TEST RECORDS

Manufacturer's representative	:	P MORESTIN	S.T / 38V
Test manager	:	G DAVALLAT-PIN	L.E.M.T / 38V

1986

TEST CONDITIONS

Apparatus conditions before tests :

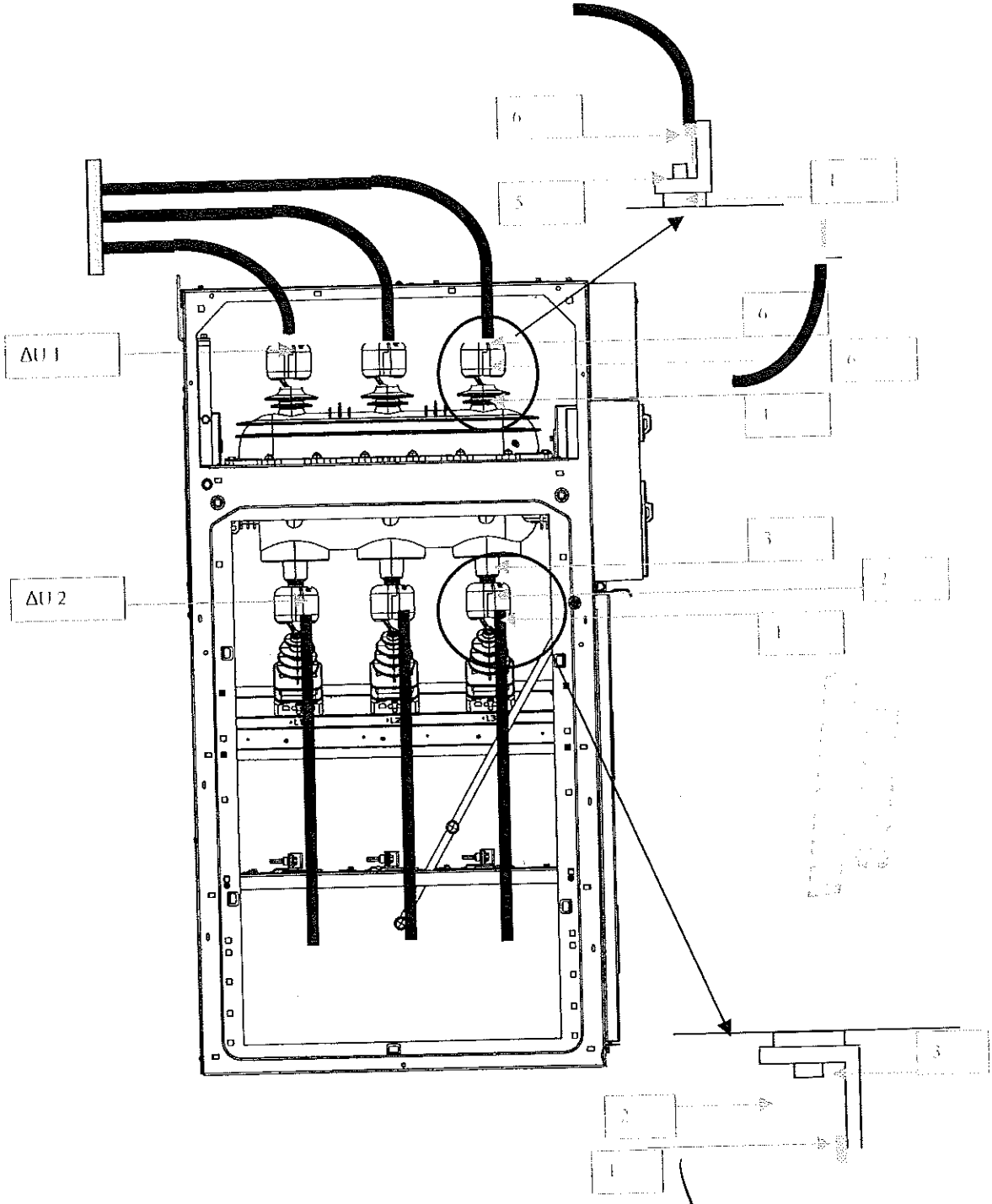
- Cubicle n° 0408213L
- The cubicle is connected with 1 cable of 240 mm² Copper per phase.
- The relative test pressure at 20 °C is 0.4 bar SF_6 (enclosure)
- The thermocouples used are Copper-Constantan

Tests and measurements facilities :

Sensor amperemetric	ET07 / ET08 / ET09
Measurement apparatus (AOIP)	ECM1
Voltage drop truck	EVO1 / EAM1
Thermo-anemometer	ETH1

TEST CONDITIONS

DRAWING OF THERMOCOUPLES POSITION :



1988

TEST RESULTS

- Measurement of the dc voltage drop before temperature-rise test (I = 100 Adc)

	Phase 1 (mV)	Phase 2 (mV)	Phase 3 (mV)
Δu1/Δu2	5.7	5.7	5.7

- Measurement of the dc voltage drop after temperature-rise test (I = 100 Adc)

	Phase 1 (mV)	Phase 2 (mV)	Phase 3 (mV)
Δu1/Δu2	6.20	5.79	5.62

1989

TEST RESULTS

-Values of the temperature rise at 630 A

Ambient temperature : 23.7 °C

(*) : - Maximum value of the temperature rise at ambiant air temperature not exceeding 40°C
- Measuring uncertainty on the maximum value

Thermocouple				Nature of the	temperature rise (K)			Maximum value (*)	
Plan mark	n° ph 1	n° ph 2	n° ph 3	part, material, diélectric	phase 1	phase 2	phase 3	(K)	
1	203	491	195	connection silver-coated in air	44.3	44.1	44.2	75	± 2
2	636	425	39	connection silver-coated in air	41.4	42.2	41	75	± 2
3	388	504	395	Point Tg insulating	41.1	40.9	41.6	65	± 1.8
4	167	574	183	Point Tg insulating	37.5	39.3	32.4	65	± 1.8
5	99	514	190	connection silver-coated in air	39.6	41.4	37.9	75	± 2
6	385	200	180	connection silver-coated in air	44.5	48	43.8	75	± 2

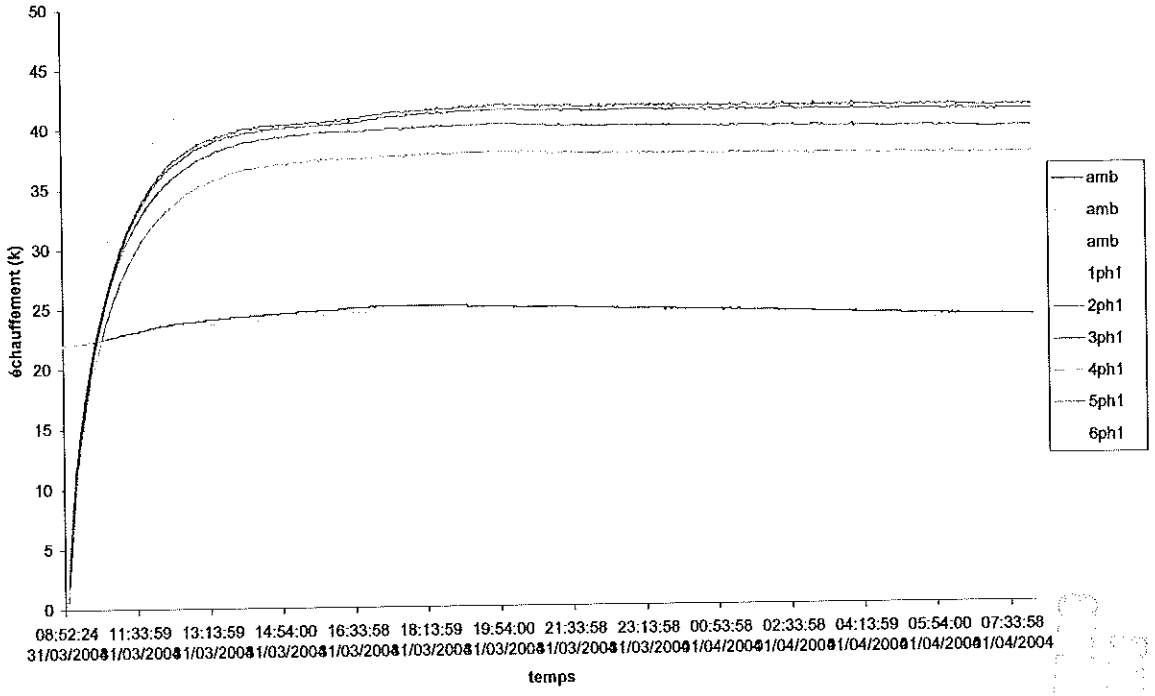
CONCLUSION

Tests are in accordance with the standard IEC 62271-200

1950

OSCILLOGRAM

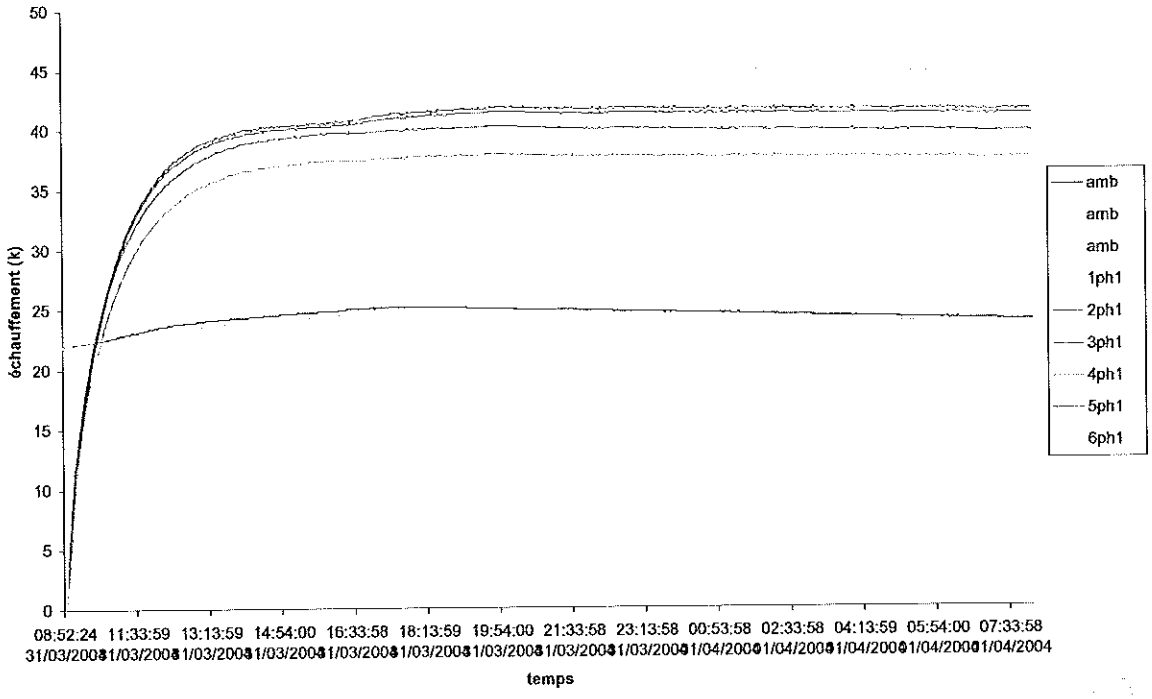
Phase 1



1991

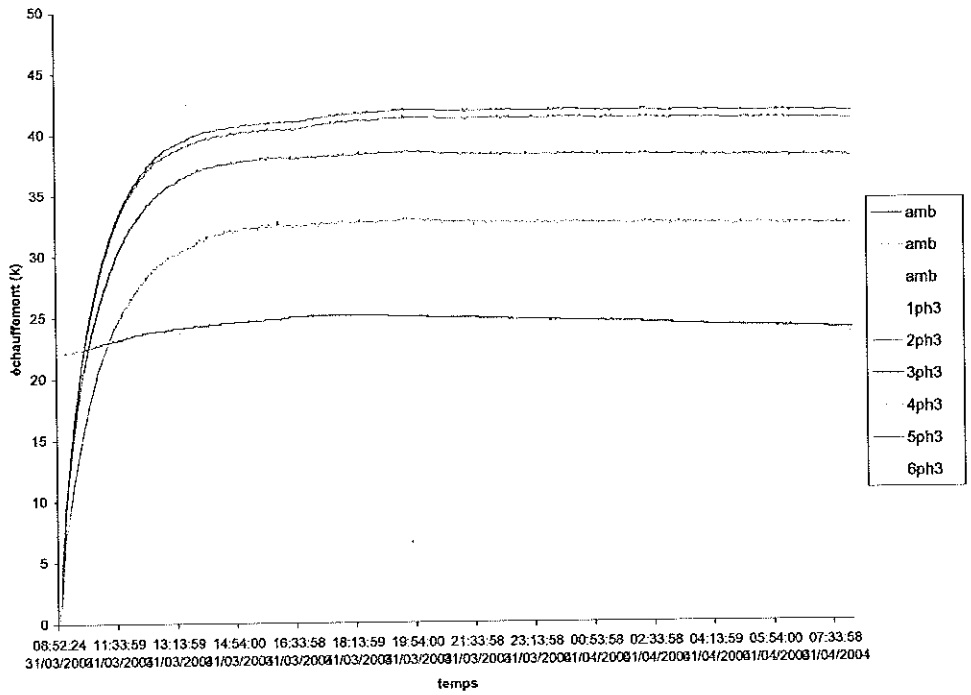
OSCILLOGRAM

Phase 2

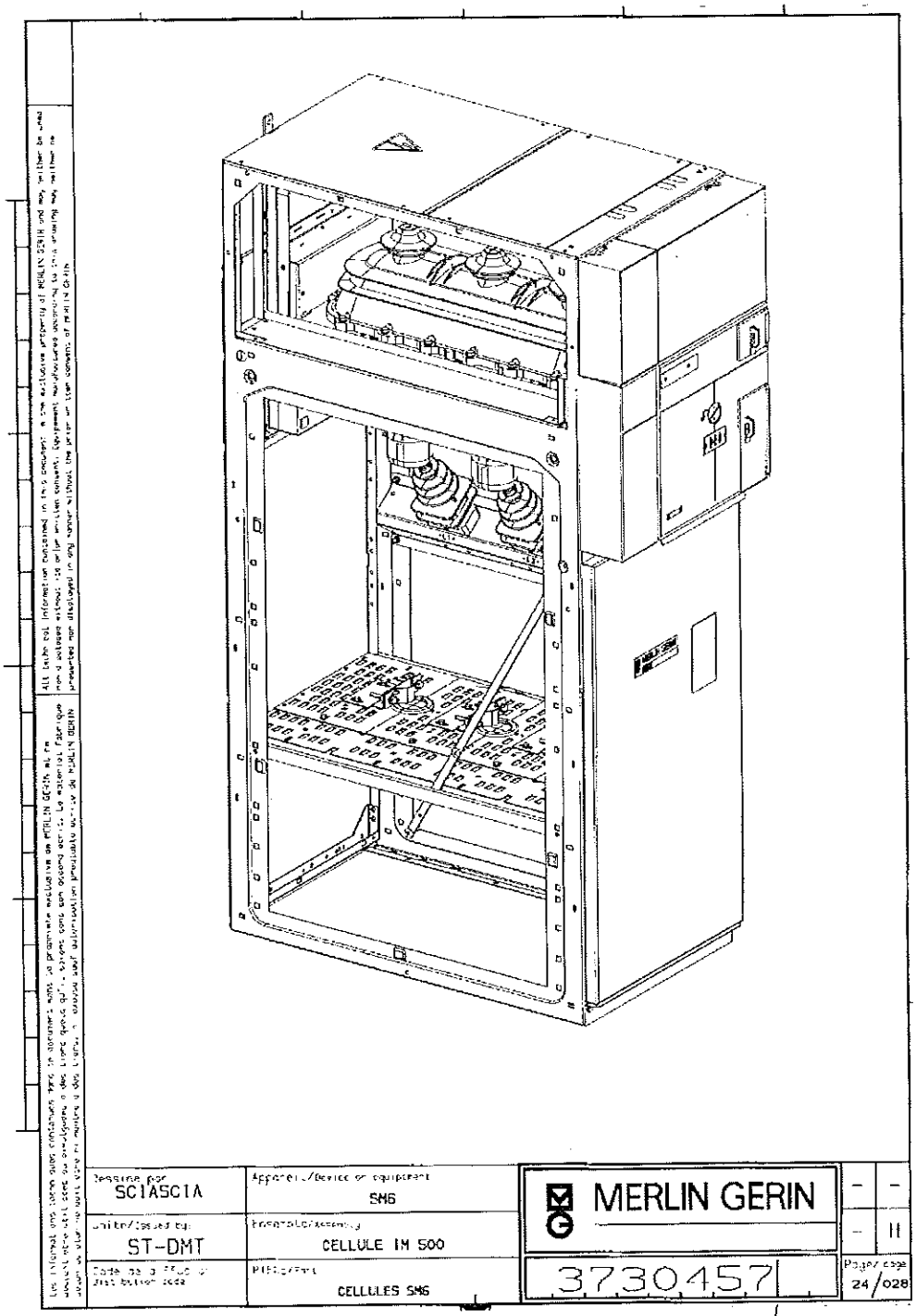


OSCILLOGRAM

Phase 3



DRAWING


Dessiné par
SC1ASC1A
Apparell / Device or equipment
SM6
Unité/Issued by
ST-DMT
Ensemble/Assembly
CELLULE IM 500
Objet/Part
CELLULES SM6
MERLIN GERIN
3730457
Page/ page
24/028

TEST REPORT

No. A2007-0713-00

1955

Volta

☐ Environment
☐ Functional
☐ Metrology
☒ Power

L2E : Expertise and Testing Laboratory

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ESSAIS
ACCREDITATION
No. 1-0140
Scope
available on
www.cofrac.fr

TEST REPORT No. A2007-0713-00

Delivered to : *SCHNEIDER ELECTRIC INDUSTRIES SAS - Rueil-Malmaison - FRANCE*

Equipment

Designation : *Metal-enclosed switchgear*

Reference : *SM6 cubicle type GAM2 + IM375 with exhaust by the top*

Rated voltage 24 kV - Rated normal current 630 A - Rated frequency 50/60 Hz

Trademark : *SCHNEIDER ELECTRIC*

Type of test : *Arcing test due to internal fault in the switch compartment rated at :*
- 16 kA - 1 s - three-phase

Date(s) of tests : *19/10/2007*

Place of tests : *L2E / T7 – 38050 Grenoble – FRANCE*

These tests were carried out in accordance with : **Standard IEC 62271-200 (11/2003) Annex A**

Conclusion :

Satisfactory results. Class AFL validated.

The performance of the apparatus tested and the results obtained are shown in the tables, oscillograms and photographs enclosed.
The responsibility for conformity of any apparatus having the same designation with that tested rests with the Manufacturer.

This report contains : 15 Pages with 1 oscillogram(s) and 1 drawing(s) of the apparatus.

Grenoble 18/12/2007

Test Manager

Technical Manager

M. ROSELLO

B. BELLIA

1996

RATINGS OF THE METAL-ENCLOSED SWITCHGEAR ACCORDING TO IEC 62271-200

Manufacturer	:	SCHNEIDER ELECTRIC INDUSTRIES SAS
Designation	:	SM6 cubicles type GAM2 + IM375
Number of phases		: 3
Voltage		kV : 24
Power frequency withstand voltage (1 min)		
- to earth and between poles		kV : 50
- accross the isolating distance		kV : 60
Lightning impulse withstand voltage		
- to earth and between poles		kV peak : 125
- accross the isolating distance		kV peak : 145
Frequency		Hz : 50/60
Normal current		A : 630
Peak withstand current		kA : 40
Short-time withstand current (duration)		
- main circuit		kA : 16 (1 s)
- earthing switch		kA : 16 (1 s)
- earth bar		kA : 16 (1 s)
Arcing withstand due to an internal fault		kA : 16
- duration		s : 1
- classification		: AFL
Degree of protection		: IP2XC
Dimensions (H x W x D)		mm : /
Weight		kg : /
Drawing(s) No.		: AAV7400700 rev 00 sheet 1/1
Metal-enclosed switchgear equipped with		: - 1 cubicle GAM2 - 1 cubicle IM375

RATINGS OF THE HV SWITCH

ACCORDING TO IEC 60265-1

Manufacturer	:	SCHNEIDER ELECTRIC INDUSTRIES SAS
Designation	:	SM6 cubicle IM375
Increased operating frequency switch	:	■■
	other :	
Installation	indoor :	■■
	outdoor :	
Interrupting medium	gas SF6 :	■■
	other :	
Absolute pressure at 20 °C	bar :	1.4
Number of poles	:	3
Voltage	kV :	24
Power frequency withstand voltage (1 min)	kV :	50
Lightning impulse withstand voltage	kV peak :	125
Frequency	Hz :	50/60
Normal current	A :	630
Peak withstand current	kA :	40
Short-time withstand current	kA :	16
- duration	s :	1
Breaking capacity		
- mainly active load	A :	630
- no-load transformer	A :	/
- closed loop	A :	630
- cable-charging	A :	31.5
- line-charging	A :	/
- earth-fault	A :	95
- cable-charging under earth-fault conditions	A :	55
Short-circuit making current	kA peak :	40
Number of operations with mainly active load		100
Mechanical endurance	operating cycles :	1000
Operating temperature	minimum °C :	- 5
	maximum °C :	+ 40
Degree of protection	:	IP2XC
Drawing(s) No.	:	/

1998

RECORD OF PROVING TESTS

Apparatus No. : /

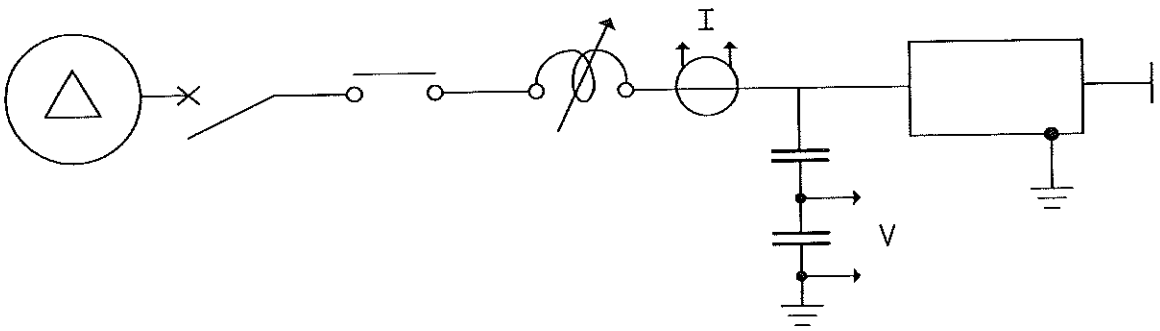
Test type and test-duty	Page
- Arcing test due to internal fault in the switch compartment at : 16.3 kA - 1 s - three-phase	9 - 10

Manufacturer Representative(s)	:	Mr. Vincent RUGGIERO Mr. Sylvain BREAN	SCHNEIDER ELECTRIC SCHNEIDER ELECTRIC

1999

TEST CIRCUIT

alternateur / alternator
disjoncteur de protection / protection circuit-breaker
enclencheur / making switch
élément de réglage / adjustable circuit
appareil en essai / apparatus under test



CONDITIONS OF PROVING TESTS

SUPPLY	By GAM2 cubicle		
	Copper bar	mm x mm :	
	Aluminium cable	mm^2 :	150
	Copper cable	mm^2 :	
	Number per phase	:	
INDICATORS IN BLACK CRETONNE	Cotton fabric	150 g/m^2 :	■■
	Black cotton-interlining lawn	40 g/m^2 :	
	No indicators	:	
RELATIVE PRESSURE INSIDE SWITCH COMPARTEMENT		bar :	Air at 0.4

Arc initiated between phases by means of a metal wire of 0.5 mm diameter.

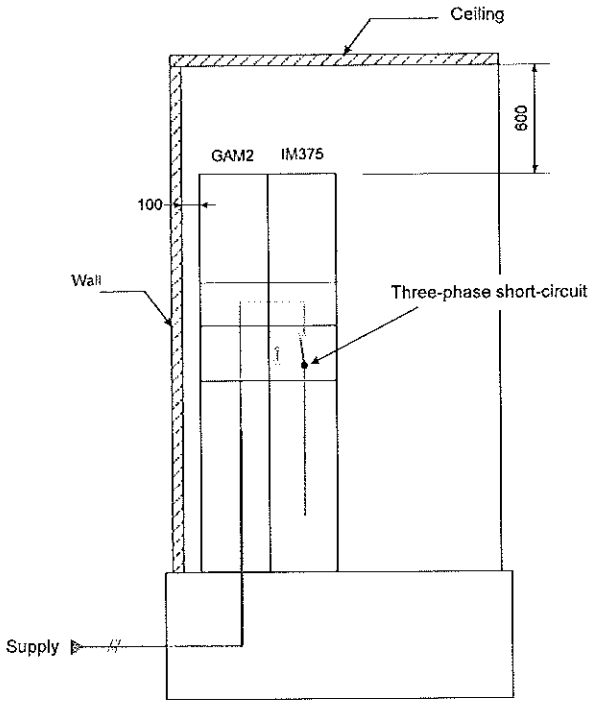
Functional unit under test : - IM375 placed at the right of the cubicle GAM2
- Arc initiated in the switch compartment

CONDITIONS OF INSTALLATION See page(s) : 6 & 7

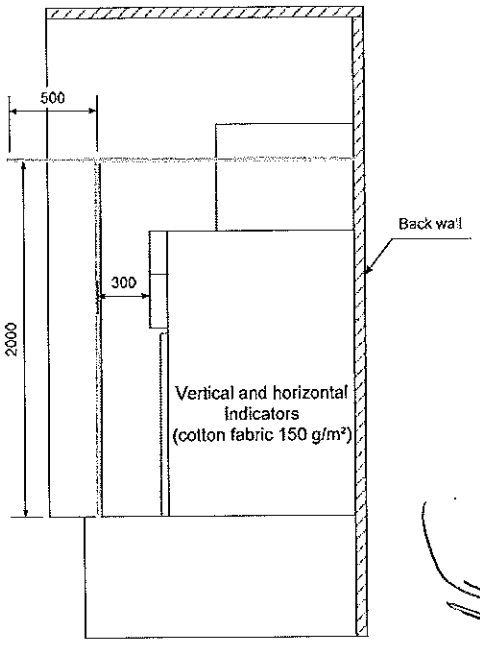
2000

CONDITIONS OF INSTALLATION

- Switch IM375 is closed.
- No cables connected output.

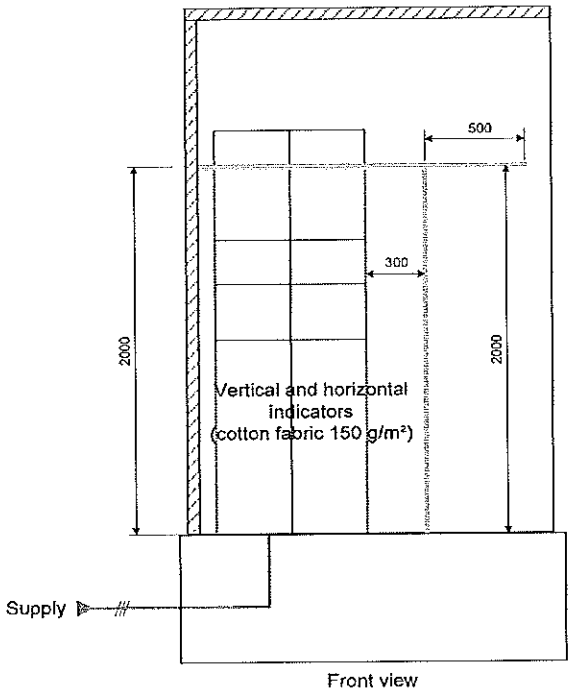


Front view

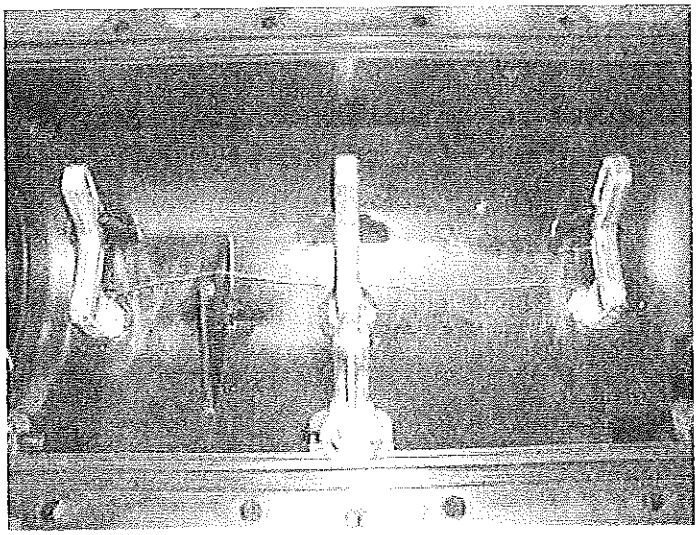


Side view

CONDITIONS OF INSTALLATION



POSITIONING OF THE METAL WIRE



2002

UNCERTAINTIES OF MEASURING CHAINS

Type of measurement	Range	Type of calculation	Total uncertainty (2σ) in %
Current from shunt	0 - 5 A	True r.m.s. value	1.15
Current from shunt	0 - 5 A	Peak value	1.07
Current from shunt	> 5 A	True r.m.s. value	1.65
Current from shunt	> 5 A	Peak value	1.60
Current from pulse current transformer	0 - 65 A	true r.m.s. value	1.15
Current from tore	> 100 A	True r.m.s. value	1.28
Current from tore	> 100 A	r.m.s. value (peak to peak / $\sqrt{8}$)	1.67
Current from tore	> 100 A	Peak value	1.20
Current from tore	> 100 A	Joule integral Thermal current equivalent	2.56 1.28
Current from tore	> 100 A	Quadratic average (peak to peak / $\sqrt{8}$)	3.34
Power factor	> 100 A	Peak ratio	2.69
Voltage from CD or MCD	≤ 1000 V	True r.m.s. value	1.08
Voltage from CD or MCD	≤ 1000 V	r.m.s. value (peak to peak / $\sqrt{8}$)	1.42
Voltage from CD or MCD	≤ 1000 V	Peak value	0.98
Voltage from CD or MCD	≥ 1000 V and < 10 kV	True r.m.s. value < 20 kHz > 20 kHz	1.61 1.42
Voltage from CD or MCD	≥ 1000 V and < 10 kV	r.m.s. value (peak to peak / $\sqrt{8}$) < 20 kHz > 20 kHz	1.93 1.79
Voltage from CD or MCD	≥ 1000 V and < 10 kV	Peak value < 20 kHz > 20 kHz	1.55 1.35
Voltage from CD or MCD	≥ 10 kV	True r.m.s. value < 20 kHz > 20 kHz	1.61 3.08
Voltage from CD or MCD	≥ 10 kV	r.m.s. value (peak to peak / $\sqrt{8}$) < 20 kHz > 20 kHz	1.93 3.27
Voltage from CD or MCD	≥ 10 kV	Peak value < 20 kHz > 20 kHz	1.55 3.05
Arc voltage from CD or MCD	< 1000 V	Peak value	1.55
Arc energy measured from CD or MCD	U ≥ 10 kV I measured with TORE > 100 A	True r.m.s. value	2.35
Pressure	0.5 to 1 bar 1 to 2 bars 2 to 5 bars 5 to 10 bars	Peak value	4.15 2.75 2.10 1.72
Time	10 to 200 ms		≈ 3
Time	200 ms to 16 s		± 10 ms

CD : capacitive divider MCD : mixed capacitive divider

2003

RESULTS OF THE ARCING TEST

DUE TO INTERNAL FAULT

Apparatus under test : SM6 cubicle IM375
Switch compartment

Test conditions : See pages 5 to 8

Apparatus condition before tests : - new : ■■
- having performed the previous tests :
- see photograph page : 11

Oscillogram		No.	20070713 - 0004		
Phase			1	2	3
Applied voltage		kV	8.80		
Frequency		Hz	50		
Peak current		kA	27.1	37.1	40.3
Current	initial	kA	16.3	16.2	16.0
(r.m.s.	middle	kA	15.8	15.5	15.3
value)	final	kA	15.5	15.5	15.2
Quadratic average		kA	15.6		
Current duration		ms	1095		
Thermal equivalent		kA	16.3 - 1 s		

Apparatus condition after tests : See following page.
See photographs pages 12 - 13

2004

ASSESSMENT OF THE TEST

The following criteria allow for the arcing effects listed in clause A6 (annex A) of the IEC standard 62271-200 (2003).

CRITERION No. 1 (respected)

The correctly secured doors and covers did not open.
Deformations are accepted.

CRITERION No. 2 (respected)

No fragmentation of the enclosure had occured within the time specified of the test.
No projection of small parts up to 60 gr had occured.

CRITERION No. 3 (respected)

Arc didn't cause holes in the accessible sides up to a height of 2 m.

CRITERION No. 4 (respected)

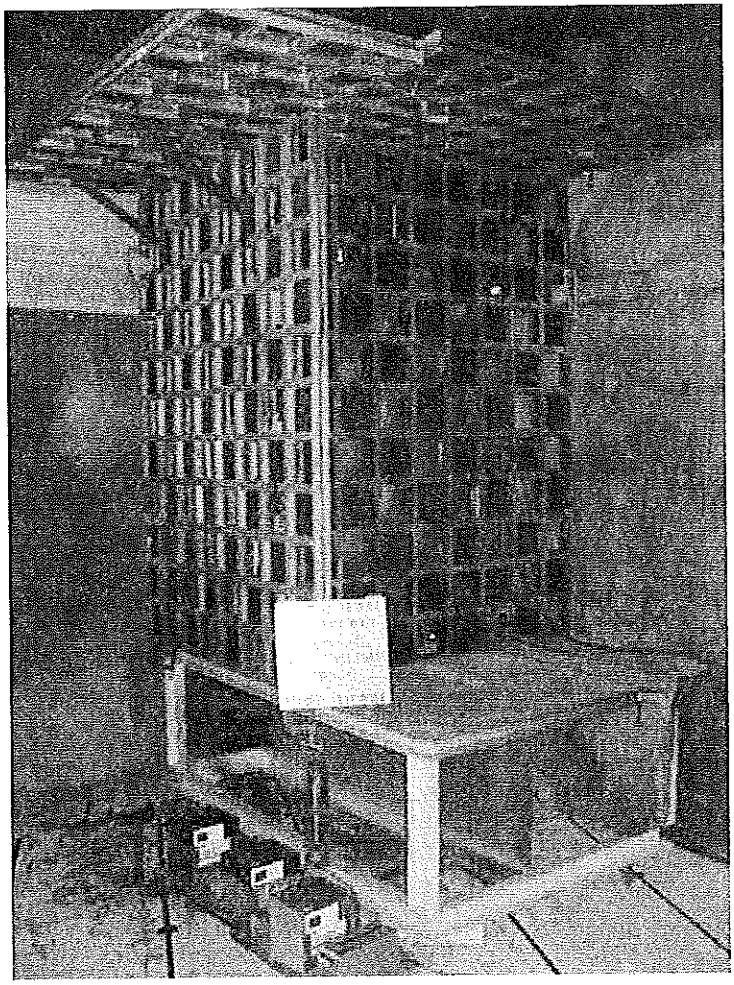
Indicators did not ignite due to the effect of hot gases.

CRITERION No. 5 (respected)

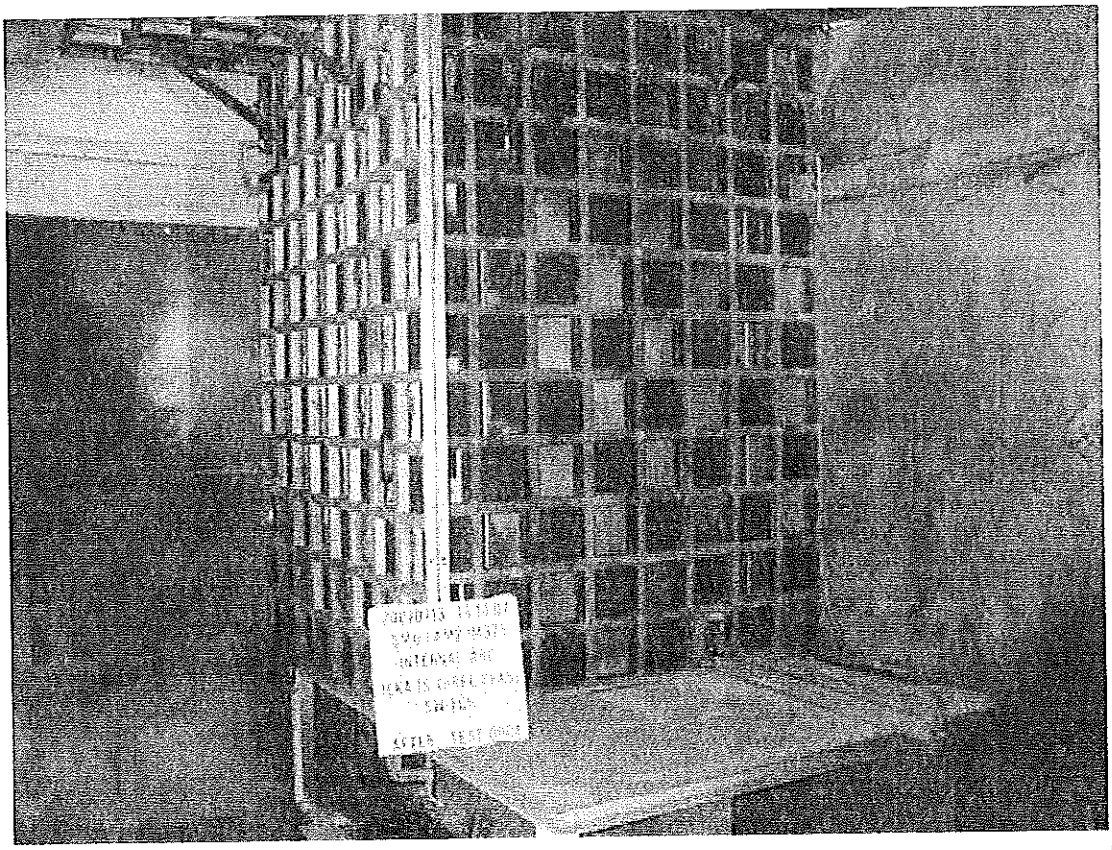
The enclosure remains connected to its earthing point.

2005

PHOTOGRAPH BEFORE TEST 0004

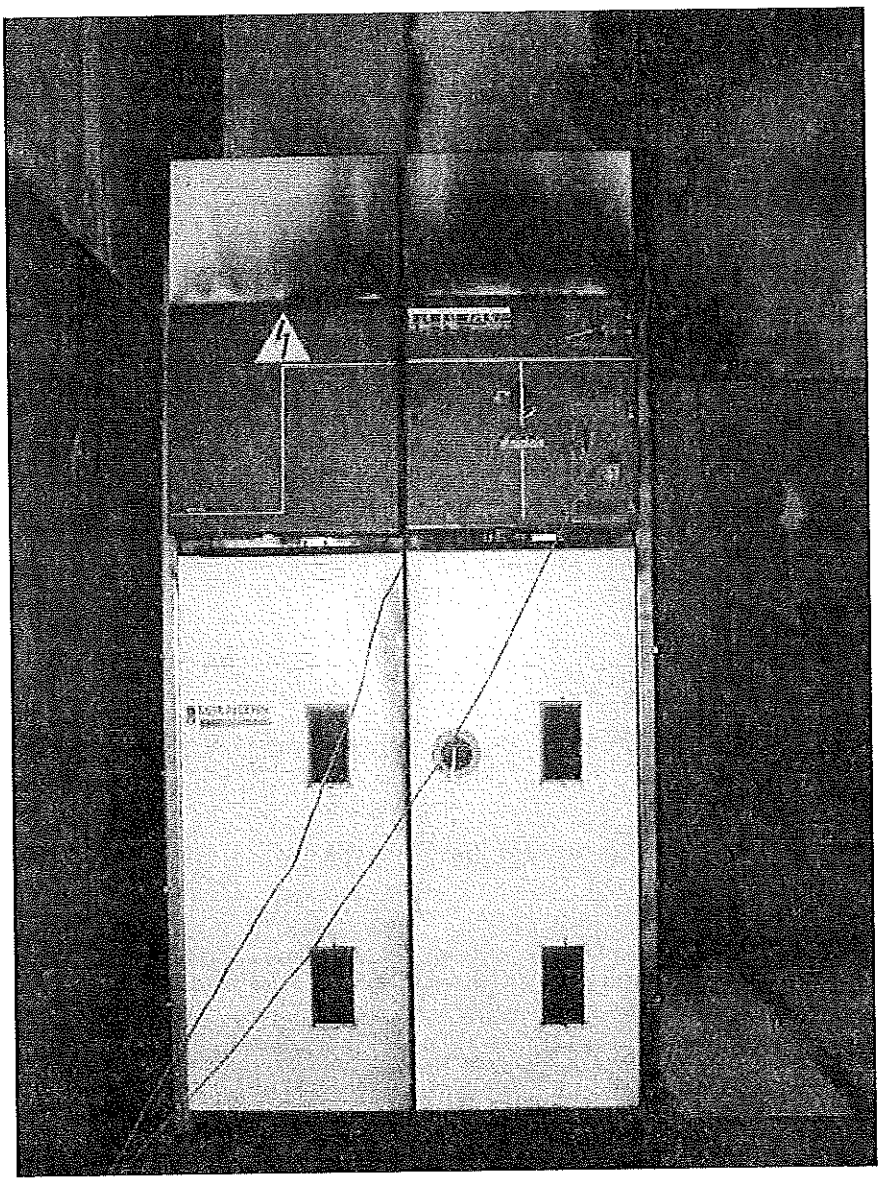


PHOTOGRAPH AFTER TEST 0004

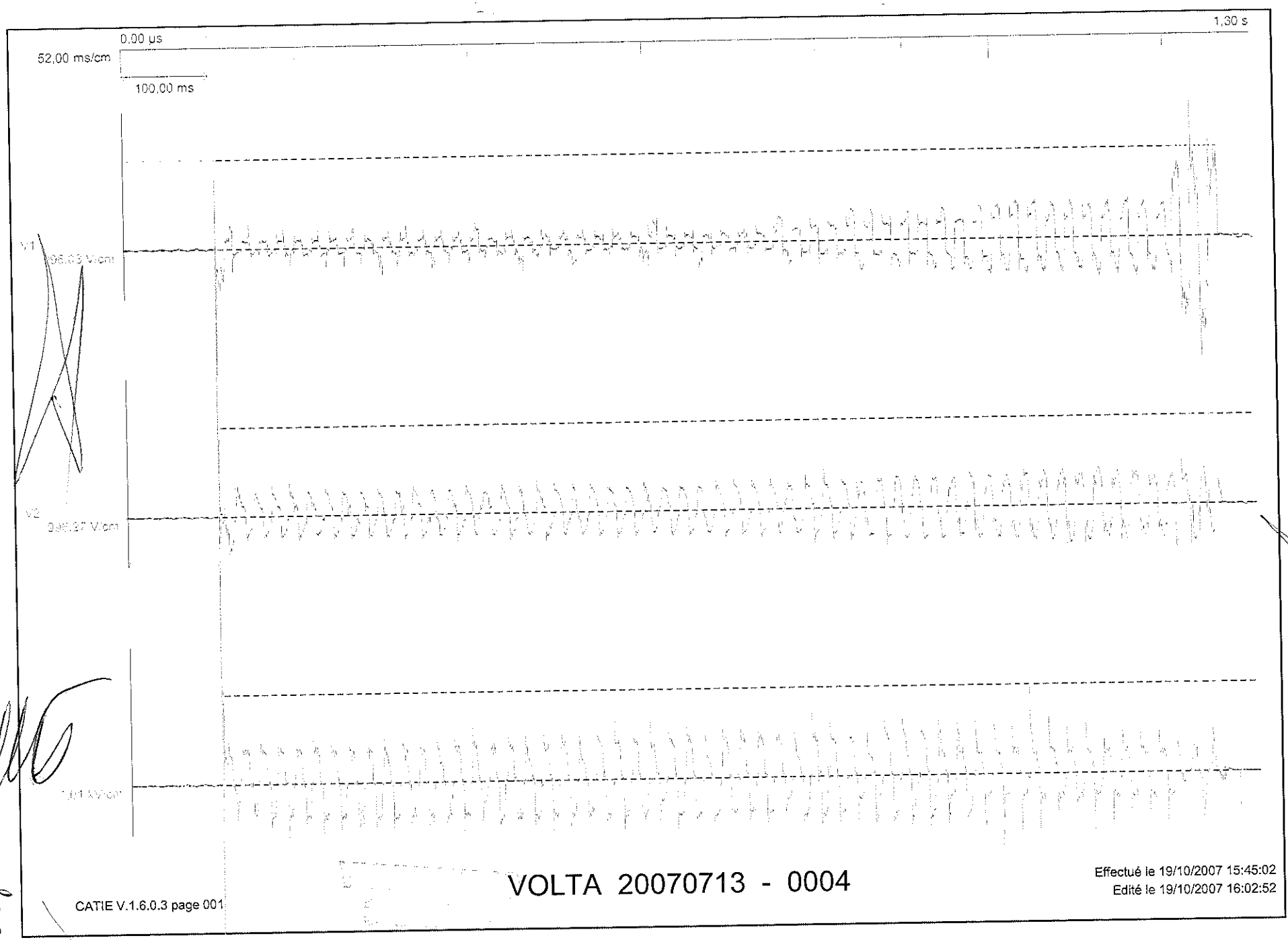


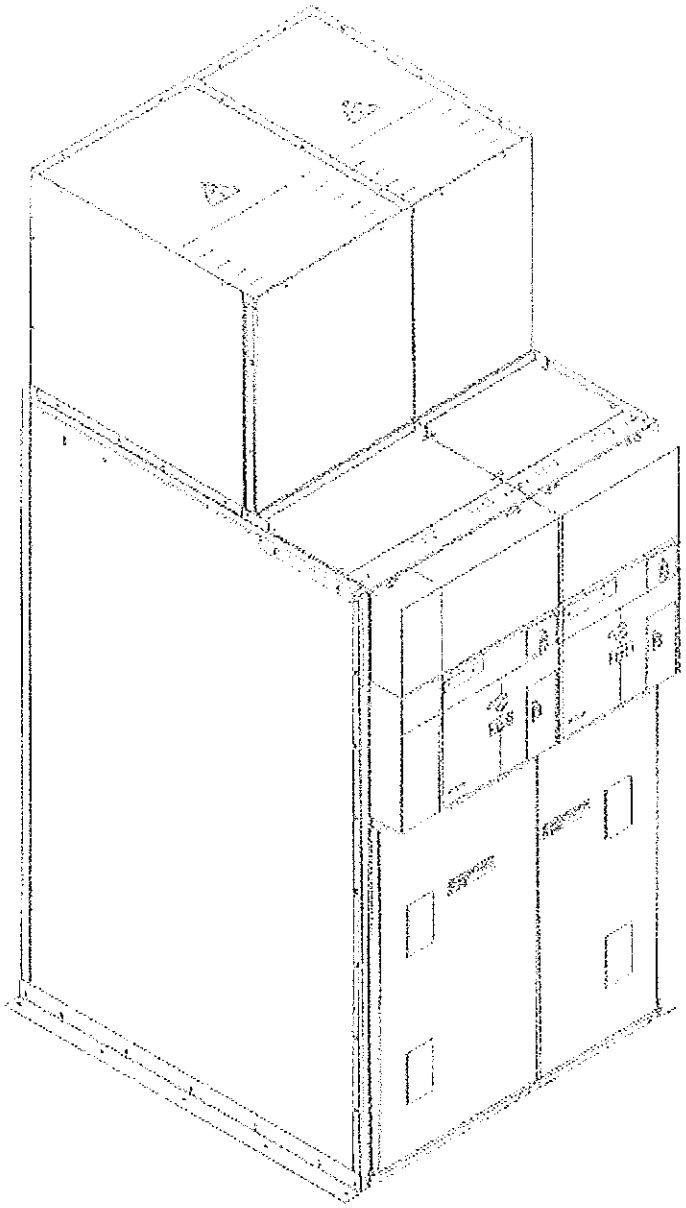
2007

PHOTOGRAPH AFTER TEST 0004



2008


0,00 µs
1,30 s
52,00 ms/cm
100,00 ms
V1
V2
VOLTA 20070713 - 0004
Effectué le 19/10/2007 15:45:02
Edité le 19/10/2007 16:02:52
CATIE V.1.6.0.3 page 001



Schneider Electric

TABLE GAM2 + IM375 AI 16 KA EXHAUST FROM THE TOP

TABLEAU GAM2+IM375 AI 16 KA ECHAPPEMENT PAR LE HAUT

Number:	Revision:	Sheet:
AAV7400700	00	1/1

State:

2010

TEST REPORT

No. A2007-0713-01

Volta

☐ Environment
☐ Functional
☐ Metrology
☒ Power

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ACCREDITATION
No. 1-0140
Scope
available on
www.cofrac.fr

TEST REPORT No. A2007-0713-01

Delivered to : *SCHNEIDER ELECTRIC INDUSTRIES SAS - Rueil-Malmaison - FRANCE*

Equipment

Designation : *Metal-enclosed switchgear*

Reference : *SM6 cubicle type GAM2 + IM500 with exhaust by the top*

Rated voltage 24 kV - Rated normal current 630 A - Rated frequency 50/60 Hz

Trademark : *SCHNEIDER ELECTRIC*

Type of test : *Arcing test due to internal fault in the cables compartment rated at :*
- 16 kA - 1 s - three-phase

Date(s) of tests : *19/10/2007*

Place of tests : *L2E / T7 – 38050 Grenoble – FRANCE*

These tests were carried out in accordance with : **Standard IEC 62271-200 (11/2003) Annex A**

Conclusion :

Satisfactory results. Class AFLR validated.

The performance of the apparatus tested and the results obtained are shown in the tables, oscillograms and photographs enclosed.
The responsibility for conformity of any apparatus having the same designation with that tested rests with the Manufacturer.

This report contains : 15 Pages with 1 oscillogram(s) and 1 drawing(s) of the apparatus.

Grenoble 18/12/2007

Test Manager

Technical Manager

M. ROSELLO

B. BELLIA

1 of 2

RATINGS OF THE METAL-ENCLOSED SWITCHGEAR ACCORDING TO IEC 62271-200

Manufacturer	:	SCHNEIDER ELECTRIC INDUSTRIES SAS
Designation	:	SM6 cubicles type GAM2 + IM500
Number of phases		: 3
Voltage		kV : 24
Power frequency withstand voltage (1 min)		
- to earth and between poles		kV : 50
- accross the isolating distance		kV : 60
Lightning impulse withstand voltage		
- to earth and between poles		kV peak : 125
- accross the isolating distance		kV peak : 145
Frequency		Hz : 50/60
Normal current		A : 630
Peak withstand current		kA : 40
Short-time withstand current (duration)		
- main circuit		kA : 16 (1 s)
- earthing switch		kA : 16 (1 s)
- earth bar		kA : 16 (1 s)
Arcing withstand due to an internal fault		kA : 16
- duration		s : 1
- classification		: AFLR
Degree of protection		: IP2XC
Dimensions (H x W x D)		mm : /
Weight		kg : /
Drawing(s) No.		: AAV7400900 rev 00 sheet 1/1
Metal-enclosed switchgear equipped with		: - 1 cubicle GAM2 - 1 cubicle IM500

2013

RATINGS OF THE HV SWITCH

ACCORDING TO IEC 60265-1

Manufacturer	:	SCHNEIDER ELECTRIC INDUSTRIES SAS
Designation	:	SM6 cubicle type IM500
Increased operating frequency switch	:	■■
	other :	
Installation	indoor :	■■
	outdoor :	
Interrupting medium	gas SF6 :	■■
	other :	
Absolute pressure at 20 °C	bar :	1.4
Number of poles	:	3
Voltage	kV :	24
Power frequency withstand voltage (1 min)	kV :	50
Lightning impulse withstand voltage	kV peak :	125
Frequency	Hz :	50/60
Normal current	A :	630
Peak withstand current	kA :	40
Short-time withstand current	kA :	16
- duration	s :	1
Breaking capacity		
- mainly active load	A :	630
- no-load transformer	A :	/
- closed loop	A :	630
- cable-charging	A :	31.5
- line-charging	A :	/
- earth-fault	A :	95
- cable-charging under earth-fault conditions	A :	55
Short-circuit making current	kA peak :	40
Number of operations with mainly active load		100
Mechanical endurance	operating cycles :	1000
Operating temperature	minimum °C :	- 5
	maximum °C :	+ 40
Degree of protection	:	IP2XC
Drawing(s) No.	:	/

2014

RECORD OF PROVING TESTS

Apparatus No. : /

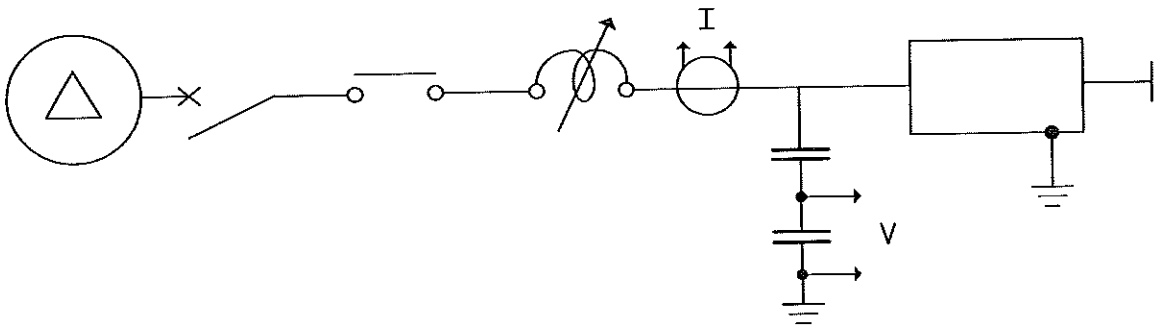
Test type and test-duty	Page
- Arcing test due to internal fault in the cables compartment at : 16.2 kA - 1 s - three-phase	9 - 10

Manufacturer Representative(s) : Mr. Vincent RUGGIERO SCHNEIDER ELECTRIC
Mr. Sylvain BREAN SCHNEIDER ELECTRIC

2015

TEST CIRCUIT

alternateur / alternator
disjoncteur de protection / protection circuit-breaker
enclencheur / making switch
élément de réglage / adjustable circuit
appareil en essai / apparatus under test



CONDITIONS OF PROVING TESTS

SUPPLY	By GAM2 cubicle		
	Copper bar	mm x mm :	
	Aluminium cable	mm^2 :	150
	Copper cable	mm^2 :	
	Number per phase	:	
INDICATORS IN BLACK CRETONNE	Cotton fabric	150 g/m^2 :	■■
	Black cotton-interlining lawn	40 g/m^2 :	
	No indicators	:	

RELATIVE PRESSURE INSIDE SWITCH COMPARTEMENT bar : Air at 0.4

Arc initiated between phases by means of a metal wire of 0.5 mm diameter.

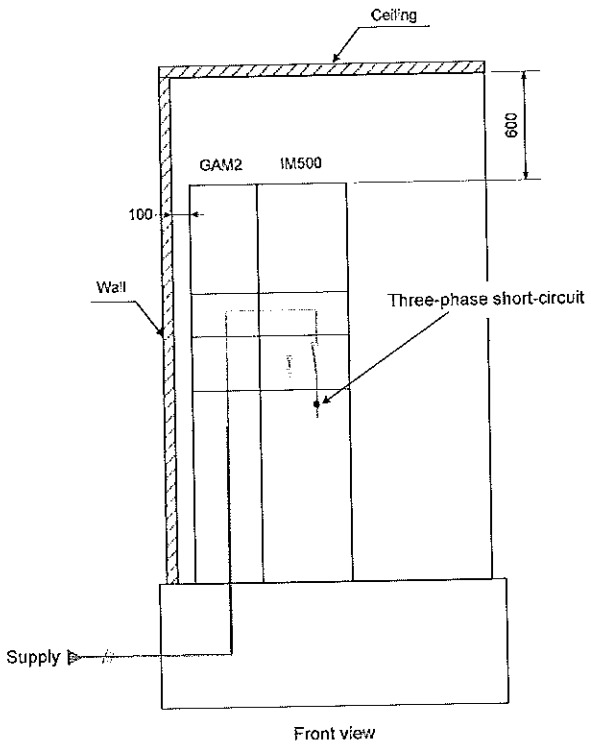
Functional unit under test : - IM500 placed at the right of the cubicle GAM2
- Arc initiated in the cables compartment

CONDITIONS OF INSTALLATION See page(s) : 6 & 7

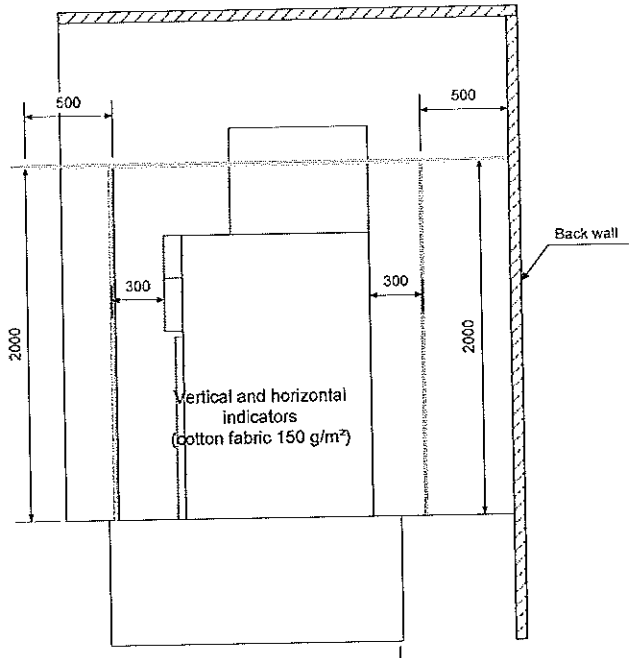
2016

CONDITIONS OF INSTALLATION

- Switch IM500 is closed.
- No cables connected output.

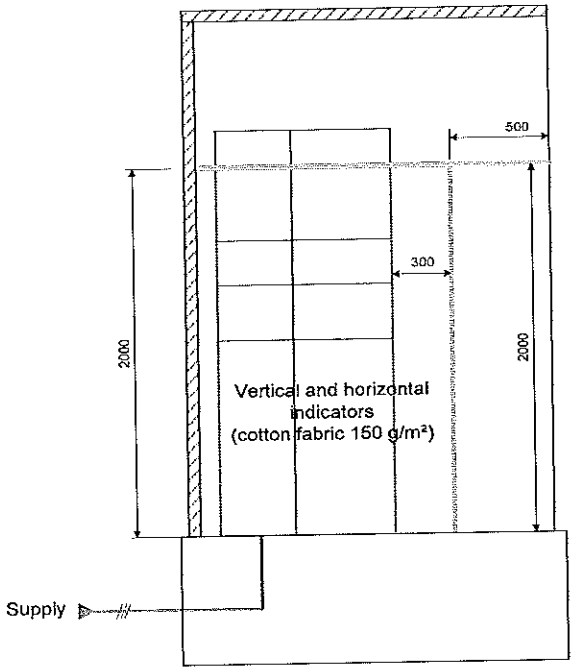


Front view



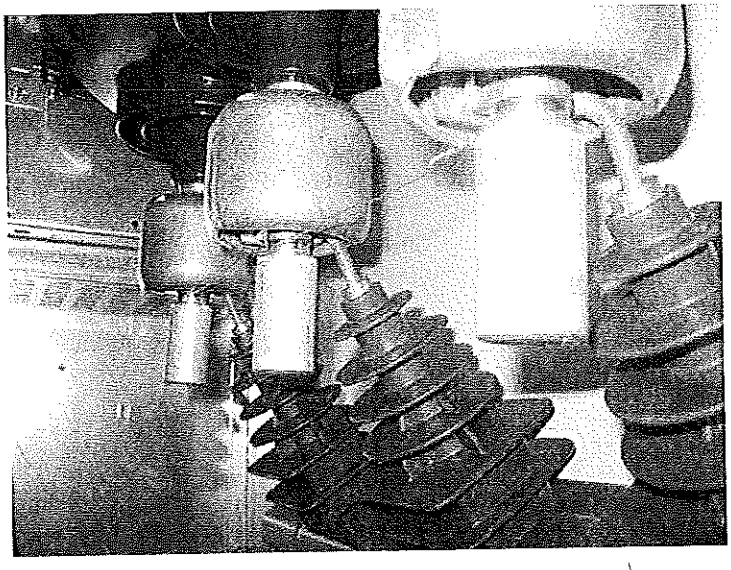
Side view

CONDITIONS OF INSTALLATION



Front view

POSITIONING OF THE METAL WIRE



2018

UNCERTAINTIES OF MEASURING CHAINS

Type of measurement	Range	Type of calculation	Total uncertainty (2σ) in %
Current from shunt	0 - 5 A	True r.m.s. value	1.15
Current from shunt	0 - 5 A	Peak value	1.07
Current from shunt	> 5 A	True r.m.s. value	1.65
Current from shunt	> 5 A	Peak value	1.60
Current from pulse current transformer	0 - 65 A	true r.m.s. value	1.15
Current from tore	> 100 A	True r.m.s. value	1.28
Current from tore	> 100 A	r.m.s. value (peak to peak / √8)	1.67
Current from tore	> 100 A	Peak value	1.20
Current from tore	> 100 A	Joule integral Thermal current equivalent	2.56 1.28
Current from tore	> 100 A	Quadratic average (peak to peak / √8)	3.34
Power factor	> 100 A	Peak ratio	2.69
Voltage from CD or MCD	≤ 1000 V	True r.m.s. value	1.08
Voltage from CD or MCD	≤ 1000 V	r.m.s. value (peak to peak / √8)	1.42
Voltage from CD or MCD	≤ 1000 V	Peak value	0.98
Voltage from CD or MCD	≥ 1000 V and < 10 kV	True r.m.s. value < 20 kHz > 20 kHz	1.61 1.42
Voltage from CD or MCD	≥ 1000 V and < 10 kV	r.m.s. value (peak to peak / √8) < 20 kHz > 20 kHz	1.93 1.79
Voltage from CD or MCD	≥ 1000 V and < 10 kV	Peak value < 20 kHz > 20 kHz	1.55 1.35
Voltage from CD or MCD	≥ 10 kV	True r.m.s. value < 20 kHz > 20 kHz	1.61 3.08
Voltage from CD or MCD	≥ 10 kV	r.m.s. value (peak to peak / √8) < 20 kHz > 20 kHz	1.93 3.27
Voltage from CD or MCD	≥ 10 kV	Peak value < 20 kHz > 20 kHz	1.55 3.05
Arc voltage from CD or MCD	< 1000 V	Peak value	1.55
Arc energy measured from CD or MCD	U ≥ 10 kV I measured with TORE > 100 A	True r.m.s. value	2.35
Pressure	0.5 to 1 bar 1 to 2 bars 2 to 5 bars 5 to 10 bars	Peak value	4.15 2.75 2.10 1.72
Time	10 to 200 ms		≈ 3
Time	200 ms to 16 s		± 10 ms

CD : capacitive divider MCD : mixed capacitive divider

2019

RESULTS OF THE ARCING TEST

DUE TO INTERNAL FAULT

Apparatus under test : SM6 cubicle IM500
Cables compartment

Test conditions : See pages 5 to 8

Apparatus condition before tests : - new : ■■
- having performed the previous tests :
- see photographs pages : 11 - 12

Oscillogram		No.	20070713 - 0003		
Phase			1	2	3
Applied voltage		kV	8.80		
Frequency		Hz	50		
Peak current		kA	26.8	36.0	40.5
Current	initial	kA	16.1	15.9	16.0
(r.m.s.	middle	kA	15.6	15.2	15.3
value)	final	kA	15.3	15.5	15.3
Quadratic average		kA	15.5		
Current duration		ms	1100		
Thermal equivalent		kA	16.2 - 1 s		

Apparatus condition after tests : See following page.
See photograph page 13.

2010

ASSESSMENT OF THE TEST

The following criteria allow for the arcing effects listed in clause A6 (annex A) of the IEC standard 62271-200 (2003).

CRITERION No. 1 (respected)

The correctly secured doors and covers did not open.
Deformations are accepted.

CRITERION No. 2 (respected)

No fragmentation of the enclosure had occured within the time specified of the test.
No projection of small parts up to 60 gr had occured.

CRITERION No. 3 (respected)

Arc didn't cause holes in the accessible sides up to a height of 2 m.

CRITERION No. 4 (respected)

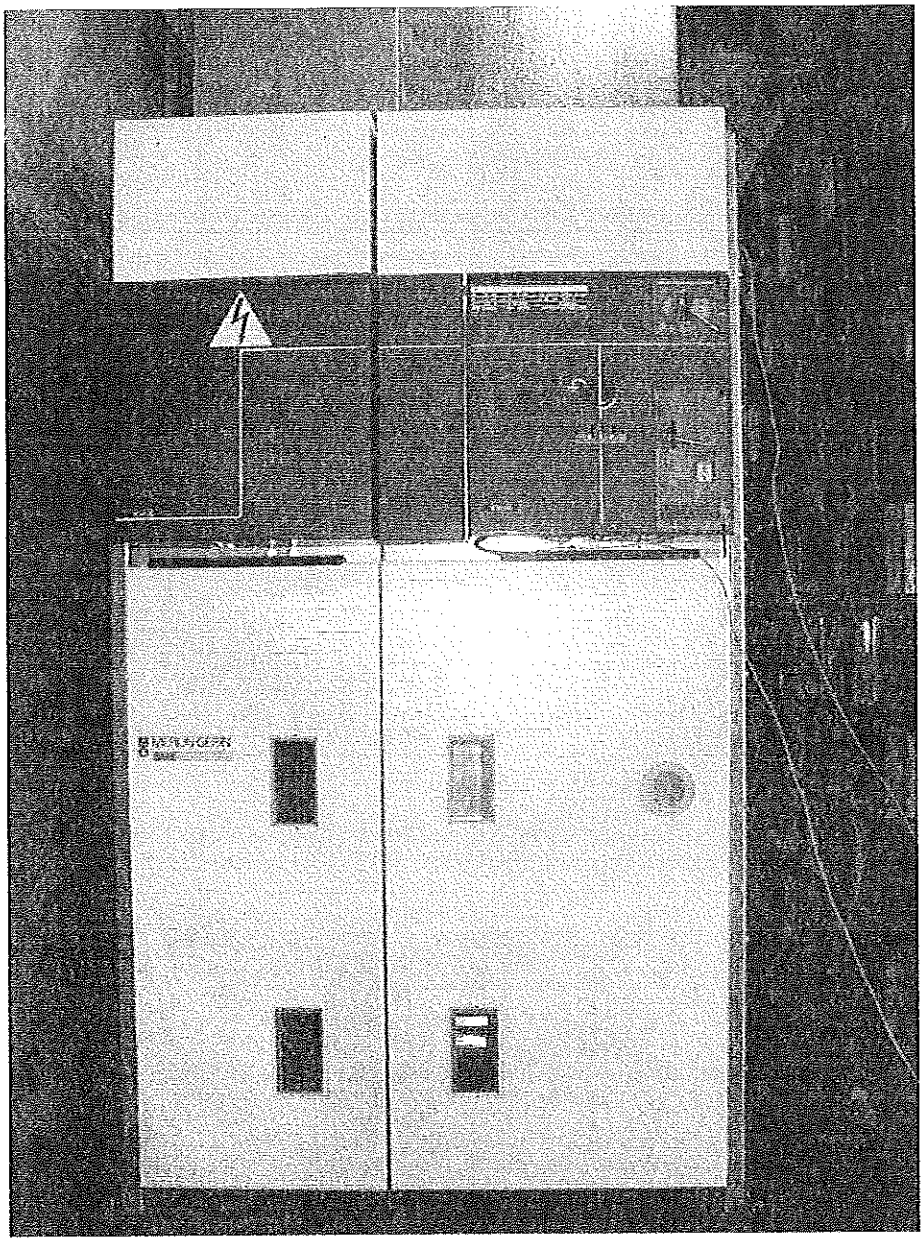
Indicators did not ignite due to the effect of hot gases.

CRITERION No. 5 (respected)

The enclosure remains connected to its earthing point.

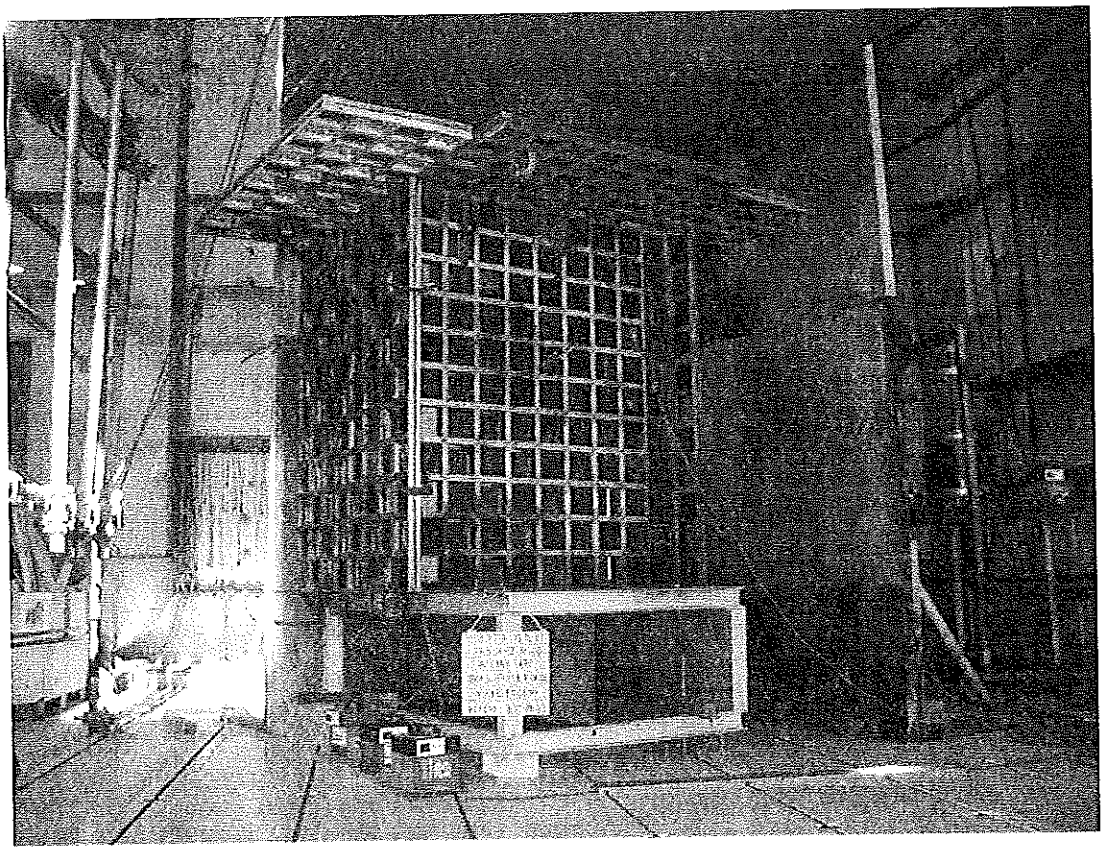
2011

PHOTOGRAPH BEFORE TEST 0003



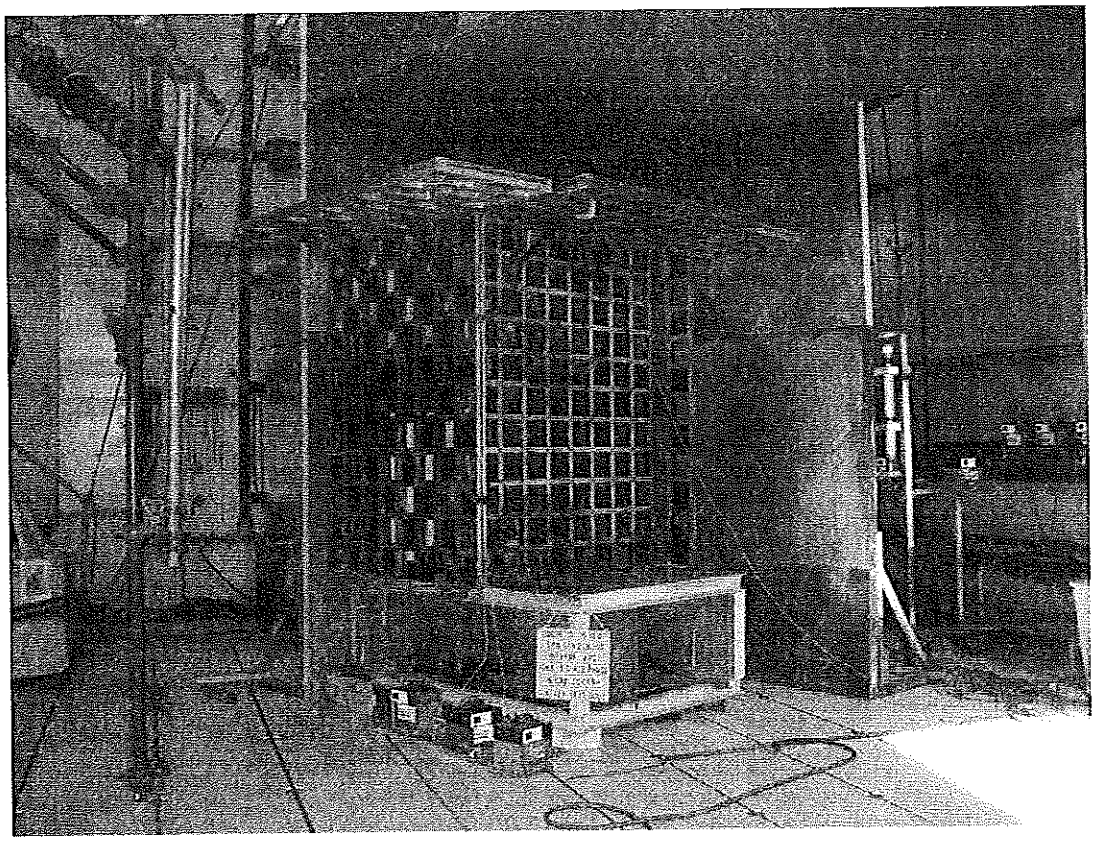
2022

PHOTOGRAPH BEFORE TEST 0003

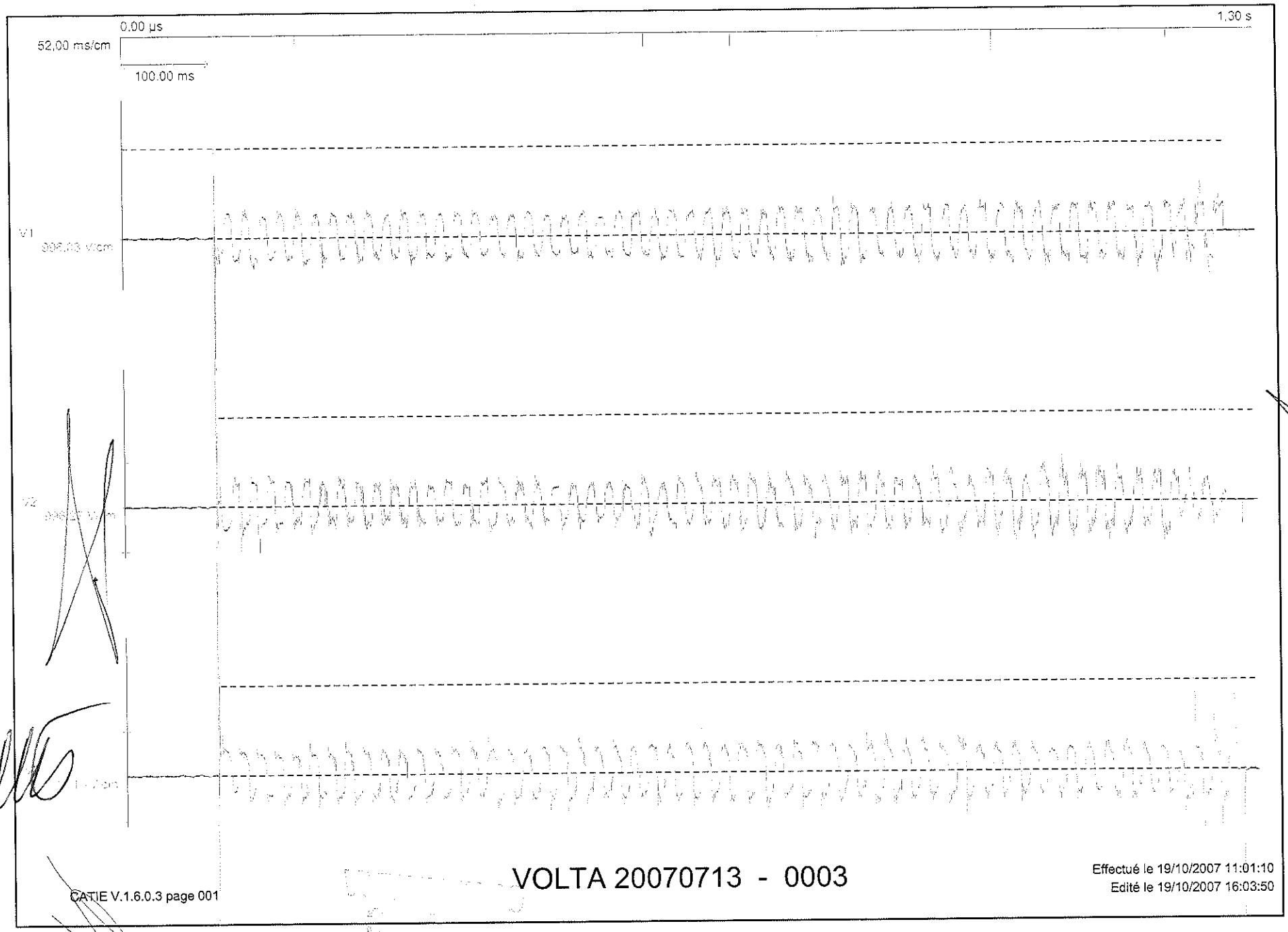


2023

PHOTOGRAPH AFTER TEST 0003



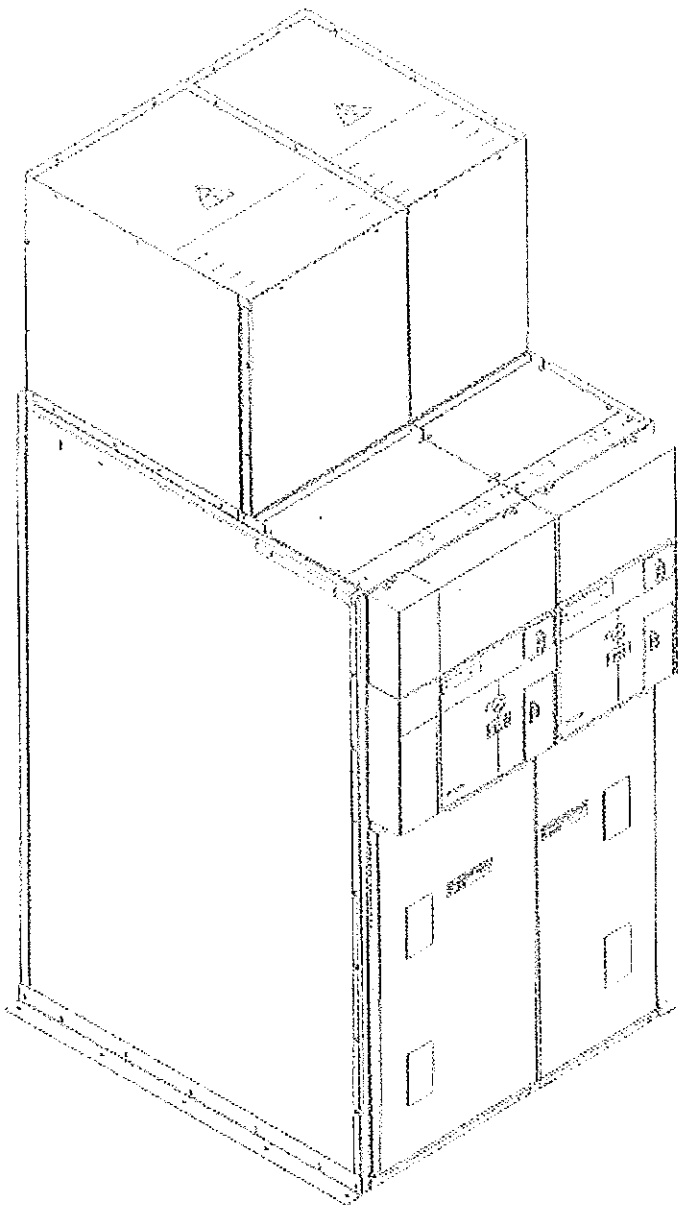
2024



VOLTA 20070713 - 0003

CATIE V.1.6.0.3 page 001

Effectué le 19/10/2007 11:01:10
Edité le 19/10/2007 16:03:50



Schneider Electric

TABLE GAM2 + IM500 AI 16 KA EXHAUST FROM THE TOP

TABLEAU GAM2 + IM500 AI 16KA ECHAPPEMENT PAR LE HAUT

Number:	Revision:	Sheet:
AAV7400900	**00**	1/1

State:

L.E.M.T.
Laboratoire d'essais moyenne tension
Usine 38V
Z.A.C Champ saint-ange
38760 Varces
tél. : 04 76 39 44 93
fax : 04 76 39 13 01

TEST REPORT n°AAA25847EA

Apparatus : High-voltage alternating-current circuit-breaker

Designation : MERLIN GERIN SM6 Type IM
Rated voltage : 24 kV Rated current : 630 A

Manufacturer : Schneider Electric Industries SA - Rueil-Malmaison - FRANCE

Object : Gas thigthness tests before and after 1000 mechanical operations at temperature ambient

Tested for : Schneider Electric Industries SA

Date(s) of tests : 23 May 2007

These tests were carried out in accordance with : customer request based on IEC 62271-200

The performance of the apparatus tested and the results obtained are shown in the tables, oscillograms and photographs enclosed.
This document relate only to the items presented for testing.

The documents forming part of this test report are :

This test report can only be copied as a photographic fac simile in its entirety.
COFRAC Testing Section accreditation is only to certify that the laboratory complies with the technical competence required to carry out test on the product types covered by the accreditation.

Varces, 04 June 2007

Technical manager

B. VANDENBERGUE

Testing laboratory manager

J-M. ANSELMETTI

APPARATUS RATINGS

Manufacturer		:	Schneider Electric Industries SA
Designation		:	MERLIN GERIN SM6
		:	Type IM
Number of poles		:	3
Voltage	**kV**	:	24
Lightning impulse withstand voltage	**kV**	:	125
Power frequency withstand voltage	**kV**	:	50
Frequency	**Hz**	:	50 / 60
Normal current	**A**	:	630
Short time withstand current	**kA**	:	25
Peak withstand current	**kÂ**	:	62.5
Duration of short circuit	**s**	:	1
Short circuit breaking current	**kA**	:	25
Short circuit making current	**kÂ**	:	62.5
Interrupting medium	/	:	SM6 interruptor
Operating mechanism		:	CIT
Degree of protection	/	:	/
Drawing n°	/	:	3730007 ind. M

2028

TEST RECORDS

Manufacturer's representative : S. PONS S.T / 38V

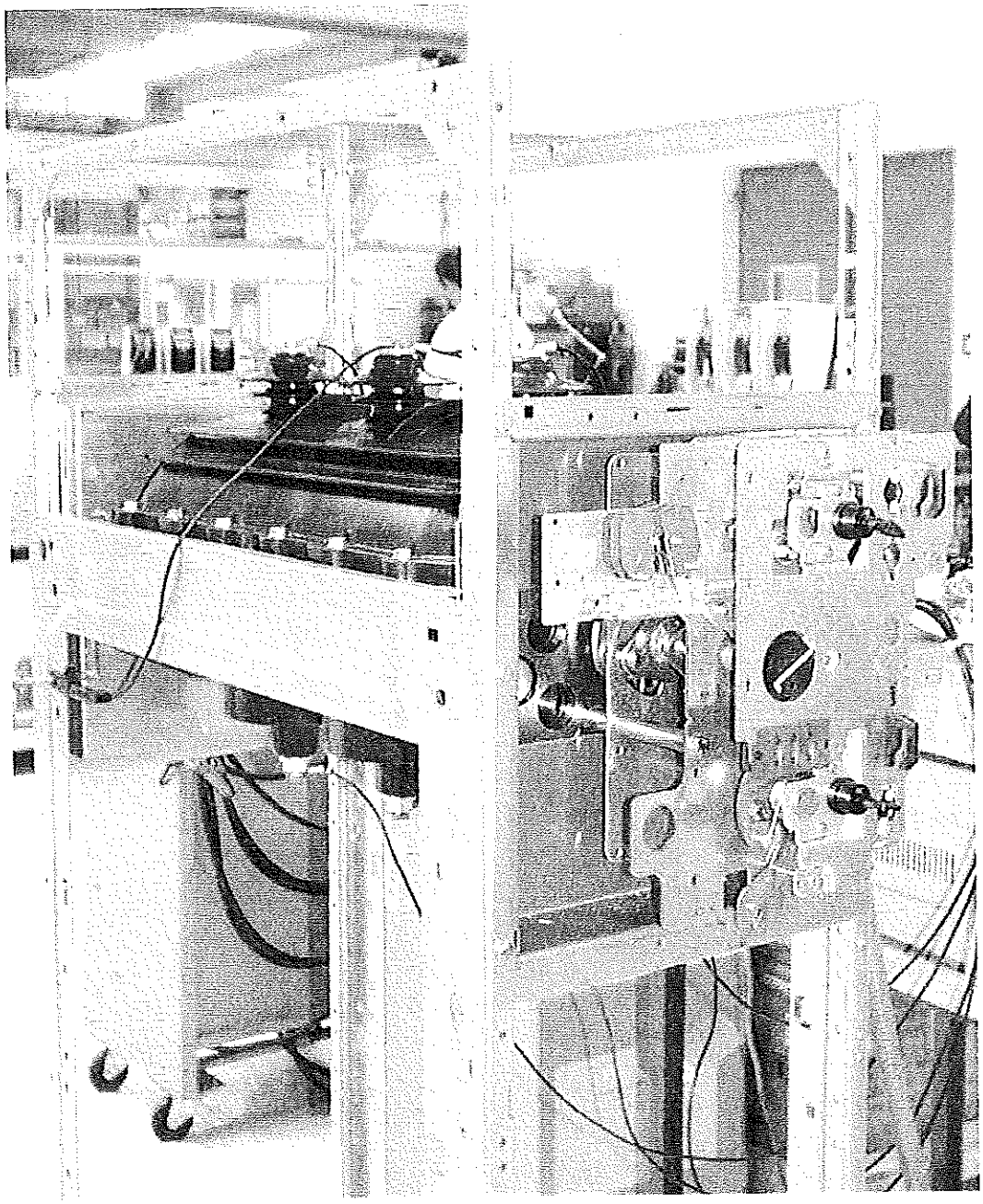
Test manager : J. BOUDAREL L.E.M.T / 38V

2029

TEST CONDITIONS

Apparatus condition before tests :

- Apparatus new cuve N°: 1342
- N°: 1141



2030

Conditions and Result of Gas thigthness tests

CONDITION OF THE ENCLOSURE IN TEST

- New apparatus
- The enclosure is placed in a sealing casing

APPARATUS USED

- Fuitmètre 200 n°2001206 (analytic system)

TEST PROCEDURE

- Leakage is measured by the method known as "accumulation" :

- Placing of the enclosure to be inspected in a sealed casing filled with clean air at atmospheric pressure.

- First measurement
Using an electron trapping detector, the concentration of SF6 in the casing is cheched.
The concentration of SF6 is usually undetectable.

- Second measurament
Using the same detector, measurement of the concentration of SF6 in the casing after an interval of time t (>12 hours)

- Calculation of the concentration and leak output.

2031

TESTS RESULTS

CALCULATION OF THE CONCENTRATION AND LEAKAGE RATE

$$\text{Leakage rate} = \text{concentration} \times \frac{\text{Sensitive volume} \cdot (\text{in} \cdot \text{cm}^3)}{\text{time} \cdot (\text{in} \cdot \text{s})}$$

N.B. *: Sensitive volume = Volume of casing - Volume of enclosure*
Concentration = Test n°2 – Test n°1

MEASUREMENT READINGS

Measurements made on a sensitive volume of 137000 cm^3

Measurements before 1000 operations

Test n°	Time in casing	Concentration	Leakage rate
/	s	10^{-6}	(bar × cm^3/s)10^{-6}
1	0	0	
2	68400	1.07	2.14

Measurements after 1000 operations

Test n°	Time in casing	Concentration	Leakage rate
/	s	10^{-6}	(bar × cm^3/s)10^{-6}
1	0	0	
2	62100	0.9	1.99

2032

TESTS RESULTS

RESULTS OF THE MEASUREMENTS BEFORE TEST (1)

- SPEED :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.57	4	5.01	5
Earthing switch	4.32	1	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	28	27
Earthing switch	27	31

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	44	47	47
Earthing switch	80	93	83

- Simultaneity of poles (ms) :

	Close (ms)	Open (ms)
Switch	0.06	0.48
Earthing switch	0.28	/

2033

RESULTS OF THE MEASUREMENTS BEFORE TEST (2)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.62	/	5.02	/
Earthing switch	4.34	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	27	27
Earthing switch	28	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	45	46	49
Earthing switch	79	94	85

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.05	0.45
Earthing switch	0.28	/

2034

RESULTS OF THE MEASUREMENTS BEFORE TEST (3)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.59	/	5.06	/
Earthing switch	4.40	/	/	/

- Operation torgue

	Close (N.m)	Open (N.m)
Switch	27	28
Earthing switch	27	31

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	47	48	48
Earthing switch	80	90	84

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.03	0.44
Earthing switch	0.19	/

2035

RESULTS OF THE MEASUREMENTS BEFORE TEST (4)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch r	4.62	/	5.06	/
Earthing switch	4.37	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	28	28
Earthing switch	28	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	45	50	49
Earthing switch	77	84	86

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.05	0.46
Earthing switch	0.13	/

2036

RESULTS OF THE MEASUREMENTS BEFORE TEST (5)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.68	/	5.00	/
Earthing switch	4.40	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	28	28
Earthing switch	28	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	46	54	52
Earthing switch	73	81	85

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.07	0.44
Earthing switch	0.18	/

2037

RESULTS OF THE MEASUREMENTS AFTER 1000 OPERATIONS (1)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.39	204	4.49	205
Earthing switch	4.13	201	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	30	28
Earthing switch	30	31

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	161	143	112
Earthing switch	196	266	185

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.18	0.81
Earthing switch	0.17	/

2038

RESULTS OF THE MEASUREMENTS AFTER 1000 OPERATIONS (2)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.34	/	4.43	/
Earthing switch	4.12	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	29	29
Earthing switch	31	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	168	142	121
Earthing switch	234	344	214

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.19	0.64
Earthing switch	0.05	/

2039

RESULTS OF THE MEASUREMENTS AFTER 1000 OPERATIONS (3)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.41	/	4.47	/
Earthing switch	4.10	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	30	28
Earthing switch	30	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	160	155	118
Earthing switch	363	291	273

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.18	0.82
Earthing switch	0.19	/

RESULTS OF THE MEASUREMENTS AFTER 1000 OPERATIONS (4)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.34	/	4.46	/
Earthing switch	4.13	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	30	28
Earthing switch	30	31

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	154	171	129
Earthing switch	252	424	222

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.21	0.84
Earthing switch	0.09	/

RESULTS OF THE MEASUREMENTS AFTER 1000 OPERATIONS (5)

- Speed :

	Close		Open	
	(m/s)	Oscillo n°	(m/s)	Oscillo n°
Switch	4.46	/	4.58	/
Earthing switch	4.11	/	/	/

- Operation torque

	Close (N.m)	Open (N.m)
Switch	30	28
Earthing switch	31	32

- Resistance of the main circuit (100 Adc) :

	Phase 1 (μΩ)	Phase 2 (μΩ)	Phase 3 (μΩ)
Switch	152	186	132
Earthing switch	381	482	191

- Simultaneity of poles

	Close (ms)	Open (ms)
Switch	0.19	0.84
Earthing switch	0.16	/

After 1000 operating cycles, the characteristic measured remain according to the acceptance tests of the manufacturer.

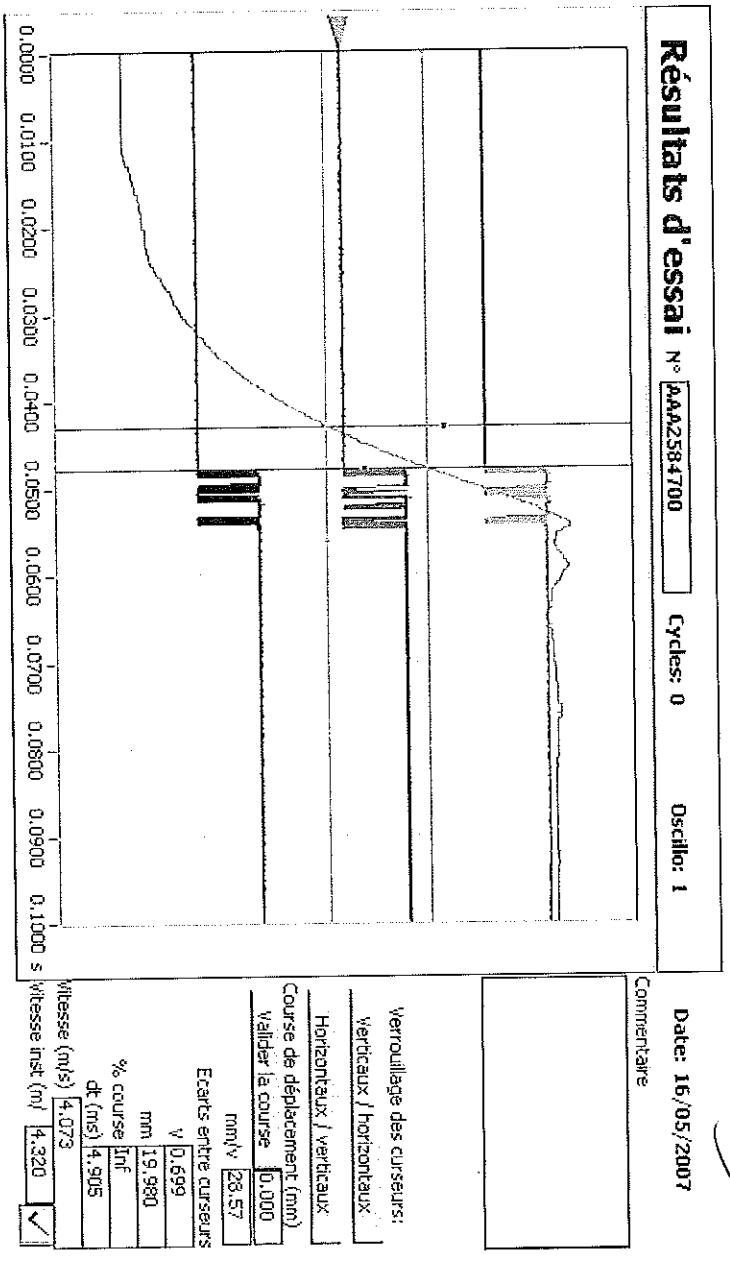
CONCLUSION :

Tests are in accordance witch the standard IEC 62271-200

The tightness value remains the same before and after the tests.

OSCILLOGRAM N°1

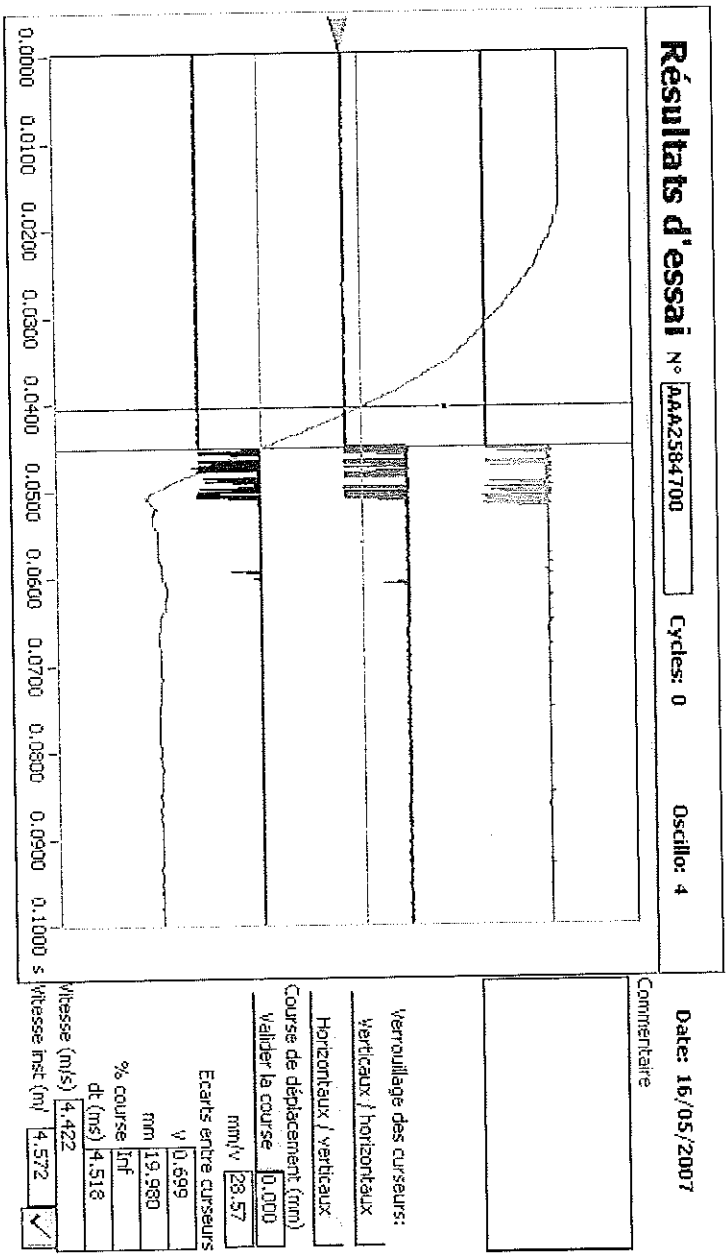
Speed close Earthing switch
Before 1000 operations



2047

OSCILLOGRAM N°4

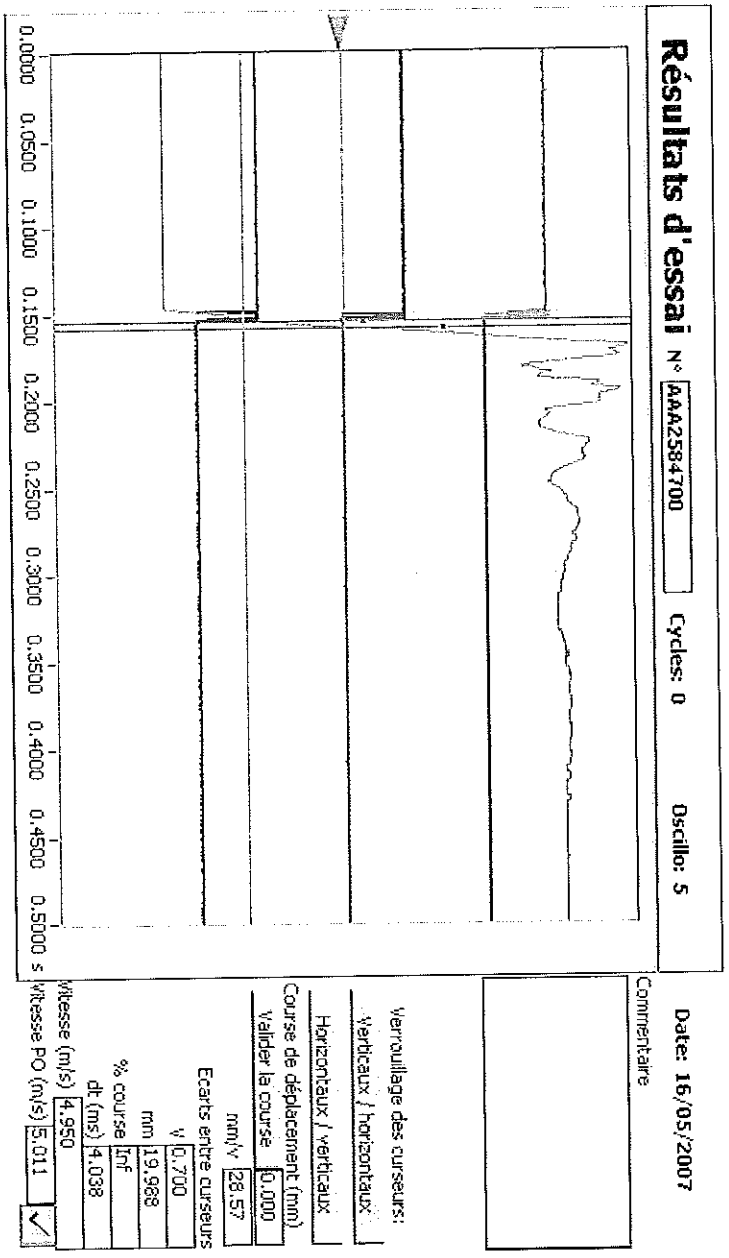
Speed close switch
Before 1000 operations



2044

OSCILLOGRAM N°5

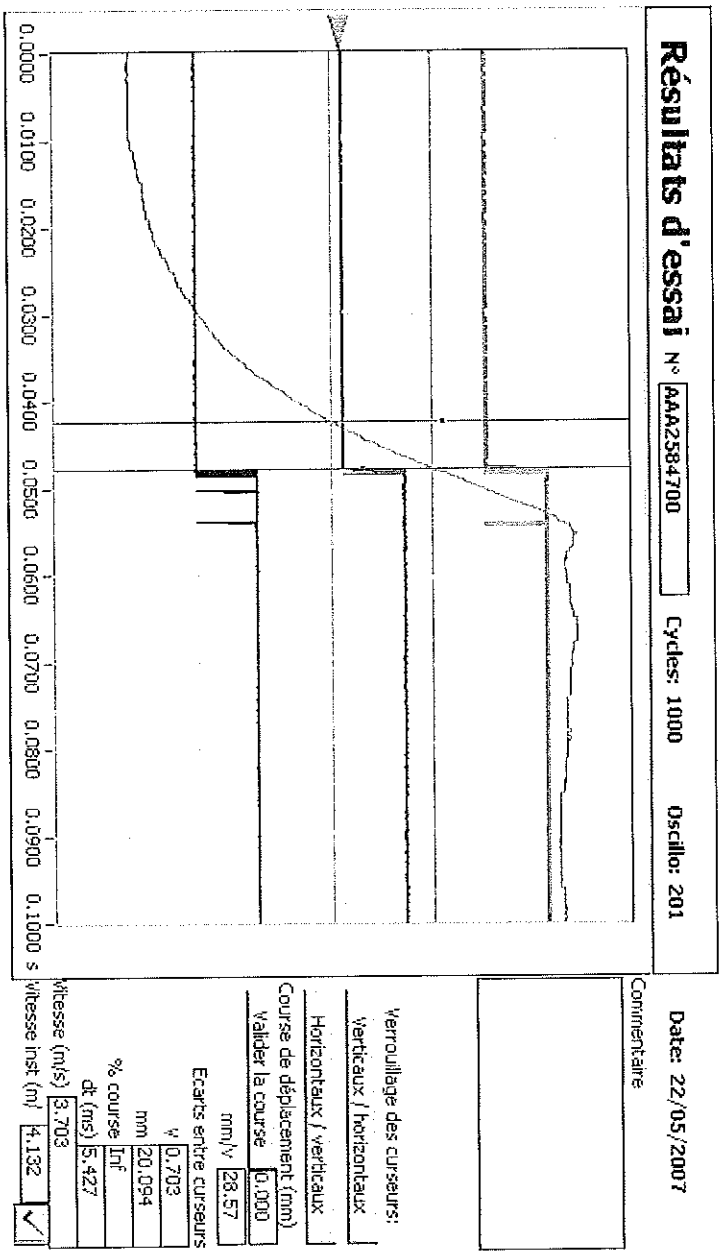
Opening close switch
Before 1000 operations



2045

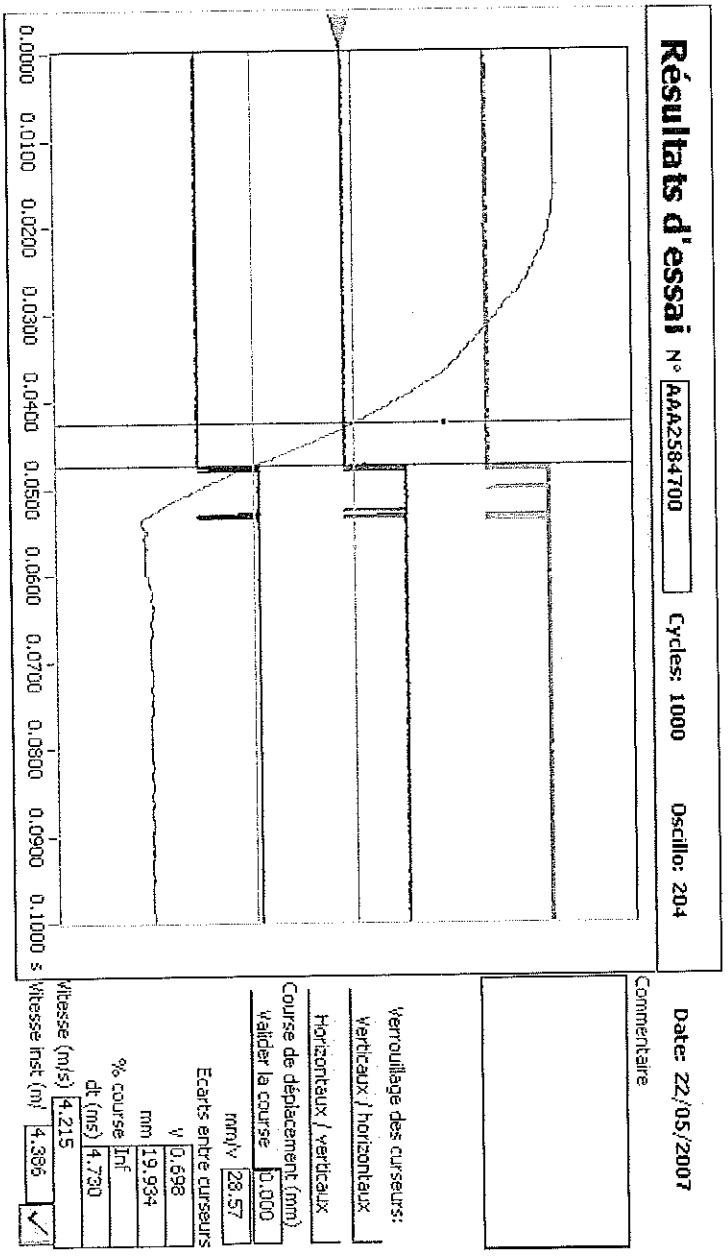
OSCILLOGRAM N°201

Speed close Earthing switch
After 1000 operations



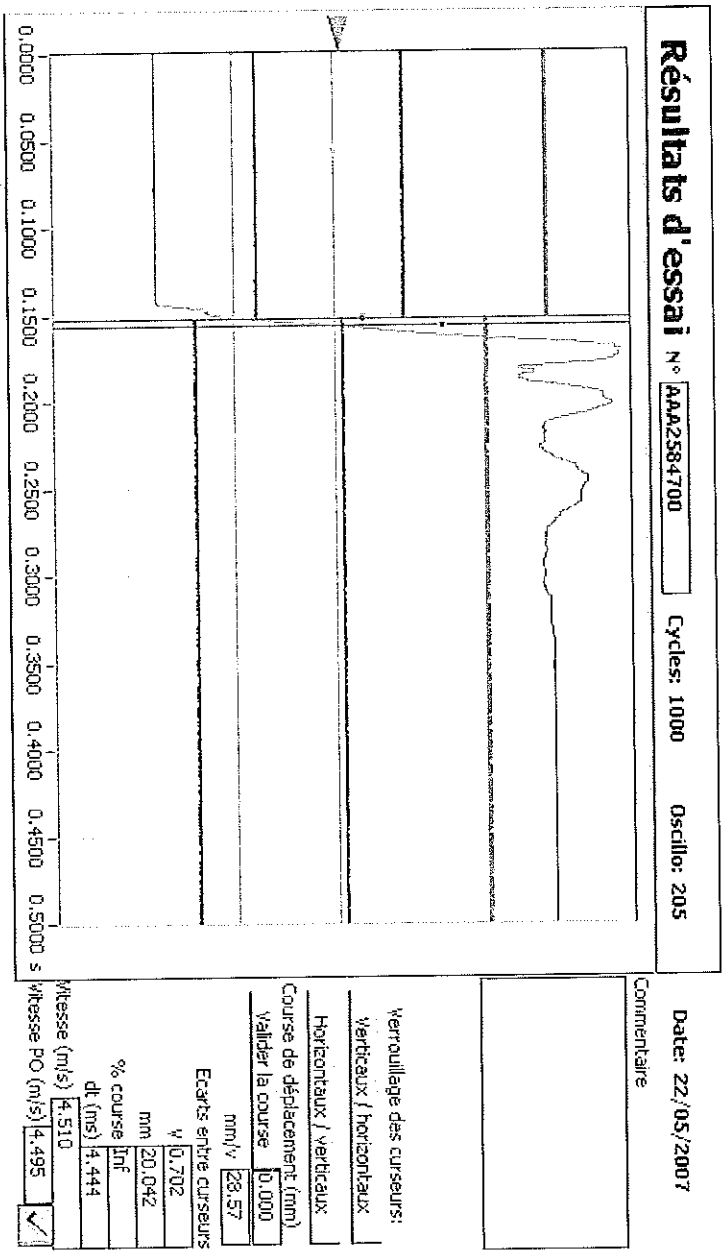
OSCILLOGRAM N°204

Speed close switch
After 1000 operations

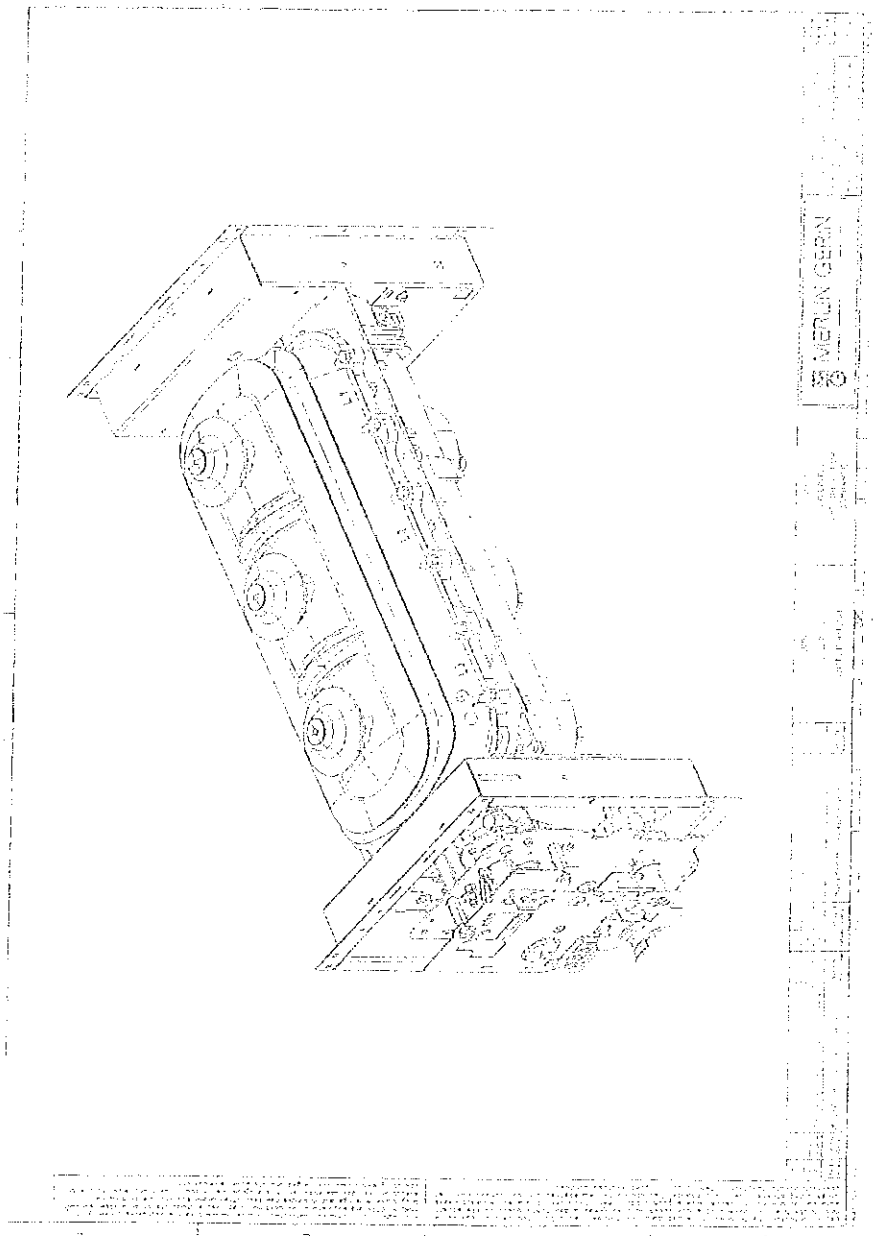


OSCILLOGRAM N°205

Open close switch
After 1000 operations



DRAWING



Eu-lab
Power European Laboratory

Schneider Electric

cofrac ESSAIS

Laboratoire d'essais moyenne tension
Schneider-Electric Industries SAS
ZAC Champ Saint Ange
F-38760 Varces

Test Report /*Rapport d'Essais* N° AAA26276A

To / *Pour* : D. CAILLET ST / 38V

Objective / *Objectif*

Test objective / *Objectif de l'essai* :
Environmental testing / *Essais d'environnement*

Test / *Essai*

Started date / *Début des essais* : 13/02/2008 Finished date / *Fin des essais* : 13/02/2008

Test performed / *Détails de l'essai* :
External mechanical impacts tests : 5 joules IK08 / *Essais aux impacts mécaniques : 5 joules IK08*

Standards / *Norme*
IEC 62271-200 / CEI 62271-200
IEC 62262-262 / CEI 6262-262

Apparatus / *Appareil* : Schneider Electric SM6 inclosure / Schneider Electric cellule SM6
Designation / *Désignation* : **QM**
Manufacturer / *Constructeur*: Schneider Electric SA – Rueil Malmaison - FRANCE

Items identification / *Identification de l'appareil*:

- Serial number / *Numéro de série* : 0714329L
- Rated voltage / *Tension assignée* (kV) : 24
- Rated normal current / Courant assigné (A) : 630
- Short-circuit breaking current / *Pouvoir de coupure* (kA) : 20

Samples / *Nombre d'appareil* : 1

Conclusion

Tests are in accordance with the standards IEC 62271-200
Essais conformes à la norme CEI 62271-200

Dept: LEMT 38V	Number of pages :
Written by : G. RAMI	Date :14/02/2008
Technical manager : B. VANDENBERGUE	Testing laboratory manager : J.M. ANSELMETTI

The performance of the apparatus tested and the results obtained are shown in the tables, oscillograms and photographs enclosed. This document relate only to the items presented for testing.
This test report can only be copied as a photographic facsimile in its entirety.
COFRAC Testing Section accreditation is only to certify that the laboratory complies with the technical competence required to carry out test on the product types covered by the accreditation

2050

Schneider Electric

CONTENT / *SOMMAIRE*

Schneider Electric

1 PRODUCT DESCRIPTION / *DESCRIPTION DU PRODUIT*

1.1 Detailed description of the item tested / *Caractéristiques de l'appareil:*

Manufacturer / *Constructeur*		: Schneider Electric Industries SA
Designation / *Désignation*		: Schneider Electric SM6 Circuit breaker
Number of poles / *Nombre de pôles*		: 3
Phase to phase / *Distance entre phases*	mm	: 375
Rated voltage / *Tension assignée*	kV	: 24
Lightning impulse withstand voltage *Tension de tenue aux chocs de foudre*	kV	: 125
Power frequency withstand voltage *Tension de tenue à fréquence industrielle*	kV	: 50
Frequency / *Fréquence*	Hz	: 50/60
Rated normal current *Courant en service continu*	A	: 630
Short time withstand current *Courant de courte durée admissible*	kA	: 20
Peak withstand current *Courant de crête admissible*	kÂ	: 52
Duration of short circuit *Durée de court-circuit*	s	: 1
Short circuit making current *Pouvoir de fermeture en court – circuit*	kÂ	: 52
Short circuit breaking current *Pouvoir de coupure en court – circuit*	kA	: 20
Interrupting medium / *Milieu de coupure*		: SF6
SF6 mass at / *Masse SF6* à 20°C	Kg	: 0.21
Operating mechanism type / *Type de commande*		: CIT
Drawing n° / *Plan n°*		: 3727000 ind H page 11 : 3728886 ind P page 20

2052

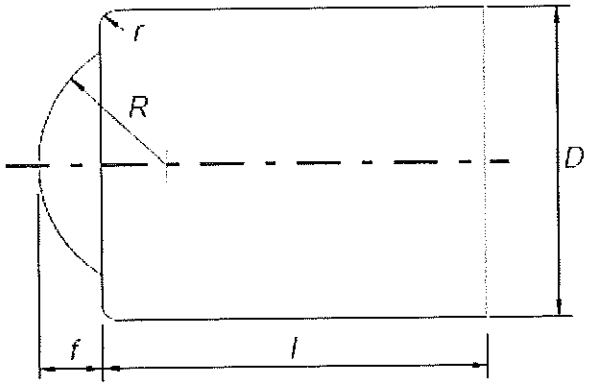
Schneider Electric

2 TEST DESCRIPTION / *DESCRIPTION DES ESSAIS*

- **Test conditions** :

The test apparatus consists basically of a pendulum rotating at is upper end in such a way as to be kept in a vertical plane. The axis of the pivot is at 1 meter.

Le moyen d'essai consiste essentiellement en un pendule pivotant à son extrémité supérieure, de façon à ne se mouvoir que dans un plan vertical. L'axe du pivot est à 1 mètre au-dessus du point de mesure.



Equivalent mass / *Masse équivalente*	Kg	1.7
Height of fall / *Hauteur de chute*	mm	300

In order to avoid secondary impacts, i.e rebounds, the hammer shall be retained after the initial impact by grasping the striking element whilst avoiding the arm so that distortion is prevented.

Afin d'éviter les impacts secondaires, le marteau doit être retenu en saisissant la pièce de frappe et non le bras pour éviter de le déformer.

Test done / Essais réalisés :

The impact energy is 5 joules / La *valeur d'énergie d'impact est de 5 joules*
The number of impacts is 3 / Le nombre d'impact est de 3

Tested parts

- *On the earth flap of cubicle's cover*
- *On the switch flap of cubicle's cover of*
- *On the windows of the cabble accen panel*
- *On the voltage indicating enclosure*

Parties testées :

- *Sur le portillon de terre du capot cellule*
- *Sur le portillon interrupteur du capot cellule*
- *Sur le hublot du panneau accès câble*
- *Sur le boitier de présence tension*

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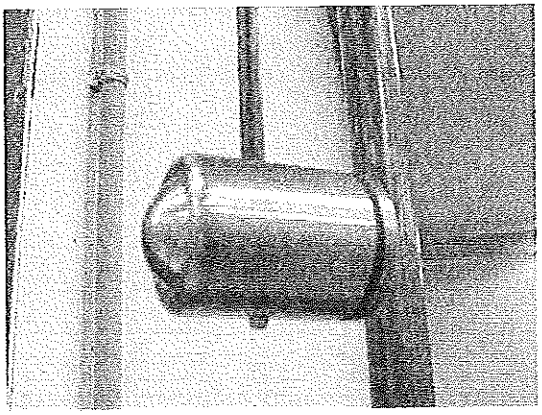
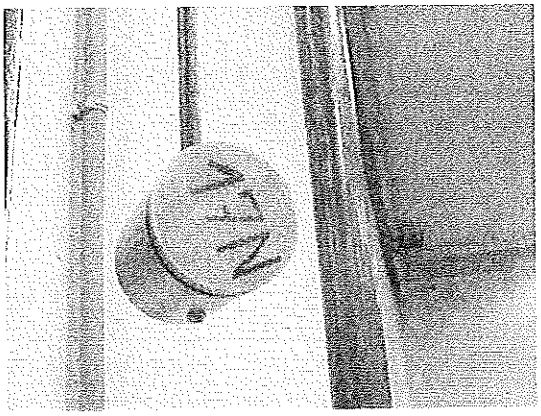
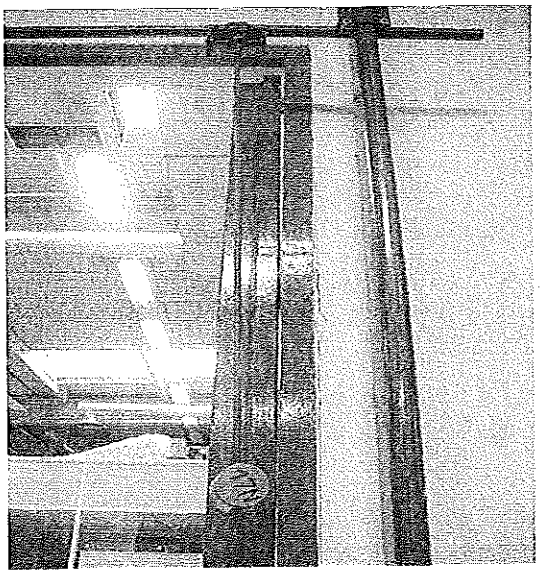
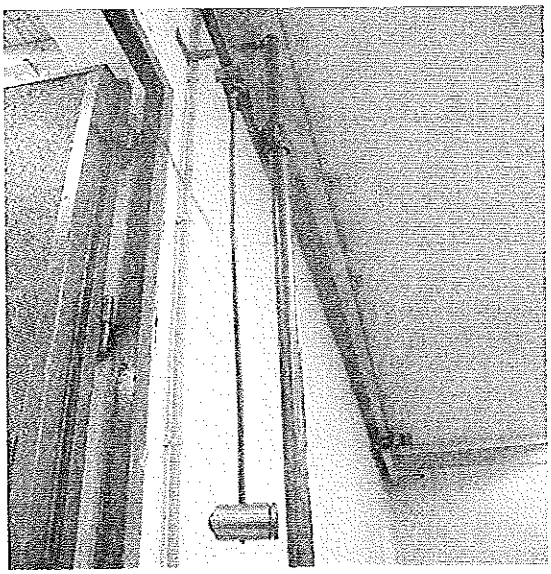
- **Test picture** / *Photo de l'essai* :





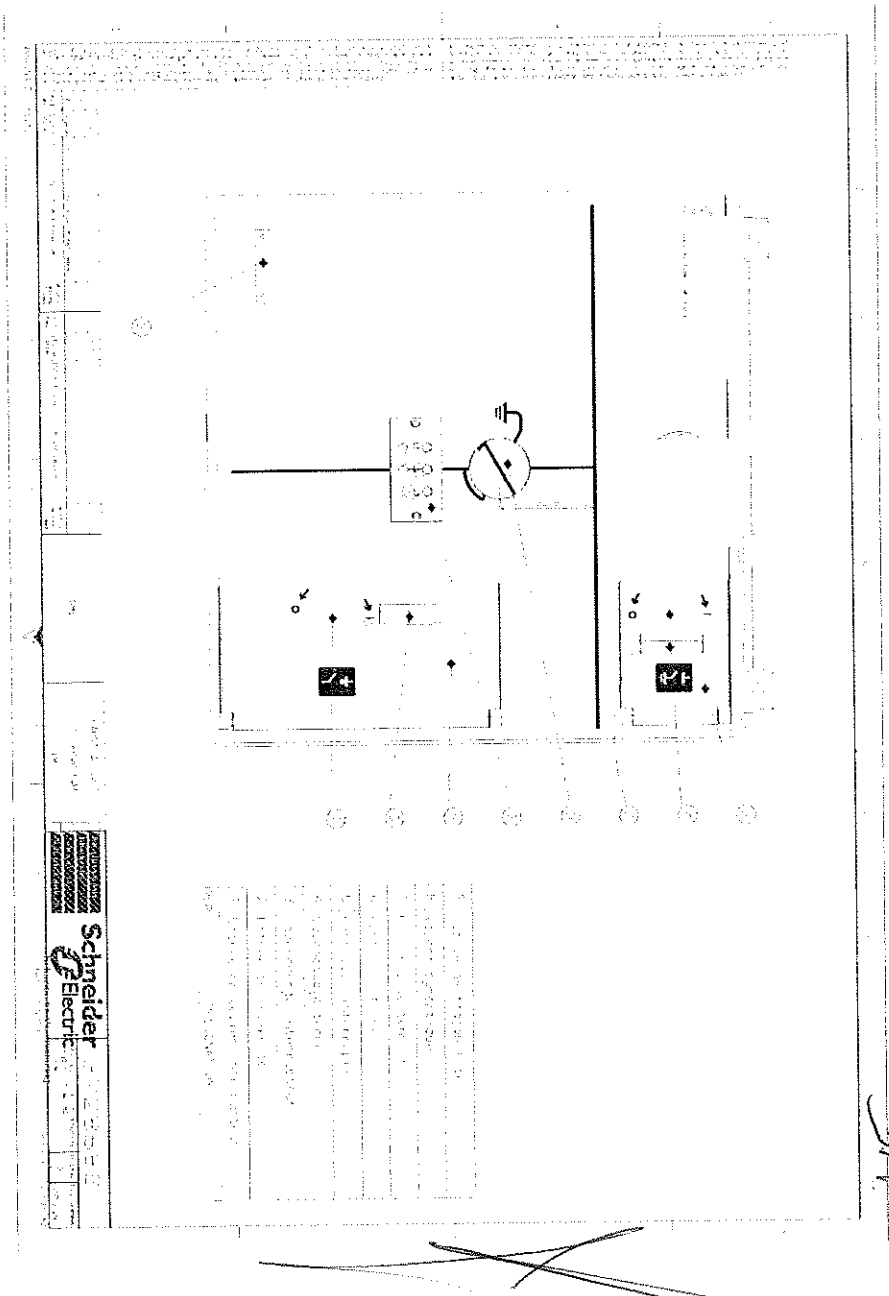




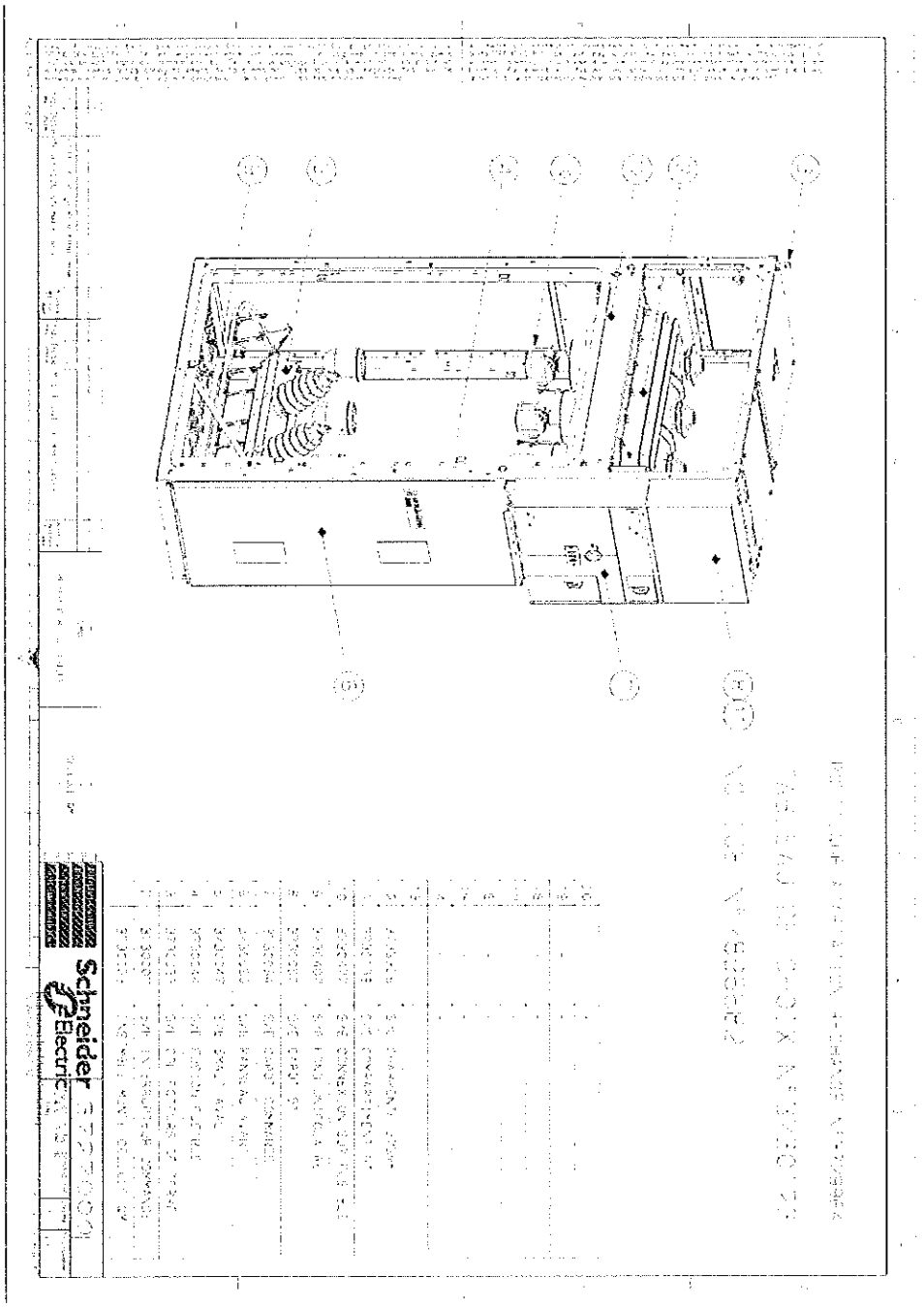
3 RESULTS / *RESULTATS*

Tests are in accordance with the standards IEC 62271-200
Essais conformes à la norme CEI 62271-200

4 DRAWING / *PLAN*



5 DRAWING / *PLAN*



Eu-lab
European Laboratory

Schneider Electric

cofrac ESSAIS

Laboratoire d'essais moyenne tension
Schneider-Electric Industries SAS
ZAC Champ Saint Ange
F-38760 Varces

Test Report /*Rapport d'Essais* N° AAA26277A

To / *Pour* : D. CAILLET ST / 38V

Objective / *Objectif*

Test objective / *Objectif de l'essai* :
Environmental testing / *Essais d'environnement*

Test / *Essai*

Started date / *Début des essais* : 13/02/2008 Finished date / *Fin des essais* : 13/02/2008

Test performed / *Détails de l'essai* :
External mechanical impacts tests : 5 joules IK08 / *Essais aux impacts mécaniques : 5 joules IK08*

Standards / *Norme*
IEC 62271-200 / CEI 62271-200
IEC 62262-262 / CEI 6262-262

Apparatus / *Appareil* : Schneider Electric SM6 inclosure / Schneider Electric cellule SM6
Designation / *Désignation* : **IM**
Manufacturer / *Constructeur.* Schneider Electric SA – Rueil Malmaison - FRANCE

Items identification / *Identification de l'appareil*:

- Serial number / *Numéro de série* : 0724237L
- Rated voltage / *Tension assignée* (kV) : 24
- Rated normal current / Courant assigné (A) : 630
- Short-circuit breaking current / *Pouvoir de coupure* (kA) : 20

Samples / *Nombre d'appareil* : 1

Conclusion

Tests are in accordance with the standards IEC 62271-200
Essais conformes à la norme CEI 62271-200

Dept: LEMT 38V	Number of pages :	
Written by : G. RAMI	Date :14/02/2008	
Technical manager : B. VANDENBERGUE	Testing laboratory manager : J.M. ANSELMETTI	

The performance of the apparatus tested and the results obtained are shown in the tables, oscillograms and photographs enclosed. This document relate only to the items presented for testing.
This test report can only be copied as a photographic facsimile in its entirety.
COFRAC Testing Section accreditation is only to certify that the laboratory complies with the technical competence required to carry out test on the product types covered by the accreditation

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Schneider Electric

CONTENT / *SOMMAIRE*

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1 PRODUCT DESCRIPTION / *DESCRIPTION DU PRODUIT*

1.1 Detailed description of the item tested / *Caractéristiques de l'appareil:*

Manufacturer / *Constructeur*		: Schneider Electric Industries SA
Designation / *Désignation*		: Schneider Electric SM6 Circuit breaker
Number of poles / *Nombre de pôles*		: 3
Phase to phase / *Distance entre phases*	**mm**	: 500
Rated voltage / *Tension assignée*	**kV**	: 24
Lightning impulse withstand voltage *Tension de tenue aux chocs de foudre*	**kV**	: 125
Power frequency withstand voltage *Tension de tenue à fréquence industrielle*	**kV**	: 50
Frequency / *Fréquence*	**Hz**	: 50/60
Rated normal current *Courant en service continu*	**A**	: 630
Short time withstand current *Courant de courte durée admissible*	**kA**	: 20
Peak withstand current *Courant de crête admissible*	**kÂ**	: 52
Duration of short circuit *Durée de court-circuit*	**s**	: 1
Short circuit making current *Pouvoir de fermeture en court – circuit*	**kÂ**	: 52
Short circuit breaking current *Pouvoir de coupure en court – circuit*	**kA**	: 20
Interrupting medium / *Milieu de coupure*		: SF6
SF6 mass at / *Masse SF6* à 20℃	**Kg**	: 0.21
Operating mechanism type / *Type de commande*		: CIT
Drawing n° / *Plan n°*		: 3727000 ind H page 24 : 3728886 ind P page 20

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2 TEST DESCRIPTION / *DESCRIPTION DES ESSAIS*

- **Test conditions :**

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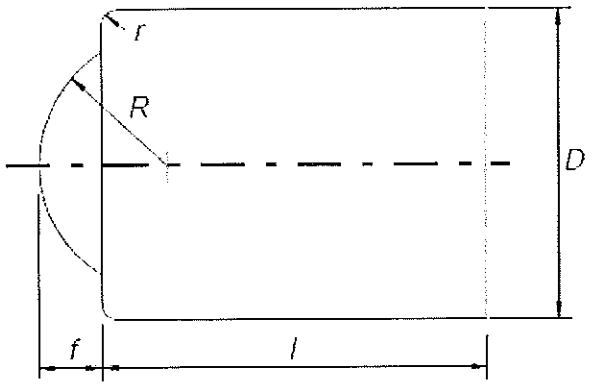

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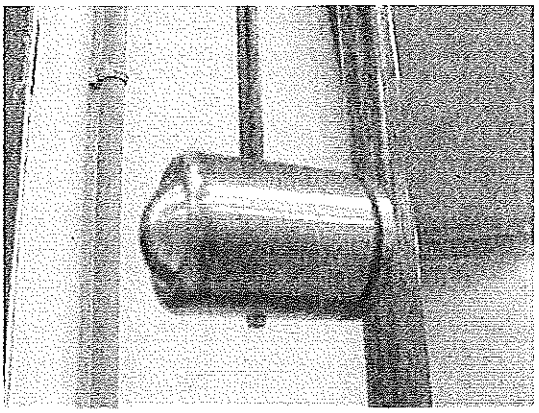
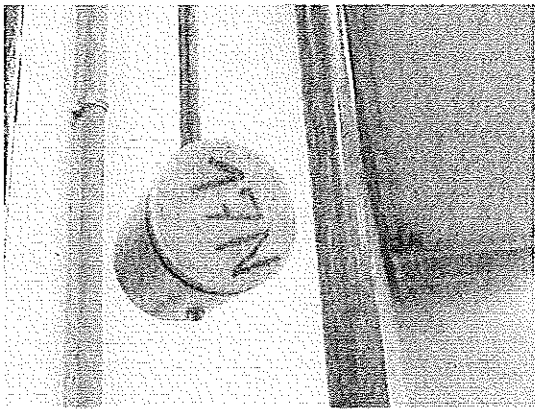
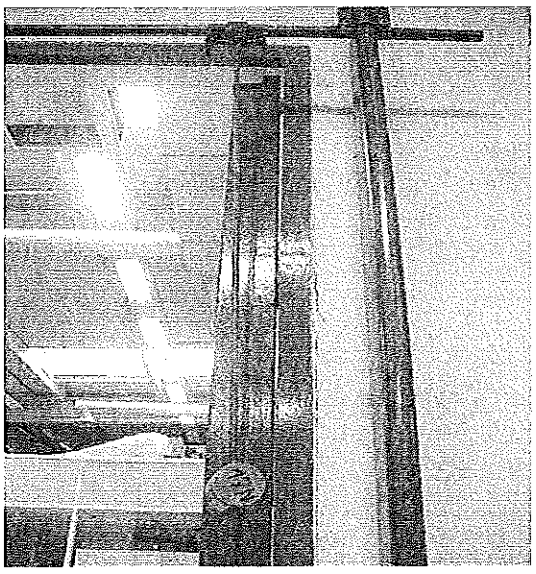
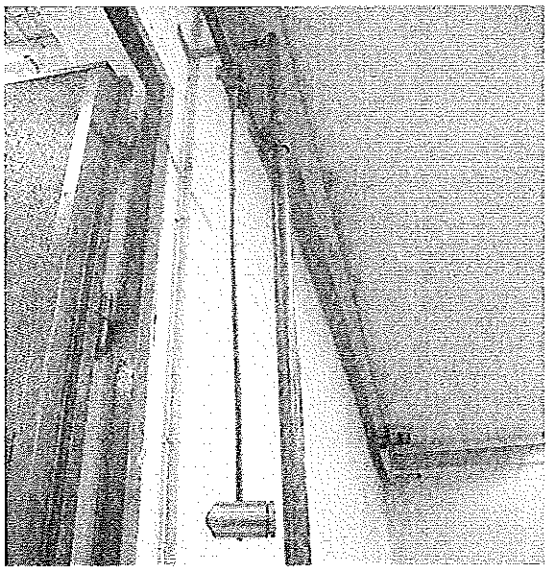
2060

- **Test picture** / *Photo de l'essai* :









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4 DRAWING / *PLAN*