SUPPLIER	FRAMATOME	Supplier No : TS / EE – DC 0244
		P.O. No.

DOC.NO: 69817

EQUIPMENT SPECIFICATION

L.N.I. SYSTEM

" VITAL" SOURCE 220 V ac

PRODUCTION AND DISTRIBUTION BOARDS

REV	DATE	DR. By	CH. By	APPR. By	MODIFICATIONS	STATUS
Z4	2006-03-06	YS	[illegible]	EJK	MOD. 00118; DDR 518/05	ESKOM
Z3	2005-07-06	AF	MH	NWB	MOD. 00118-1; DDR 517/05	ESKOM
Z2	1991-02-06	SR	GW	BD	CANCELS DDR 124/90 REF. DDR 34/91	ESKOM
Z1	1990-10-25	MM	GW	BD	MOD. 87014-1/2; DDR 124/90	ESKOM

KOEBERG NUCLEAR POWER STATION

Eskom Generation

FRAMATOME - ALSTHOM ATLANTIQUE
SPIE BATIGNOLLES – FRAMATEG

CONTRACT No. OPN 11229

CONTRACTOR MEMBER	FRAMATOME	CONTRACTOR MEMBER Doc. No.	652 KBY 7201

DOCUMENT NUMBER	K	B	A	1	2	1	7	L	N	I	8	0	0	[redacted]	F	R	A	-	R	F	R	1
REV	Z1	Z2	Z3	Z4																		

FRAMATOME

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Document type : EQUIPMENT SPECIFICATION			
Class	Number	of pages:	20
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Document title

SYSTEM MANUAL

LNI

"VITAL" SOURCE 220 V ac

PRODUCTION AND DISTRIBUTION BOARDS

Title for information system L N I S O U R C E 2 2 0 V P R O D / D I S T B O A R

Rev	Date	Author (name, signature)	Checked by (name, signature)	Change désignation	Document status	Approved by (name, signature
Z4	2006-03-06	YS	MH.	MOD. 00118; DDR 518/05	ESKOM	EJK
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Z1	1990-10-25	MM	GW	MOD. 87014-1/2; DDR 124/90	ESKOM	BD

Contract : KOEBERG
Cost Unit :
File :

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T S E E D C 0 2 4 4

INTERNATIONAL IDENTIFICATION NUMBER

REVISIONS

REV	DATE	PARAGRAPH	PAGE	DRAWING	SCOPE OF THE REVISION
Z1	1990-10-25		9		MOD. 87014-1/2; DDR 124/90
Z2	1991-02-06		9		CANCEL DDR 124/90, REF. DDR 34/91
Z3	2005-07-06		4U1,9U1,10U 1,18U1,A1		MOD. 00118-1; DDR 517/05
Z4	2006-03-06		4,9,10,18,A1		MOD. 00118; DDR 518/05

LIST OF CONTENTS

FRAMATOME S.A. - Tour Fiat - 1, Place de la Coupole - COURBEVOIE (Hauts-de-Seine)

1. SUBJECT

This Specification sets out the supply, design and manufacturing requirements and supply boundaries for "Vital source 220 V a.c. production and distribution boards" for each of the KOEBERG reactor units.

FRAMATOME S.A. - Tour Fiat - 1, Place de la Coupole - COURBEVOIE (Hauts-de-Seine)

2. FUNCTION OF EQUIPMENT

The equipment shall supply energy at 220 Volts alternating current to the various control and monitoring devices under the conditions specified in Chapter 3, either from a direct current source, or, exceptionally from a 380 Volts alternating current power supply.

Since the control and monitoring devices form the very basis of safety in the nuclear reactor, the equipment supplied shall offer a very high degree of reliability.

FRAMATOME S.A. - Tour Fiat - 1, Place de la Coupole - COURBEVOIE (Hauts-de-Seine)

3. DESCRIPTION OF EQUIPMENT AND MANUFACTURING REQUIREMENTS

3.1. General

There shall be four sets per reactor unit, each consisting of:

- One inverter

  125 Volt dc power supply, output 220 Volts ac monophase, power 5 kVa.

- One transformer Z4

  Used to obtain 220 Volt ac from the 380 Volt triphase supply.

  The transformer shall be used as a stand-by for the inverter in case of loss of dc current of inverter failure.

- One static switch-over device

  This device shall allow automatic switch-over, without cutting off the "inverter-transformer", either during inverter failure or when 125 V dc voltage departs from the values indicated in sub-para. 3.2.2.1. during rapid or slow fluctuation.

  Switch-over back to "transformer-inverter" shall be effected manually at the operator's discretion.

- One 220 Volt distribution board

  Including the protective and signalling devices described in sub-para. 3.2.5.

N.B.

1) The four sets shall operate independently.

Z4 2) The output of the inverter and the inverter bypass transformer shall be in synchronism but not electrically connected.

3.2. Equipment characteristics ; description ; manufacturing requirements

3.2.1. Power plant operating conditions

- Normal conditions

Continuous round the clock operation.

- Ab normal conditions

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. 1 hour with 47 HZ < F < 48 HZ
. 5 hours max with 48 HZ < F < 51 HZ

3.2.2. Inverters

3.2.2.1. Input characteristics

The inverters shall be supplied with 125 V (rated) direct current from booster battery-rectifier sets.

Battery characteristics :

- number of cells : 59
- voltage rating : 125 V
- floating voltage : 128/131 V

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- charging voltage : 129/135 V
- endpoint voltage : 109,7 V

Battery charger characteristics :

- Normal conditions

. voltage rating : 120 V to 130 V
. ripple ratio : < 1 %
. ripple factor : < 2 %

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- Abnormal conditions

. voltage	:	100 V to 135 V
. ripple ratio	:	⩽ 3 %
. ripple factor	:	⩽ 5 %

Effective ripple ratio :

The effective ripple ratio can be defined by the following expression, given in French Standard NF C 53.220 - Appendix A.

$$\frac{U\sigma}{Ud_1} = \frac{\sqrt{\Sigma\ (Un)^2}}{Ud_1}$$

Where :

$U\sigma$ is the total effective ripple voltage.

Un is the effective value of the harmonic of rank n of the direct voltage residual ripple.

Ud_1 is the direct rated voltage of the rectifier set.

Ripple factor :

This factor can be expressed as follows :

$$F_o = \frac{Vcc}{V_o} \times 100$$

Where :

Vcc is the peak-to-peak value of the ripple voltage.

V_o is the mean value of d.c. voltage.

3.2.2.2. Output characteristics

Power : 5 kVA

Load can range from 0 to 5 kVA (values given for minimum and maximum power supply voltage).

- Normal conditions

. voltage rating	:	220 V (which can vary by as little as 0,95 V_n or as much as 1,10 V_n)
. harmonic distortion factor	:	< 5 %
. distortion factor	:	< 5 %
. frequency	:	50 Hz + 2 % - 2 %

Outside this range, the inverter shall be desynchronized vis-à-vis the power supply and shall only be resynchronized at between + 1 % and - 1 % of the frequency.

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- Abnormal conditions

. voltage	:	220 V + 15 % - 15 %
. frequency	:	47 < f < 53 Hz
. overall harmonic distortion factor	:	< 5 %
. distortion factor	:	< 5 %

In transient conditions :

For instantaneous load variations of ± 50 % compared with initial power of between P_N and 30 % of P_N, where the power supply voltage of the inverters is between + 10 % and - 15 %, the outlet voltage shall return to ± 10 % of its original set value within 300 milliseconds and to ± 2 % of its original set value within 600 milliseconds, provided that instantaneous power does not exceed power P_N.

Harmonic distortion factor :

$$T = \sqrt{\frac{h2^2 + h3^2 \ldots + h_n^2}{h1^2 + h2^2 \ldots + h_n^2}}$$

Where :

h1 = amplitude of fundamental

h_n = amplitude of harmonic of rank n.

Distortion factor :

The following definition has been taken from issue 359 of the CEI.

"Distortion can be defined such that the wave is situated inside the surface bounded by both curves".

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$$\left.\begin{aligned} Y_1 &= (1 + \beta)\, A \sin \omega t \\ Y_2 &= (1 - \beta)\, A \sin \omega t \end{aligned}\right\}$$ for sine wave β is equal to 0.

3.2.2.3. Efficiency

Bearing in mind that power supply voltage is fixed at 125 Volts, minimum efficiencies at the various loads shall be as follows :

- 55 % at 1/4 rated load,
- 70 % at 1/2 load,
- 80 % at full load.

3.2.2.4. Description and manufacturing requirements

Each inverter shall comprise a power circuit with :

- a mutator controlled by varying the triggering angle of the thyristors,
- protective devices for diodes and thyristors,
- an output filter which enables the required distortion rate to be obtained and defect currents to be reduced,
- a filter located between the inverter and its d.c. supply, if required,
- a manual control for inverter-transformer switching,
- a programming device, controlled by a switch, which makes it possible :
  - . to close the input contactor,
  - . to transmit pulses in phase to the thyristors,
  - . to dephase progressively trigger pulses until the rated voltage is obtained at output,
  - . to trigger the thyristors.

Each item of equipment shall also include:

- Meters for measuring dimensions and characteristics, including inter alia:

  - power supply voltage : 1 voltmeter
  - power supply current : 1 amperemeter
  - output voltage : 1 voltmeter
  - output current : 1 amperemeter

- Indicator lights on the front of the cabinet:

  - Red : voltage of 125 Vc
  - yellow : mutator actuated
  - transparent : internal defects

- Circuits for processing equipment protection instructions and alarm signals, including inter alia:

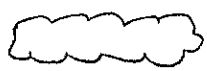
  Isolation of inverter in case of internal defects, or in case the thresholds for current supplied by the inverter and for inverter power supply voltage are exceeded.

- During boost charging periods, inverter protection is afforded by overvoltage detection balance apparatus which disconnect the inverter.

Except in cases where equipment is affected, inverter defects shall be grouped together as a single item of data "inverter production board defect' and transmitted to the control room alarm and KIT system terminal strips of the distribution board (Appendices A1 and F1).

- contactor position load pick-up inverter,
- contactor position load pick-up mains,
- by-pass distributor position.

Refer to diagram Appendix A, page A1 / A1.

3.2.3. Transformer  

Used to obtain 20 V "Vital" from 380 V ac power supply.

Transformer parameters:

- dry type,
- single-phase coupling,
- rating 5kVA,
- 380 / 220 V,
- built as per NFC 52100 (Similar to IEC 76).

Input characteristics:

- Normal conditions

  Voltage: Un + 10 % - 15 %

  Voltage rating 380 V effective.

  Frequency: 49 < f < 51 Hz

  Nominal value 50 Hz.

- Abnormal conditions

  Voltage: Same as normal conditions,

  e.g. Un + 10 % - 15 %

  Frequency: 47 < f < 51 Hz

Output characteristics under normal or emergency conditions:

Power	: 5 kVA
Load	: varying from 0 to 5 kVA (under conditions stipulated below)
Voltage	: V_N = 220 Volts + 10% –15% monophase
Frequency	: refer to power supply frequency

Transformer – Regulator transient conditions: Z4

NOTE: REGULATOR IS CURRENTLY BYPASSED

For instantaneous variations in load of ± 50% compared with an initial power of between P_N and 30% of P_N, where the voltage of inverter power supply is between + 10% and – 15%, the output voltage shall return to + 10% –15%, the output voltage shall return to ± 10% of its original set value within 300 milliseconds and to ± 2% of its original set value within 600 milliseconds, provided that instantaneous power does not exceed power P_N.

3.2.4. Solid state switch-over device

Characteristics:

This device shall ensure rapid switch-over between both transformer-inverter sources under the previously mentioned conditions of use (power, voltage, frequency) and within a time limit less than or equal to 5 milliseconds.

Description :

The device shall include :

a) an isolation device to isolate the steady-state contactor from the mains and from consumption,

b) a steady-state contactor consisting of two thyristors mounted in opposition to each other,

c) a control and synchronization device including, inter alia :

- one control for frequency adjustment of the inverter with the transformer,

- one regulator for phasing the inverter with the transformer,

- one device used to control closure of the steady-state contactor when the inverter voltage drops below the allowances ; the device shall also be used to control opening of the steady-state contactor when the voltage returns within the allowances, (for operator controlled operations, see para. 3.1.),

- output contactors inverter load pick-up and mains load pick-up.

3.2.5. 220 V distribution

3.2.5.1. Each item of equipment shall include on the left hand side of its locking devices a 220 V vital distribution set, consisting of the following :

- 6 possible leadouts, of which one part shall be used and the other part kept in reserve, as indicated in the distribution boards in Appendices B, C, D and E.

Circuit breaking equipment shall take the form either of removable circuit breakers or secured circuit breakers. In the latter case the circuit breaker shall be dependent on a general cut-out switch.

Each leadout may be locked off individually by a padlock or by any other means.

Protection shall be provided by putting "STOP. CIRCUIT" type minibreakers, calibrated 8A - 3In, in series with the above-mentioned circuit breakers, to insure trip-out selectivity at low current levels.

The "STOP-CIRCUIT" shall not be fitted for "SIP" outputs since the location is obstructed by a cover.

A monitoring cell with all the necessary equipment for detecting defects : maximum and minimum voltage relays, insulation measurement equipment (if possible, MESURISOL RCN type by DELLE-ALSTHOM). The production-distribution board shall be designed for easy connection of lead-in and lead-out wiring, and shall offer easy access (assembly and maintenance). (Refer to diagram in Appendix F, page F1/F1).

3.2.5.2. Characteristics

- Dielectric strength 2000 Volts 50 Hz 60 seconds.

3.2.5.3. Bipolar circuit breakers

The Manufacturer shall give FRAMATOME detailed information about each component, in particular, their trigger curves to check the selectivity of the protective devices.

3.2.6. General requirements

The equipment shall be placed in a closed cabinet. The cabinets shall be installed in a room with the following ambient conditions :

- maximum short-duration temperature	: + 40°C
- mean temperature over 24 h	: + 35°C
- mean annual temperature	: + 25°C
- minimum temperature	: + 15°C
- relative humidity	: 70 %
- degree of protection	: IP 205 (as per IEC Standards 439 and 529)

Equipment shall be fitted in the cabinets so as to allow :

- separate access to distribution and production,

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- easy access to equipment to facilitate quick replacement, if necessary,

- a physical separation between the emergency part and the inverter which allows live troubleshooting when the inverter is in failure or out of service,

- easy access to the various points of measurement,

- suitable gaps to be left between actuated parts and between the earth, so as to ensure proper operation of the thyristors and high performance during the dielectric strength tests,

- particularly easy connection of wiring coming from the outside (wiring shall be connected in the upper part of the cabinets),

- proper distribution of natural ventilation,

- locking by means of Ronis locks (N° to be indicated at a later date),

- equipment is designed in such a way that there is an internal equipotential line conductor for all non-energized metal parts. A terminal is provided for earthing of this line,

- all of the equipment to be carefully selected, leaving ample sizing allowances, so that it can operate within the ordinary characteristics for which it has been manufactured, the equipment being designed for no-break duty.

All the equipment, including the various items on the front door and inside the cabinet, shall be referenced. The system used for referencing shall be submitted for FRAMATOME's approval.

Equipment shall be supplied with tags in English. Adequate space shall be provided for Afrikaner equivalents.

Location

- Reactor 1 units :

  . LNA - Room W508 - level + 11,500
  . LNB - Room W506 - level + 11,500
  . LNC - Room W503 - level + 11,500
  . LND - Room W502 - level + 11,500

- Reactor 2 units :

  . LNA - Room W548 - level + 11,500
  . LNB - Room W546 - level + 11,500
  . LNC - Room W543 - level + 11,500
  . LND - Room W542 - level + 11,500

Approximate dimensions

- Height : 2060 mm
- Length : 1270 mm
- Width : 900 mm
- Weight : 700 kgs
- Secured by halfen bars, distance between axes : 760 mm

Penetration of cables in the upper part of the cabinet by means of stuffing box plates

3.3. Standards - rules, regulations and requirements

Equipment shall comply with the following standards, rules, regulations or requirements, insofar as they are applicable :

3.3.1. UTE Standards

Prefabricated low voltage assemblies : UTE 63410 (IEC 439)

Degree of protection obtained by envelopes : NFC 20010 (IEC 529)

Ability to withstand heating and dielectric qualities of component parts

contactor : NFC 63110 (IEC 158-1)
" " circuit breaker : NFC 63120 (IEC 157-1)
transformer : NFC 52100 (IEC 76)

3.3.2. General technical documents

Earthing of equipment : KBA 00 15 M00.007.

3.3.3. Contractual FRAMATOME documents

- Paint coating procedure and Appendix (products and colours) KBA 00.22.E.01-012 and KBA 00.22.E.01-021
- General seismic strength test specification KBA 12.22.E.02.008
- Turbine missile strength test specification KBA 12.22.E.02.007
- Packing, storage and shipping of equipment KBA 00.22.E.01.010
- OR 009 Rev. 2 : "General document specification - Requirements for export project supplies" with appendices applicable to the KOEBERG contract.
- General Conditions and Clauses - 1st March 1975 issue
- Special conditions for General Conditions and Clauses Report TA/CG/086/010/020 Rev. 2
- Q.M.M. 76.5105, Ref. 5 : "Quality requirement specification for KOEBERG"
- Q.P. 8454, Rev. 3 : "Quality Assurance Programme specification. Export contracts, Category Q1".

3.4. Quality and safety

Quality class shall be Q1.

Safety class shall be 1E .

The equipment is covered by this specification seismic class 1.

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4. SCOPE OF SUPPLY AND SUPPLY BOUNDARIES

4.1. Hardware

4.1.1. The following are the Manufacturer's responsibility

The supply boundaries encompass the various circuitry and equipment mentioned in the Specification and all the auxiliary equipment required for proper operation, repair, transportation, delivery, installation and adjustment of the equipment.

4.1.2. The following are not the Manufacturer's responsibility

- iron bars required to secure the equipment to the ground,
- cables and wiring leading to or terminating at items of equipment.

Nevertheless, the iron mountings intended to secure cables and wiring inside the equipment shall be provided.

4.2. Software

4.2.1. The following are the Manufacturer's responsibility

- Detailed design of equipment defined in this specification to make possible drafting of documents listed in paragraph 6,
- calculations to subsidiate selection of components,
- calculations substantiating the equipment's ability to withstand short circuiting,
- tests listed in Chapter 5,
- packing for shipment,
- storage, if necessary,
- transportation to a French port, in compliance with Specification KBA 00 22 E 01 010.

4.2.2. The following are not the Manufacturer's responsibility

- transportation from the French port to the KOEBERG site,
- installation, embedding of equipment etc. (These services will be dealt with in a separate Specification).
- laying down and connection of cables and wiring coming from outside the equipment.

5. EXAMINATIONS AND TESTS

F The examination and tests are thi following :

Post-assembly examinations and tests

5.1. Notification

No official test may begin without FRAMATOME's prior agreement of the procedure proposed by the Manufacturer.

The Manufacturer shall inform FRAMATOME ten days before the date scheduled for any examination or test stipulated below.

5.2. Pre-production equipement

The Manufacturer shall submit to FRAMATOME, upon consultation, a full list and procedure of standard tests to be performed, including seismic strength tests or test certificates which have been made out for identical equipment.

5.3. Mass production

The Manufacturer shall submit to FRAMATOME, upon consultation, a full list and procedure of tests to be carried out.

Each item of equipment shall be individually tested and shall undergo every test for which it is scheduled.

The tests shall be conducted in such a way that the equipment is subject to actual working conditions, without any on-site modification being carried out.

The Manufacturer shall provide test certificates for sub-assemblies or components as stipulated in the manufacturing operations and surveillance check list (L.O.F.C.).

5.4. In-factory electrical tests

In addition to tests listed hereafter, the Manufacturer shall carry out all tests intended to prove that all functions and performance mentioned in the present specification are met as required.

The main tests shall be as follows :

1) Finish check.

2) Dielectric strength test of various circuitry :

- Main circuit : 2000 Volts effective – 50 Hz for one minute,
- Auxiliary circuits : 125 V = 2000 Volts – 50 Hz effective for one minute

  48 V = 500 Volts effective 50 Hz for one minute.

3) Insulation resistance measurement: > 100 MΩ AT 500 dc
4) Earth continuity check.
5) Heat buildup tests.
6) Inverter electric running tests.
7) Inverter bypass supply availability test. Z4
8) Protection and signalling channel check.
9) Distribution PCB tests.

NOTE: Test 5 is a type test. All others are routine tests.

In the event of equipment which has already been subjected to type tests, a compliance certificate shall be issued. This certificate shall exempt the Manufacturer from conduct of these tests.

Where type test reports exist, they shall be submitted to Eskom for considerations in lieu of the need to conduct further type tests.

6. MANUFACTURER'S DOCUMENTS

The Manufacturer shall submit the following documents, to be circulated in accordance with OR 009 :

- calculation design reports substantiating the choice of equipment and solutions to design problems, on FRAMATOME request,
- general layout drawings and installation and interface requirements,*
- assembly drawings,
- equipment lists, including inter alia, all necessary information for identification and passing of the order to sub-contractors,
- wiring and repair or analogue diagrams,*
- diagrams showing installation of equipment in cabinets,*
- operating manual and repair manual,*
- schedule of spare parts required for assembly and testing,*
- schedule of spare parts required for 5 years' operation,*
- schedules for design, manufacture and in-factory tests,
- programme of in-factory tests, followed by report,*
- Manufacturing and Surveillance Operations Check-list.*

* Documents also to be supplied in English.

7. GUARANTEES

- Manufacturing guarantees :

The equipment shall be manufactured according to the rules of good workmanship. All parts shall present a finish in keeping with their importance, their location and their intended use.

Parts shall be sound and not possess any defect liable to impair their strength.

- Operating guarantees :

The Manufacturer shall undertake to deliver equipment which is capable of providing proper industrial service in the general operating conditions stipulated in this Specification.

Service life, excluding wear parts : 40 years.

FRAMATOME S.A. - Tour Fiat - 1, Place de la Coupole - COURBEVOIE (Hauts-de-Seine)

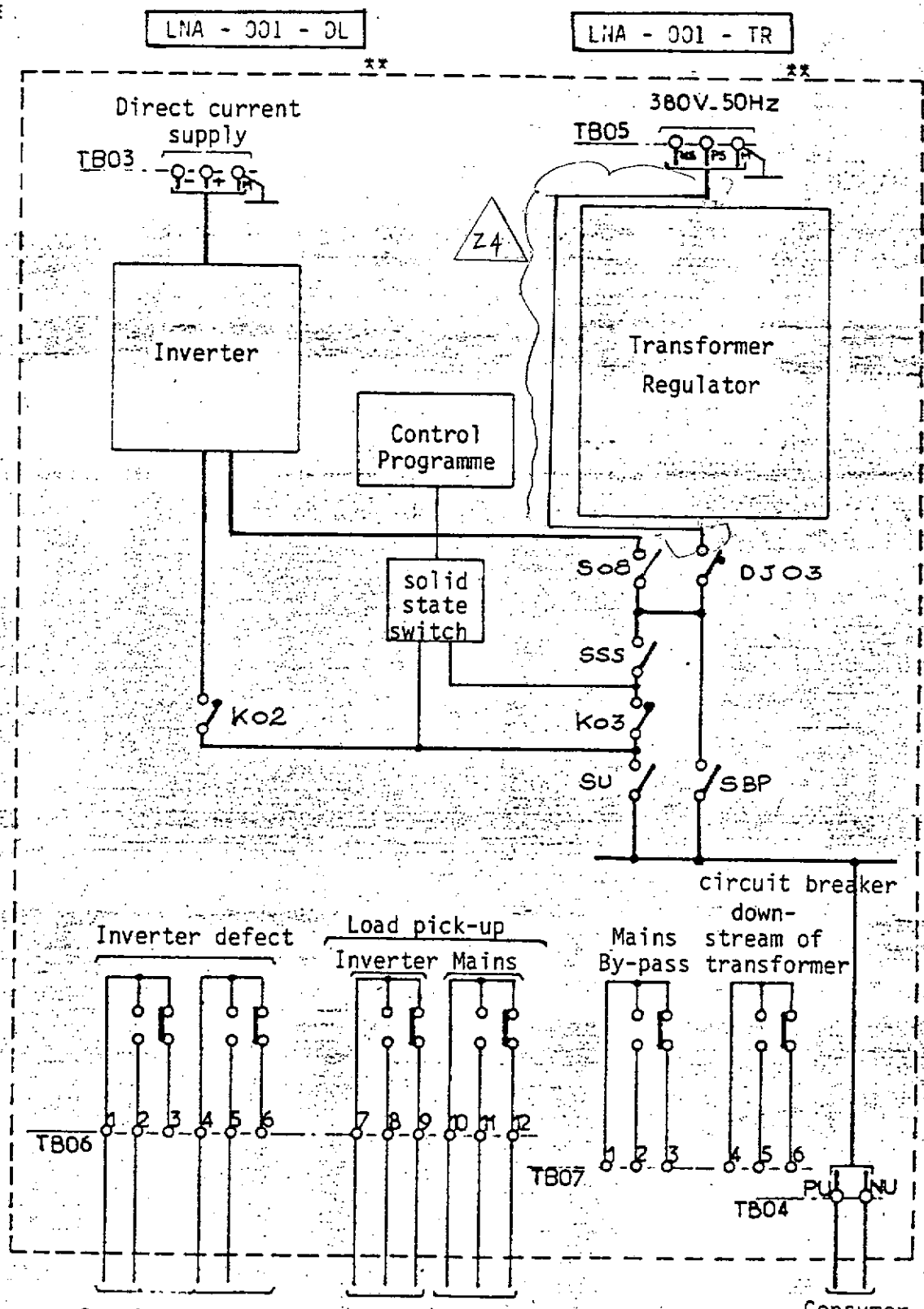
FRAMATOME

APPENDIX A

INVERTER DIAGRAM

N° TS/EE DC 0244

REVISION Z4



* See Appendix F1

LNA.001.DL - ILNA.001.TR	LNA	106LA	104LA
LNB.001.DL - ILNB.001.TR	LNB	206LA	204LA
LNC.001.DL - ILNC.001.TR	LNC	306LA	304LA
LND.001.DL - ILND.001.TR	LND	406LA	404LA

* 1,2,3 or 4 according to reactor unit

** Colour of label according to inverter

See Appendices B1, C1, D1 and E1.

FRAMATOME

APPENDIX B

DISTRIBUTION BOARD

N° TS/EE-DC- 0244

REVISION F

: LNA 001TB *

** CHANNEL : Auxiliary A

Lead-out	N°	Consumption A	Set value for trigger mechanism	Lead-outs location	Labels read as below
SIP1 Protection	1	3	8	131	KRG / 12 AR ** 101 JA
SIN1 Monitoring	1	3	8	121	RPN 001 AR-Monitoring 103 JA **
SIN1 protection	1	3	8	122	RPN 001 AR-protection 104 JA **
Recorder (Emergency Shutdown Panel)	1	1	8	111	KPR 401 EN 105 JA ***

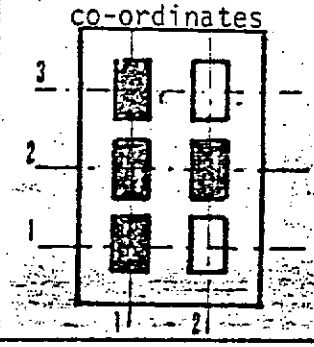
Colour of labels

** Black on yellow

*** Black on white

* 1, 2, 3 or 4 according to reactor unit

BALANCE - Total consumption		10			Lead-out co-ordinates
N° of lead-outs used	4				
N° of equipped reserves	2				
N° of non-equipped reserves	/				
N° of possible lead-outs	6				



FRAMATOME

APPENDIX C

DISTRIBUTION BOARD

N° TS/EE-DC-0244

REVISION F

*

: LNB 001 TB CHANNEL : Auxiliary B

**

Lead-out	N°	Consumption	Set value for trigger mechanism	Lead-outs location	Labels read as below
SIP2 protection	1	4	8	131	KRG / 22 AR ** ** 101 JA
SIN2 Monitoring	1	3	8	121	RPN.002AR-Monitoring 103 JA **
SIN 2 protection	1	3	8	122	RPN.002AR-protection 104 JA **
Local instrumentation	1	1	8	111	RIS 402 AM 105 JA ***
" "	1	1	8	112	LNB 001 CR 106 JA ***

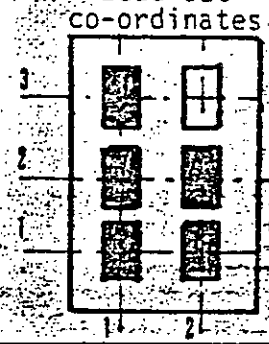
Colour of labels

** White on blue

*** Black on white

* 1, 2, 3 or 4 according to reactor unit

BALANCE - Total consumption		12			Lead-out co-ordinates
N° of lead-outs used	5				
N° of equipped reserves	1				
N° of non-equipped reserves	/				
N° of possible lead-outs	6				



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APPENDIX D

DISTRIBUTION BOARD

N° TS/FF-DC- 0244

REVISION F

* LNC 001 TB ** CHANNEL : Auxiliary A

Lead-out	N°	Consumption	Set value for trigger mechanism	Lead-outs location	Labels read as below
SIP3 protection	1	5	8	131	KRG / 32 AR 101 JA **
SIN3 Monitoring	1	3	8	121	RPN 003 AR-Monitorin 103 JA **
SIN 3 protection	1	3	8	122	RPN 003 AR protection 104 JA **
Local instrumentation	1	1	8	112	LNC 002 CR 106 JA ***
" "	1	2	8	111	LNC 001 CR 105 JA ***

Colour of labels

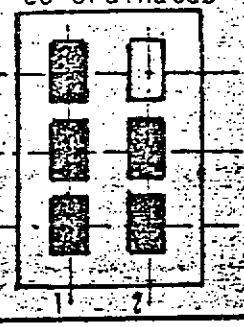
** White on red

***Black on white

*1, 2, 3 or 4 according to reactor unit

BALANCE - Total consumption		14			
N° of lead-outs used	5				
N° of equipped reserves	1				
N° of non-equipped reserves	/				
N° of possible lead-outs	6				

Lead-out co-ordinates



FRAMATOME S.A. : Tour Fiat - 1, Place de la Coupole - COURBEVOIE (Hauts-de-Seine)

F

EQ 110

FRAMATOME

APPENDIX E

DISTRIBUTION BOARD

N° TS/EE-DC- 0244

REVISION F

* LND 001 TB **

CHANNEL : Auxiliary B

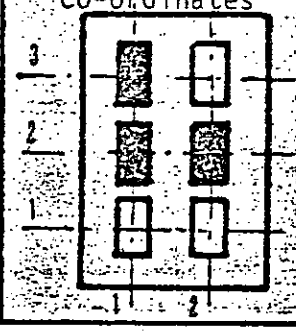
Lead-out	N°	Consumption	Set value for trigger mechanism	Lead-outs location	Labels read as below
SIP4 protection	1	3	8	131	KRG / 41 AR 101 JA **
SIN4 Monitoring	1	3	8	121	RPN 004 AR -Monitoring 103 JA **
SIN4 protection	1	3	8	122	RPN 004 AR-protection 104 JA **
BALANCE - Total consumption		9			
N° of lead-outs used	3				
N° of equipped reserves	3				
N° of non-equipped reserves	/				
N° of possible lead-outs	6				

Colour of labels

** White on brown

* 1, 2, 3 or 4 according to reactor unit

Lead-out co-ordinates



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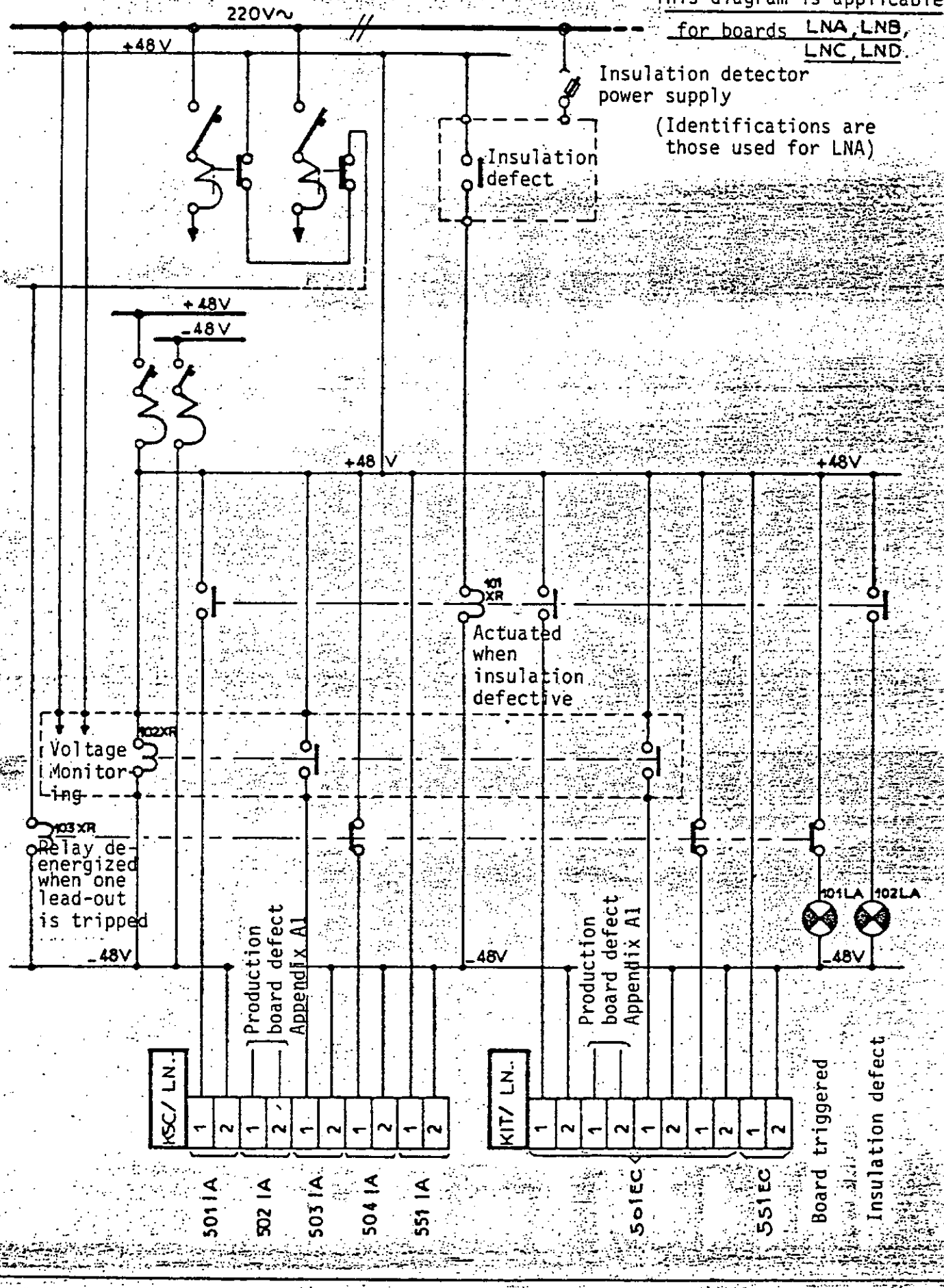
APPENDIX F

220 V~ PRODUCTION AND DISTRIBUTION DEFECT DATA

N° TS/EE-DC- 0244

REVISION F

This diagram is applicable for boards LNA, LNB, LNC, LND.



	LNA	LNB	LNC	LND
Lamp triggered off	LNA.101.LA	LNB.101.LA	LNC.101.LA	LND.101.LA
Lead-out circuit breaker				
Lamp insulation defect	LNA.102.LA	LNB.102.LA	LNC.102.LA	LND.102.LA
Insulation monitoring	LNA.101.XR	LNB.101.XR	LNC.101.XR	LND.101.XR
220 V voltage monitoring	LNA.102.XR	LNB.102.XR	LNC.102.XR	LND.102.XR
Set triggered off	LNA.103.XR	LNB.103.XR	LNC.103.XR	LND.103.XR
Circuit breaker identification according to distribution boards :				
131	LNA.101.JA	LNB.101.JA	LNC.101.JA	LND.101.JA
132	LNA.102.JA	LNB.102.JA	LNC.102.JA	LND.102.JA
121	LNA.103.JA	LNB.103.JA	LNC.103.JA	LND.103.JA
122	LNA.104.JA	LNB.104.JA	LNC.104.JA	LND.104.JA
111	LNA.105.JA	LNB.105.JA	LNC.105.JA	LND.105.JA
112	LNA.106.JA	LNB.106.JA	LNC.106.JA	LND.A06.JA

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APPENDIX H

SAFETY STANDARDS

- This specification has been drafted in accordance with requirements of following safety standards :

  IEEE 308

  IEEE 344

  R.G. 1-75

It shall be the responsibility of FRAMATOME to take into acount and to interprete the above standards.

If Manufacturer abides by the clauses of the present specification, equipment will be to above standards.

Of course, french regulations and rules shall be applicables to manufacture and inspections.