

TEST REPORT

No. A200801199_002v1

L2E : Expertise and Testing Laboratory

Power and Functional Pole

Cancels and replaces test report No.A200801199_002

TEST REPORT No. A200801199_002v1

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

Equipment

Designation : High-voltage ring main unit

Reference : RM6 type NE-IDI

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

Trademark : SCHNEIDER ELECTRIC

Manufacturer : SCHNEIDER BEIJING MEDIUM VOLTAGE (SBMLV)

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

Date(s) of tests : 20/11/2008

Place of tests : VOLTA - Grenoble - FRANCE

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

Conclusion :

Satisfactory results. Class AFL validated.

The results obtained during the tests consigned in this test report justify the above assigned characteristics stated by the manufacturer.

This document results from tests carried out on a sample. It does not prejudice the compliance of the whole manufactured products with the tested specimen.

This report contains : 16 pages with : 1 oscillogram(s) and 1 drawing(s) of the apparatus.

Grenoble 29/07/2010

Test Manager
G. NIARFEIX

Technical Manager
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RATINGS OF THE HIGH-VOLTAGE RING MAIN UNIT ACCORDING TO IEC

Manufacturer	: SCHNEIDER BEIJING MEDIUM VOLTAGE (SBMLV)
Designation	: RM6 type NE-IDI

Interrupting medium	gas SF6 : ■■
Absolute pressure at 20°C	bar : 1.15

Number of poles	: 3
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Voltage	kV : 24
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Power frequency withstand voltage (1 min)	
- to earth and between poles	kV : 50
- accross open apparatus	kV : 60

Lightning impulse withstand voltage	
- to earth and between poles	kV : 125
- accross open apparatus	kV : 145

Frequency	Hz : 50/60
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Normal current	A : 630
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Short-time withstand current	
- main circuit	kA : 20
- earthing switch	kA : 20
- earth bar	kA : 20
- duration	s : 1

Degree of protection	: IP3X
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Metal-enclosed switchgear, composed of 3 bays and equipped with :

- 2 increased operating frequency switches with earthing switches on the network side.
- 1 circuit-breaker with earthing switch on the load side.

Continue

SWITCH ON THE NETWORK SIDE

Normal current	A : 630
Short-time withstand current	kA : 20
- duration	s : 1
Breaking capacity	
- mainly active load	A : 630
- closed-loop distribution circuit	A : 630
- no-load transformer	A : ≤ 1 and $2 \leq I \leq 5$
- cable-charging	A : 31.5
- line-charging	A : /
- earth fault	A : 95
- cable-and line-charging under earth faults	A : 55
Short-circuit making current	kA peak : 50
Number of operations with mainly active load	: 100 C/O at I_n
	20 C/O at 5 % x I_n

EARTHING SWITCH ON THE NETWORK SIDE

Short-time withstand current	kA : 20
- duration	s : 1
Short-circuit making current	kA peak : 50

CIRCUIT-BREAKER ON THE LOAD SIDE

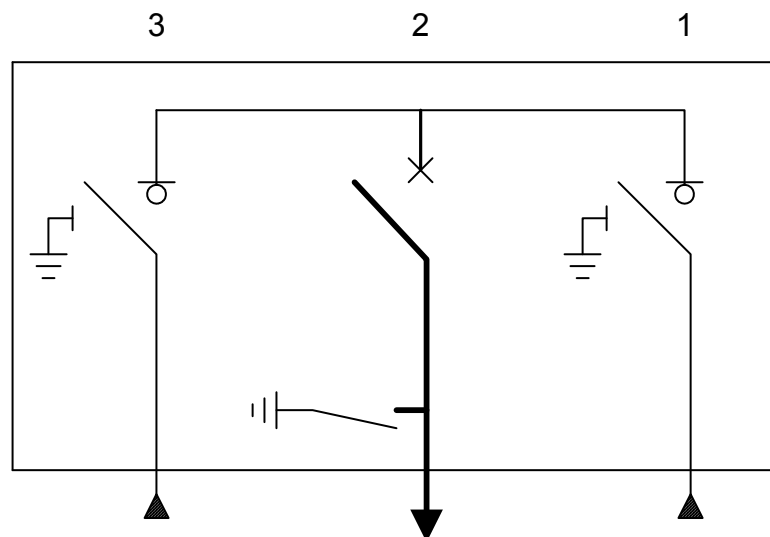
Operating mechanism	manual : with spring stored energy
- closing	: manual
- opening	: protection by self powered relay
Peak value of TRV	kV : 41
Rate-of-rise of TRV	kV/ μ s : 0.47
First-pole-to-clear factor	: 1.5
Normal current	A : 630
Breaking capacity	
- no-load transformer	A : ≤ 1 and $2 \leq I \leq 5$
- cable-charging	A : 31.5 and 50
Short-circuit breaking current	kA : 20
Percentage d.c. component	% : 27
Short-circuit making current	kA peak : 50

EARTHING SWITCH ON THE LOAD SIDE

Short-time withstand current	kA : 20
- duration	s : 1
Short-circuit making current	kA peak : 50
Drawing(s) No.	: 51008921 F0 rev. B0 (sheet 1/1)

DESCRIPTION OF SF6 METAL-ENCLOSED SWITCHGEAR

The SF6 metal-enclosed switchgear is made of 3 functional bays as shown on the plan below.



1-3 : Switches 630 A and earthing switches on network side.

2 : Circuit-breaker 630 A and earthing switch on load side.

RECORD OF PROVING TESTS

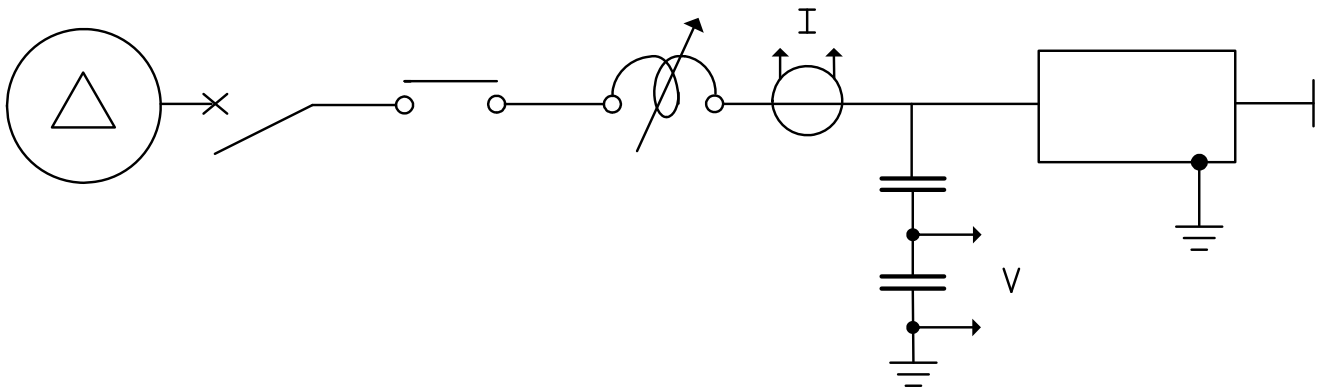
Apparatus No. : /

Test type and test-duty	Page
- Arcing test due to internal fault in the busbar compartment at : 20.7 kA - 1 s - three-phase	11 - 12

Manufacturer
Representative(s): Mr. Dominique CHABERT
Mr. Nicolas PUGETSCHNEIDER ELECTRIC
SCHNEIDER ELECTRIC

TEST CIRCUIT

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



CONDITIONS OF PROVING TESTS

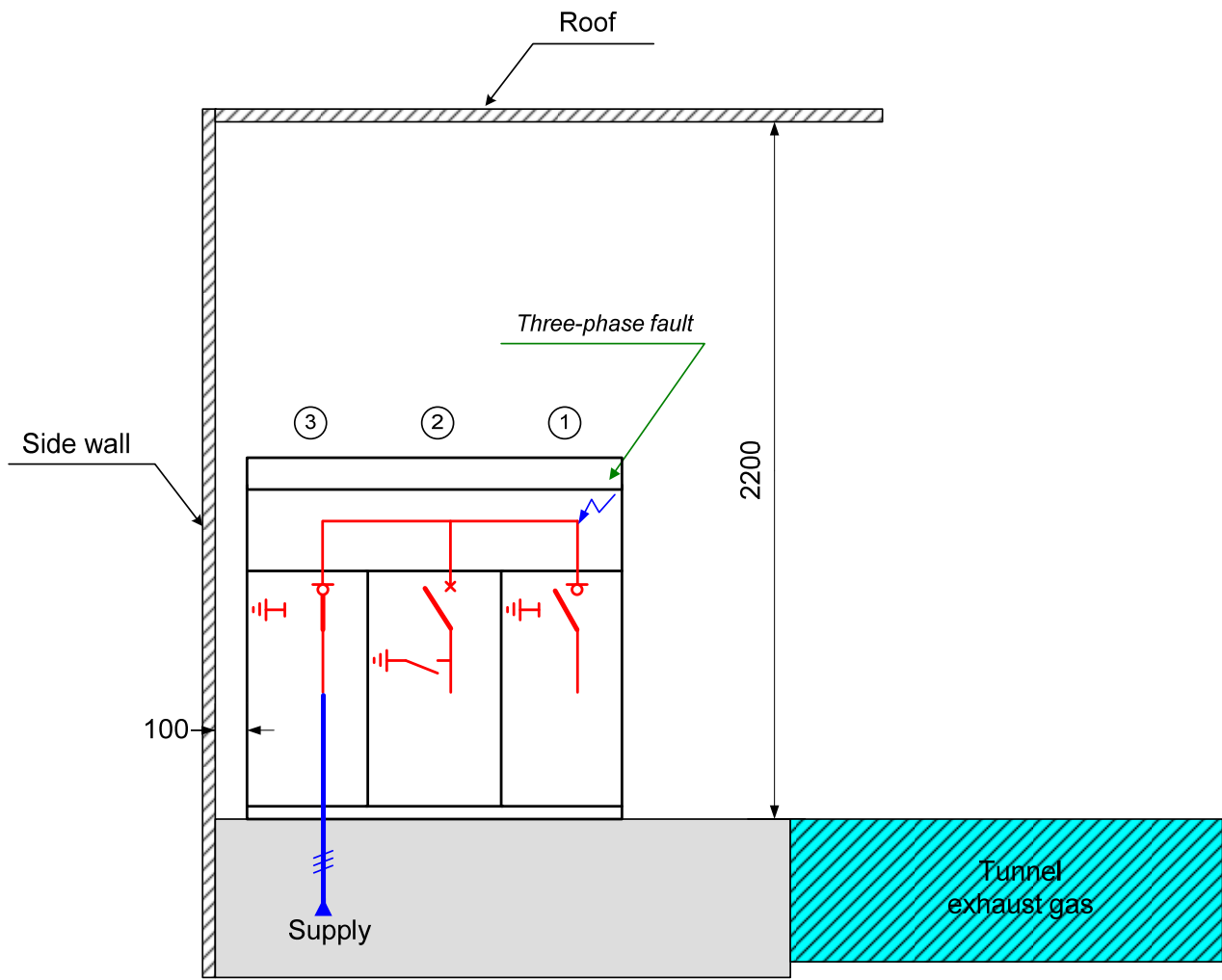
SUPPLY	Copper bar	mm x mm :
	Aluminium cable	mm ² : 185
	Copper cable	mm ² :
	Number per phase	: 1
INDICATORS IN BLACK CRETONNE	Cotton fabric	150 g/m ² : ■■
	Black cotton-interlining lawn	40 g/m ² :
	No indicators	:
RELATIVE PRESSURE INSIDE POLES	Pole 1	bar : Air at 0 bar
	Pole 2	bar : Air at 0 bar
	Pole 3	bar : Air at 0 bar

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

Functional unit under test : Busbar compartment

CONDITIONS OF INSTALLATION See pages 7 - 8 - 9

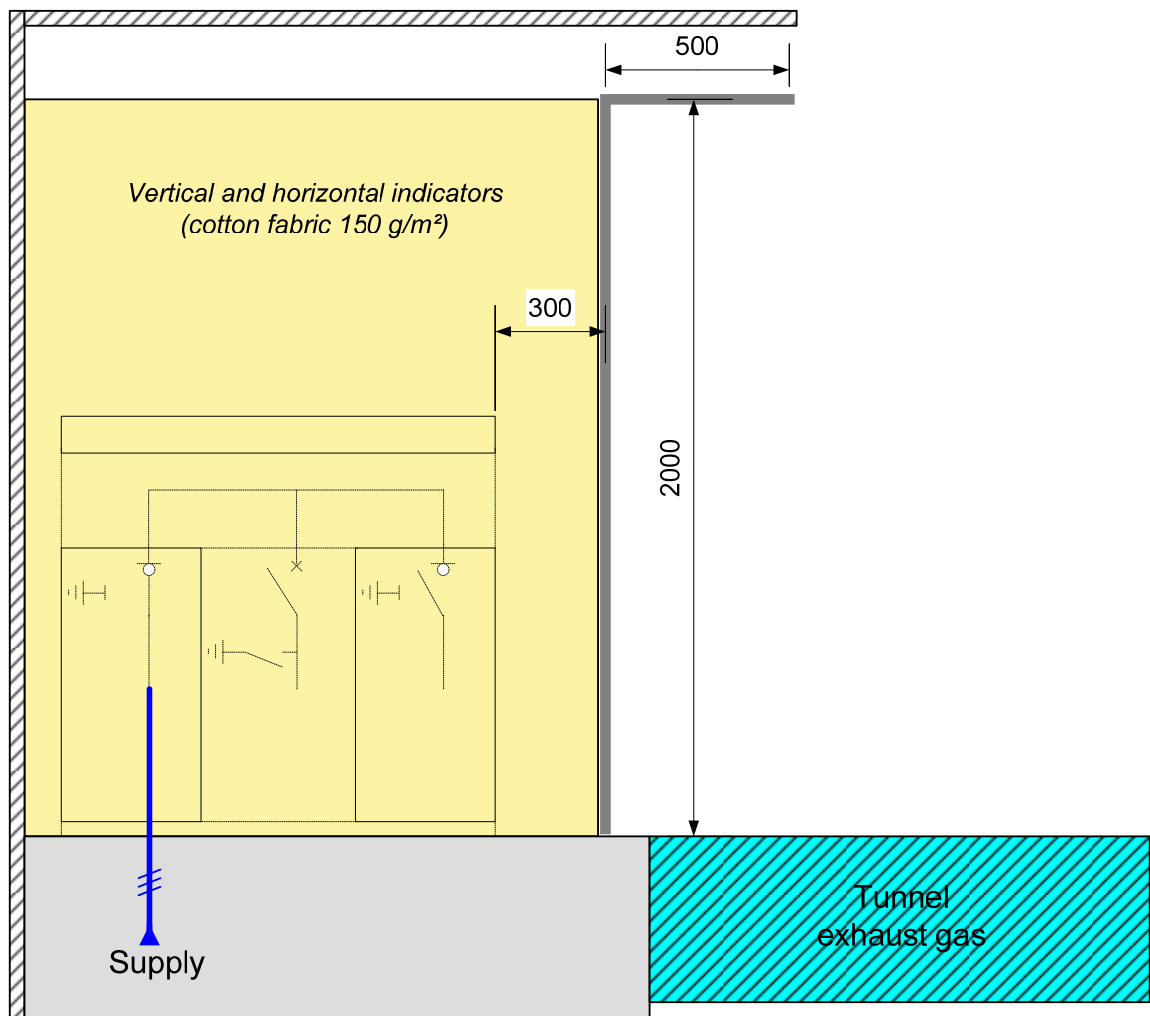
CONDITIONS OF INSTALLATION



Vue de face
Front view

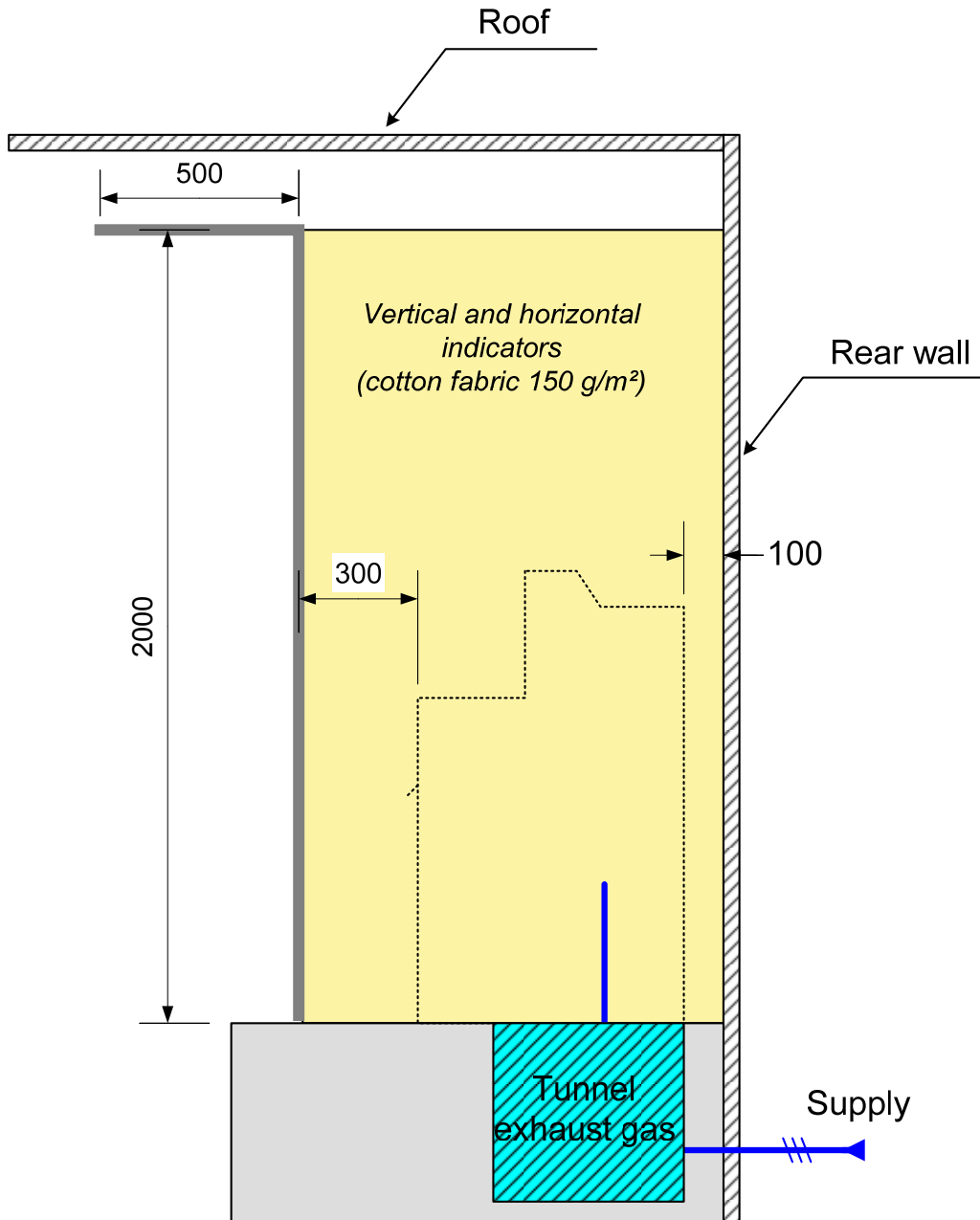
RM6 type NE-IDI

CONDITIONS OF INSTALLATION



Front view
RM6 type NE-IDI

CONDITIONS OF INSTALLATION



Side view

RM6 type NE-IDI

UNCERTAINTIES OF MEASURING CHAINS

Type of measurement	Range	Type of calculation	Total uncertainty (2 σ) 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 1.61 > 20 kHz 1.42
Voltage from CD or MCD	≥ 1000 V and < 10 kV	r.m.s. value (peak to peak / $\sqrt{8}$)	< 20 kHz 1.93 > 20 kHz 1.79
Voltage from CD or MCD	≥ 1000 V and < 10 kV	Peak value	< 20 kHz 1.55 > 20 kHz 1.35
Voltage from CD or MCD	≥ 10 kV	True r.m.s. value	< 20 kHz 1.61 > 20 kHz 3.08
Voltage from CD or MCD	≥ 10 kV	r.m.s. value (peak to peak / $\sqrt{8}$)	< 20 kHz 1.93 > 20 kHz 3.27
Voltage from CD or MCD	≥ 10 kV	Peak value	< 20 kHz 1.55 > 20 kHz 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

RESULTS OF THE ARCING TEST DUE TO INTERNAL FAULT

Apparatus under test : RM6 type NE-IDI
Busbar compartment

Test conditions : See pages 6 - 7 - 8 - 9

Apparatus condition before tests : - new : ■■
- having performed the previous tests :
- see photographs page : 13

Oscillogram		No .	08119901 - 0003		
Phase			1	2	3
Applied voltage		kV	9.18		
Frequency		Hz	50		
Peak current		kA	51.5	32.1	52.7
Current (r.m.s. value)	initial	kA	20.3	20.3	20.3
	middle	kA	20.0	20.3	19.9
	final	kA	20.0	20.3	19.8
Quadratic average		kA	20.1		
Current duration		ms	1060		
Thermal equivalent		kA	1 s	20.7	

Apparatus condition after tests : See following page.
See photographs page 14

ASSESSMENT OF THE TEST

The following criteria allow for the arcing effects listed in clause A.6 (Annex A) of the IEC standard 62271-200 (11/2003).

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

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)

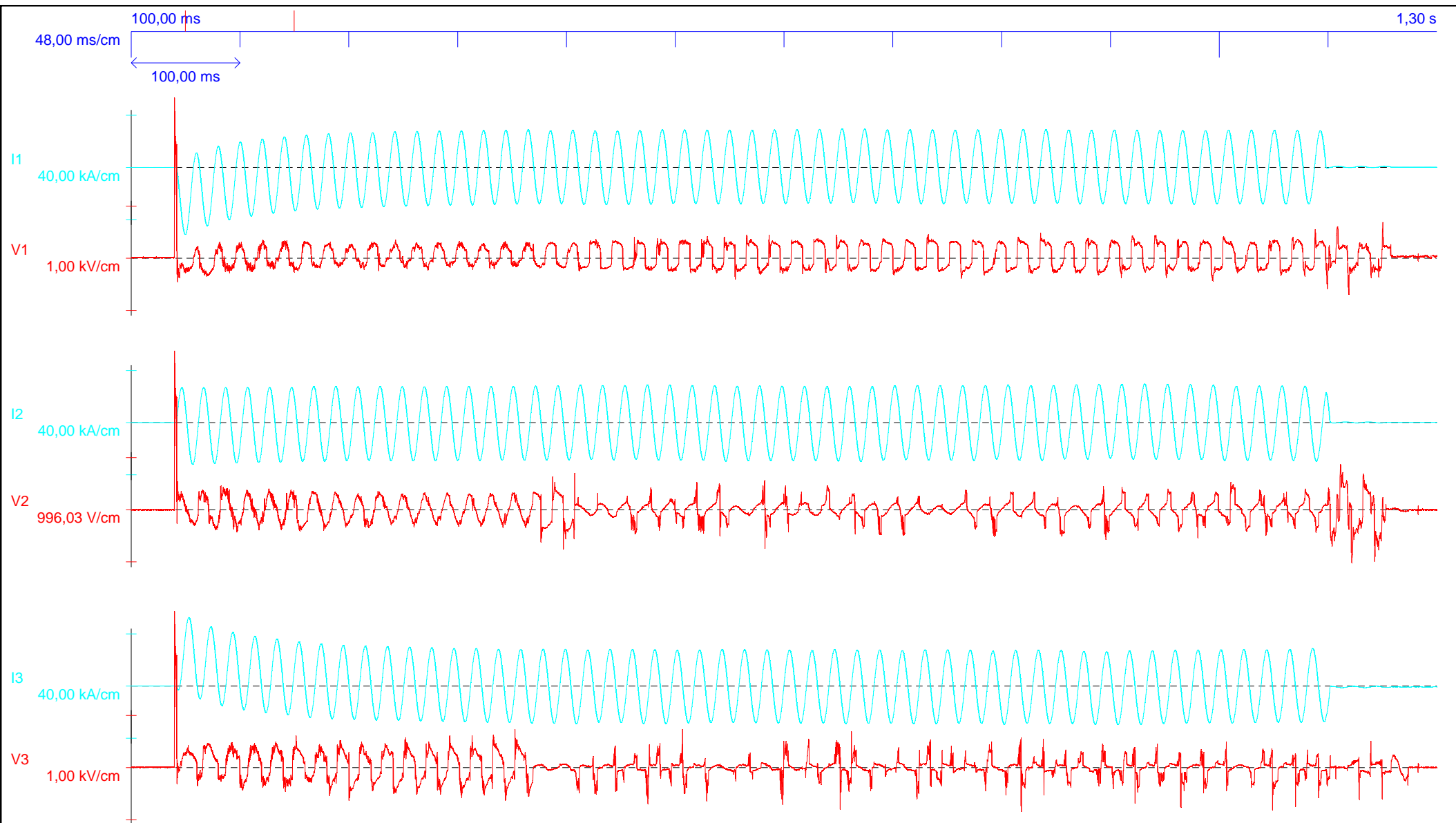
The enclosure remains connected to its earthing point.

PHOTOGRAPHS BEFORE TEST

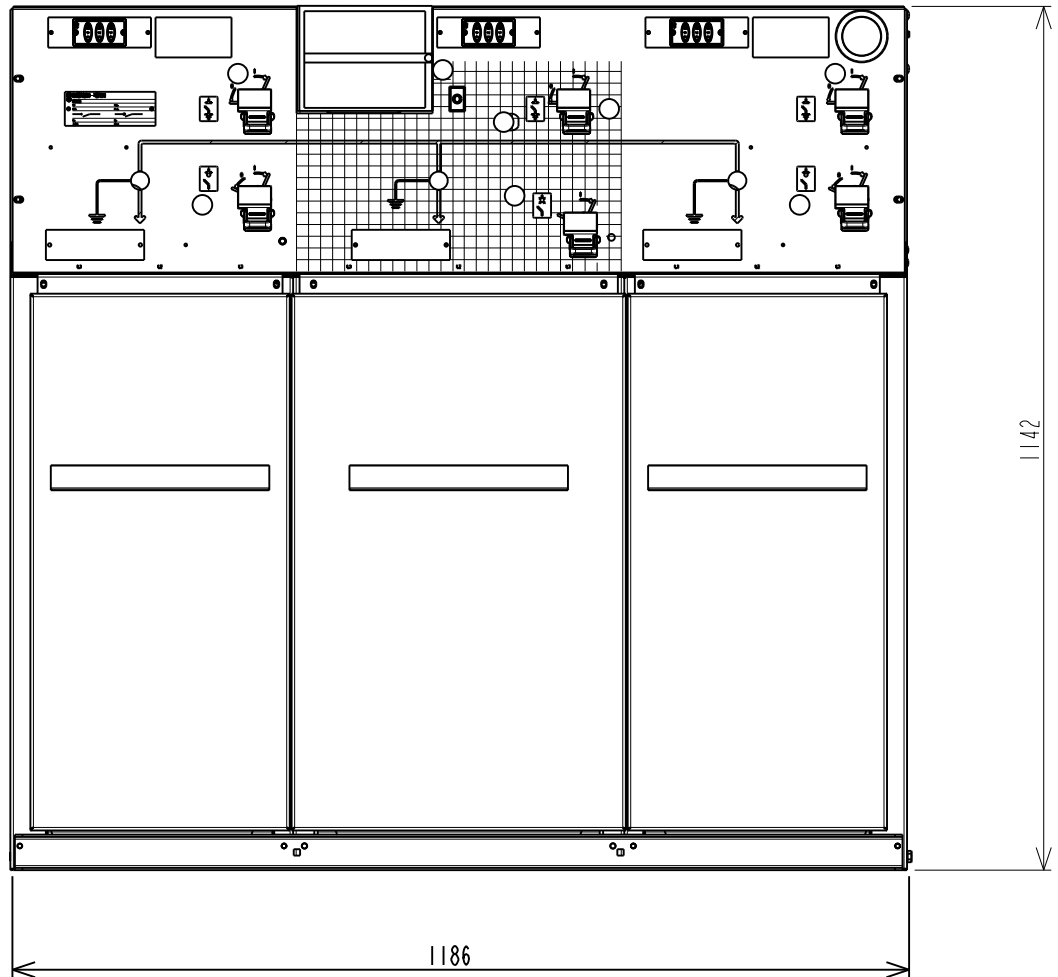


PHOTOGRAPHS AFTER TEST





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B0	05-10-05		Modification de la face avant	FAURE-C	FFC	ZACCARO	G.Z				
A0	31-03-98		Edition originale/first issue	MARECHAL	PHM						
Ind rev	Date date	Note appl appl.memo	Modification/modification	Nom/name Dessine/drawn	Visa	Nom/name Verifie/checked	Visa	Nom/name Approuve/approved	Visa	Archiv. micro- filmed	
Ech. scale	0.10	Projet project	RM6	POSTE RM6 NE-IDI -							
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