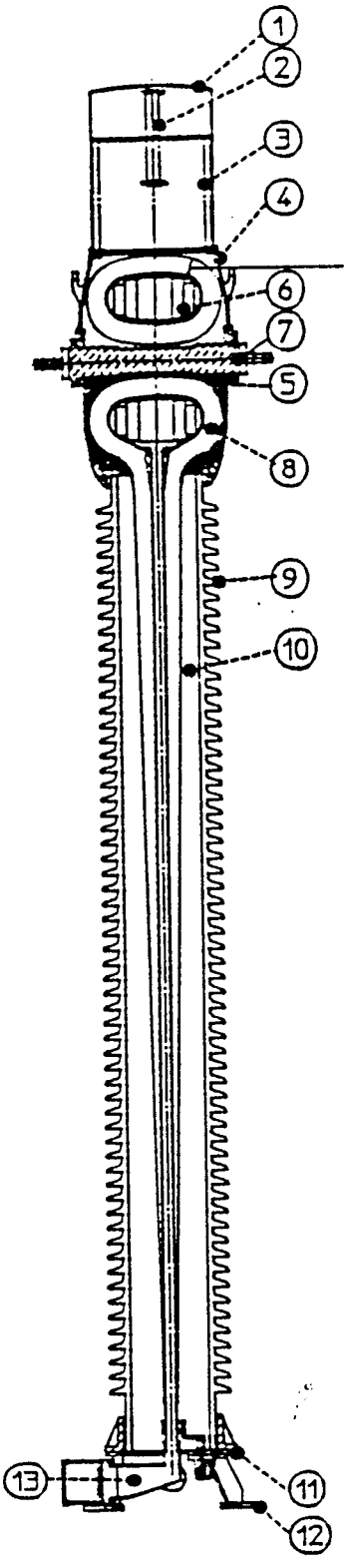
L = Low-frequency Oscillograph
M = Medium-frequency Oscillograph
H = High-frequency Oscillograph

LD = Differential measurement with L
MD = Differential measurement with M
HD = Differential measurement with H

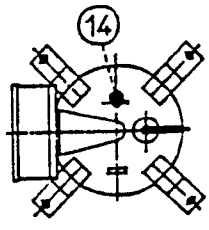



trace no. 12
50 mm
For calibration values see calibration sheet
TEST NO. 910514-2005
KEMA


TL
UL
E
50 mm
For calibration values see calibration sheet
TEST NO. 910514-2007
trace no. 1
TOP
KEMA



1	TOP COVER	ALUMINIUM
2	DIAPHRAGM LEVEL INDICATOR	
3	DIAPHRAGM	STAINLESS STEEL
4	HEAD HOUSING	ALUMINIUM
5	EPOXY CAST RESIN	
6	CORES AND SECONDARY WINDINGS	IN ALUMINIUM BOX
7	PRIMARY CONDUCTOR	ALUMINIUM
8	H V INSULATION	PAPER-OIL
9	INSULATOR	PORCELAIN
10	INSULATING OIL	
11	BASE	ALUMINIUM
12	FEET	CAST-IRON
13	SECONDARY TERMINAL BOX	ALUMINIUM
14	SAMPLING VALVE	STAINLESS STEEL



	MODIFICATIONS	N°Mod.	DATE
1			
2			
3			
4			
5			

BALTEAU ENERTEC

CURRENT TRANSFORMER CTH 550

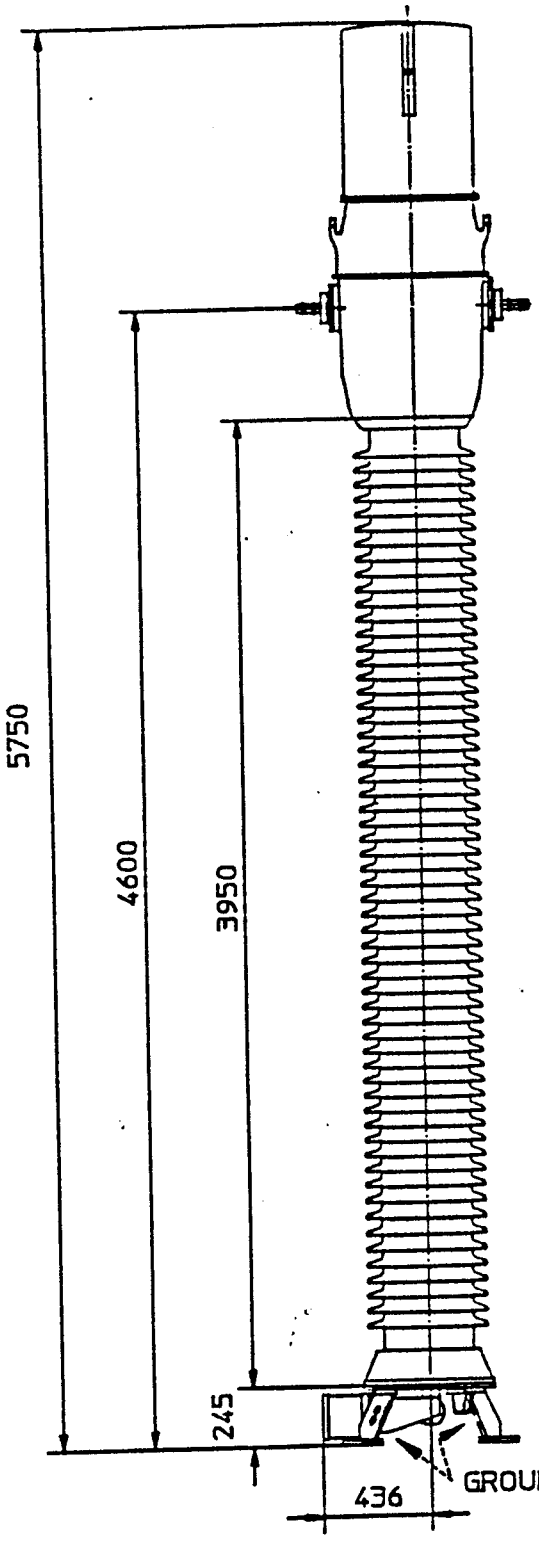
DEMANDE | NOMENC

REPERTOIRE :

APP	QC	IDH	PTH	ARC

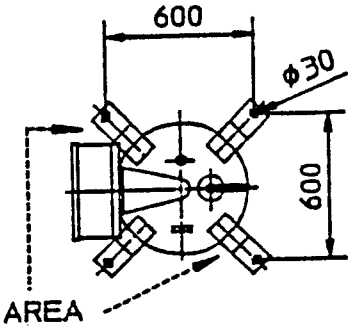
Beyne-Heusay BELGIQUE	ECHELLE	DESSINE	VU	DATE	REMPLACE	REMPLACE PAR	PLAN N°
		CP		15.6.90.			5331033

S



STRIKE DISTANCE : 3700 MM
CREEPAGE DISTANCE : 9900 MM

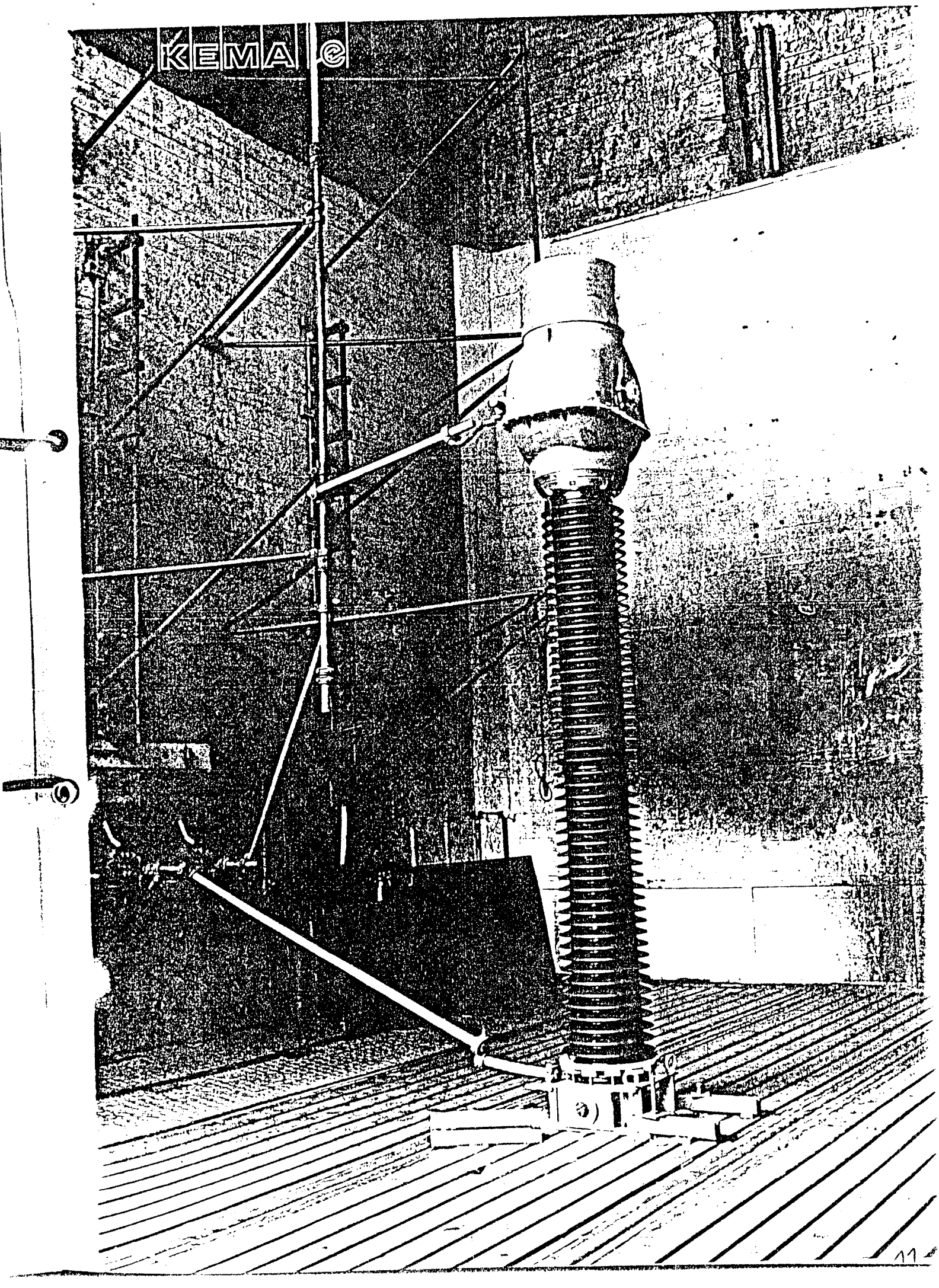
WEIGHT : 2250 KG
OIL : 560 L

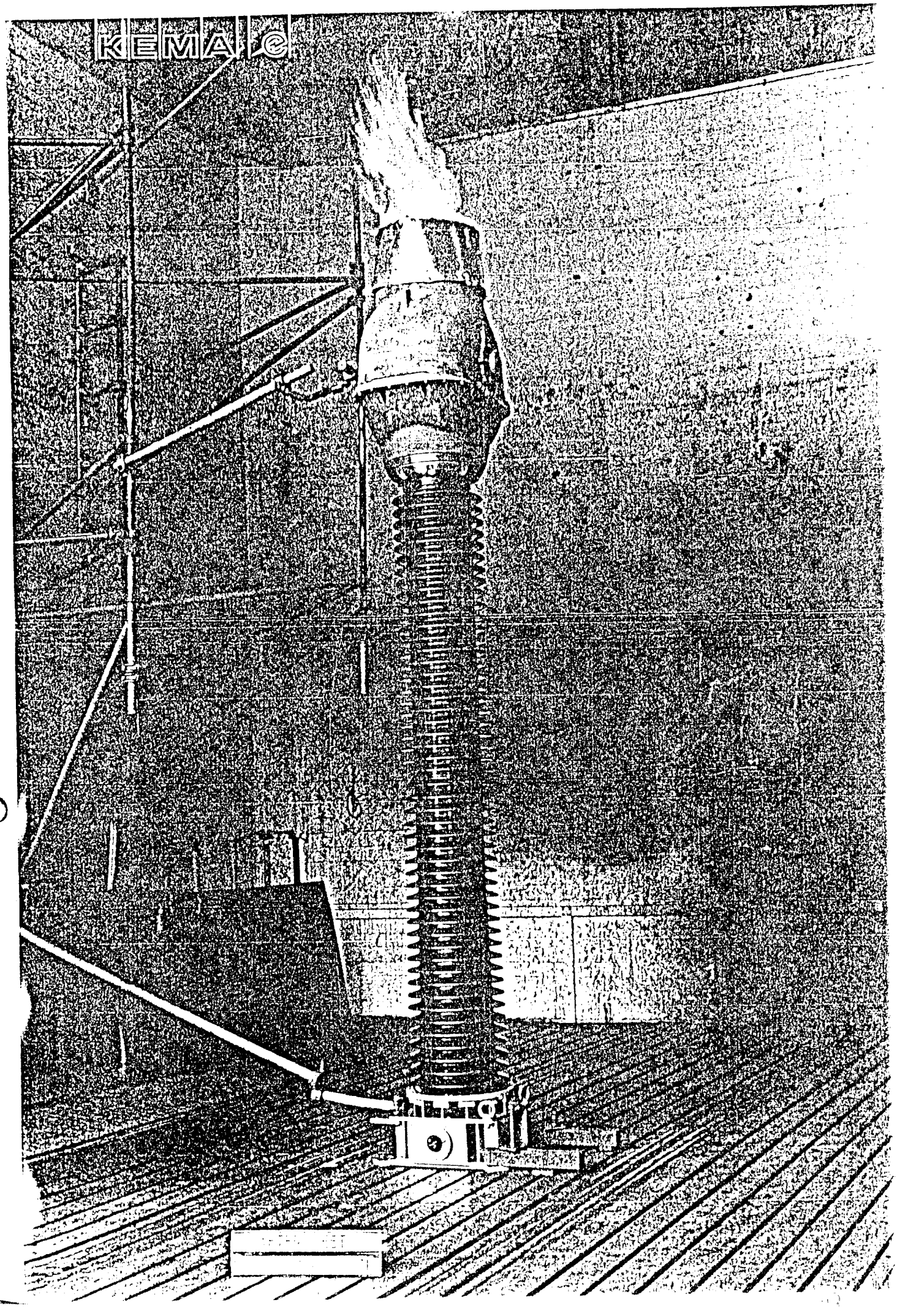


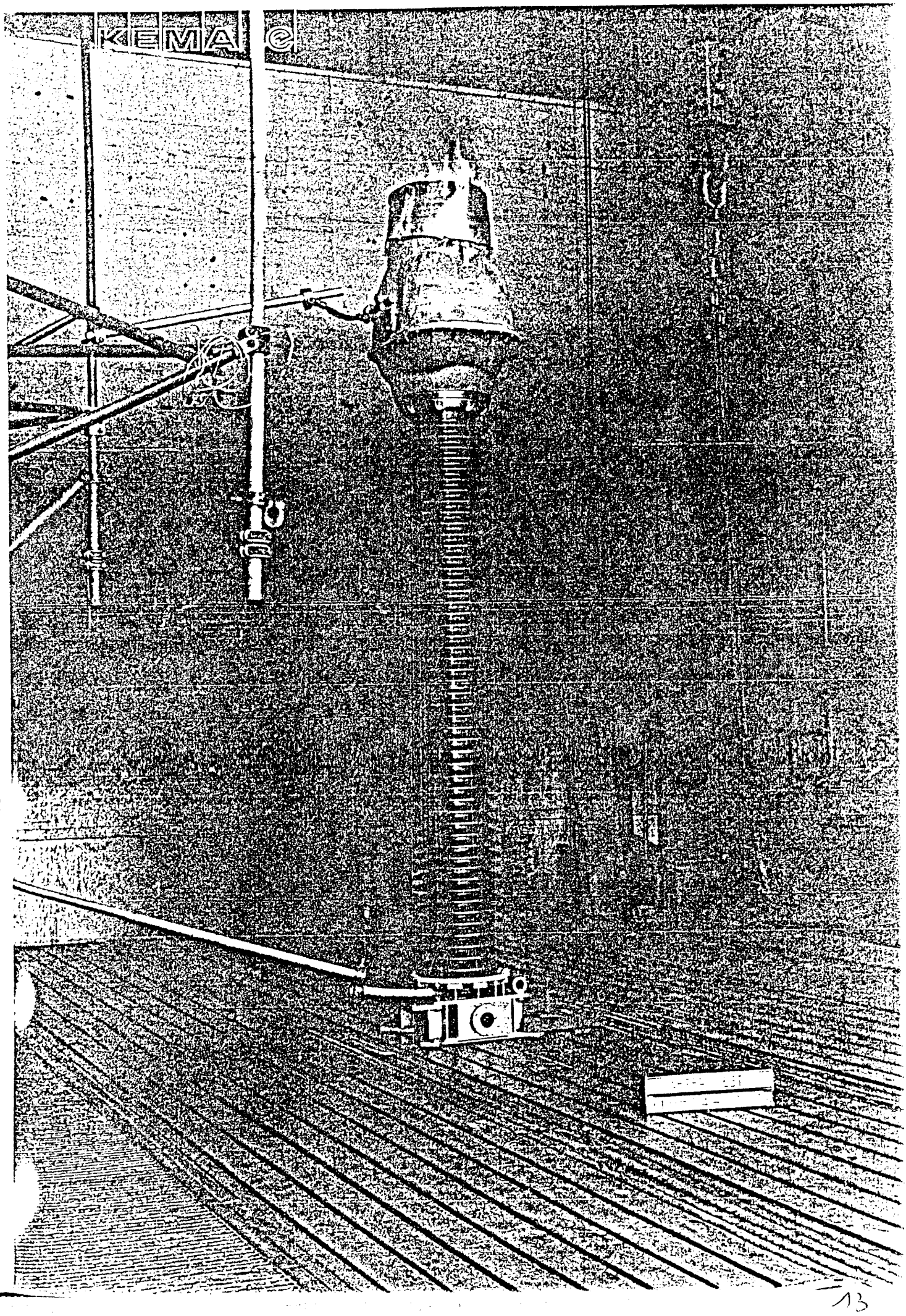
VIEW BELOW BASE

BALTEAU ENERTEC		CURRENT TRANSFORMER CTH 550					DEMANDE	NOMENC		
		REPERTOIRE :				APP	QC	IDH	PTH	ARC
Beyrac-Heusay BELGIQUE	ECHELLE 1/30	DESSINE CP	VU	DATE 15.6.90.	REMPLACE	REMPLACE PAR	PLAN N° 5331035			

10


KEMA




KEMA

DE ZOETEN LABORATORIUM
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands
Telephone +31 85 562991 - Telefax +31 85 511468 - Telex 45702 HPL NL

1 *Certificate of Compliance*

A Certificate contains a record of a series of type tests carried out strictly in accordance with a recognized standard. The equipment tested has fulfilled the requirements of this standard and the relevant ratings assigned by the manufacturer are endorsed by KEMA. The Certificate is applicable only to the equipment tested. KEMA is responsible for the validity and the contents of the Certificate.
The responsibility for conformity of any apparatus having the same designation as the one tested rests with the manufacturer.
The Certificate contains the essential drawings and a description of the equipment tested. Detailed rules are given in KEMA's Certification procedure.

2 *Report of Performance*

A Report of Performance contains a record of one or more tests which have been carried out according to the client's instructions. These tests are not necessarily in accordance with a recognized standard. The test results do not verify ratings of the test object.
KEMA issues three types of Reports of Performance:

2.1 *The tests have been carried out strictly in accordance with .... . The apparatus has complied with the relevant requirements.*

This sentence will appear on the front page of a Report of Performance if the tests have been performed in accordance with a recognized standard, but the series of tests does not completely fulfill the requirements for a Certificate of Compliance (for example, if the number of test duties is not a complete series of type tests).
The Report contains verified drawings and a description of the equipment tested. Detailed rules are given in KEMA's Certification procedure. The condition of the test object after the tests is assessed and recorded in the Report.

2.2 *The tests have been carried out in accordance with the client's instructions. Test procedure and test parameters were based on ....*

This sentence will appear on the front page of a Report of Performance if the number of tests, the test procedure and the test parameters are based on a recognized standard and related to the ratings assigned by the manufacturer.
Verification of the drawings (if submitted) and assessment of the condition after the tests is only done at the client's request.

2.3 *The tests have been carried out according to the client's instructions.*

This sentence will appear on the front page of a Report of Performance if the tests, test procedure and/or test parameters are not in accordance with a recognized standard.

3 *Standards*

When reference is made to a standard, and the date of issue is not stated, this applies to the latest issue, including amendments which have been officially published prior to the date of the tests.

4 *Accuracy of measurement*

In the table of test results the measured quantities are given in three digits. This method of presentation does not indicate an accuracy. The guaranteed uncertainty in the figures mentioned, taking into account the total measuring system, is less than 5%, unless mentioned otherwise.

5 *Qualified by STERLAB*

The De Zoeten Laboratorium has been entered in the STERLAB register for laboratories under Nr. 20 for the testing services as defined in the Field of Accreditation.
The accreditation is applicable to tests performed in accordance with IEC, ANSI and European standards, recorded in test documents items 1 and 2.1 above.
The accreditation is carried out in accordance with European Standard 45001, based on ISO/IEC Guides 25 and 38.

QUALIFIED BY STERLAB