

METHOD OF STATEMENT
FOR
FACTORY ACCEPTANCE TEST PROCEDURE
OF
LOW VOLTAGE SWITCHBOARDS

CONTENTS

S/NO.	DESCRIPTION
1.0	Scope of Work
2.0	Safety & Risk Control
3.0	Appendix : Typical Test Forms

Scope of Work

1.1 Purpose

The aim of this documentation is to outline the FAT procedure of Low Voltage Main Switchboard.

- A) Visual Inspection Test
- B) Insulation Test
- C) High Voltage Injection Test
- D) Primary Current Injection Test
- E) Metering Current Transformer Polarity Test
- F) Secondary Current Injection Test

1.2 Working Location

Approved LV main switchboard to be used for the FAT. FAT is conducted at Sunlight factory, Singapore.

1.3 Material and Equipment to be used

Items	Description Make, Model & Serial Number	Equipment Pictures
1.3.1	Digital insulation Continuity Tester Make: KYORITSU Model: 3007A Serial No.: 1462615	
1.3.2	High Voltage / Flash Tester Make: T&R Model: KV 5 -100 Serial No.: ITE0456	
1.3.3	Primary Current Injection Test Set Make: T&R Equipment Pte. Ltd. Model: PCU2 / EMK4 Serial No.: 2TE0405A / 2TE0405B	

1.3.4	Secondary Current Injection Test Set Make: T&R Equipment Pte. Ltd. Model: 100A MK2 Serial No.: 18TE0391	
1.3.5	Leakage Current Clamp Tester Make: KYORITSU Model: 2414 & 2431 Serial No.: 27911 / 34783 / & 71716 / 71717 / 71728	
1.3.6	Elcometer Thickness Gauge Make: Elcometer Model: A345FB-S1 Serial No.: NM1550-273	
1.3.7	Torque Wrench Make: TOHNICHI Model: QL100N Serial No.: 024484W	
1.3.8	Dial Caliper Range (0-150mm) Make: Mitutoyo Model: 515-550 Serial No: A-19755	

1.4 FAT procedure**(A) Visual Inspection Test**

- 1.4.1 Visual inspection with customer will be carried out on the LV switchboard to
- a. Check the layout of fitted components
 - b. Check the over all dimension of switchboard, size of busbars, cables and earthing conductors and location of feeder entry point.
 - c. Check and verify the brand, model, and circuit identification of components installed such as breakers, current transformers, fuses, ammeters, voltmeters, power meters and protection relays etc.
 - d. Check overall paint work, door locking device, door gasket, door hinges, door cut-out holes
 - e. Check the busbar and cable tightening, the marking, busbar clearance, base angle bar and plinth
 - f. Check the labels, name plate and phase identification

(B) Insulation Test

- 1.4.2 Carry out 500V meggar test for phase to earth, neutral to earth, phase to neutral and phase to phase to measure the insulation resistance with all breakers in 'ON' positions.

(C) High Voltage Injection Test

- 1.4.3 Carry out 500V meggar test between each stressed phase and all other phase connected to exposed conductive parts with all breakers in 'ON' positions.
- 1.4.4 Apply 2.5kV AC voltage between each stressed phase and all other phase connected to exposed conductive parts for 60 seconds and measure the leakage current.

(D) Primary Current Injection Test

- 1.4.6 Temporarily short the R, Y, B & N primary bars on one side of the protection current transformers.
- 1.4.7 Connect the primary injection test set on R-phase and N on primary bars on the other side of the current transformers.
- 1.4.8 Connect an ammeter to the R-phase of CT to monitor the secondary current.
- 1.4.9 Connect a milli-ammeter to the earth-fault relay current coil to monitor the spill current.
- 1.4.10 Inject 50% and 100% of the CT ratio through the primary bars and record spill current respectively. At the same time, record the secondary current of the R-phase respectively.
- 1.4.11 Repeat test mentioned from 1.4.7 to 1.4.10 with Y-phase and B-phase.

(E) Secondary Current Injection Test

- 1.4.12 Select the current plug setting of IDMTL relay to the rated current of 5A and TMS of 0.1 for 3/10 characteristic.
- 1.4.13 Inject secondary current of 5A to R-phase and adjust pickup current to 5A.
- 1.4.14 Inject 10A, 15A and 25A to R-phase and record the tripping time respectively. The time should fall with +30% and -10% of the standard timing.
- 1.4.15 Select the proposed current setting and adjust the pickup current accordingly.
- 1.4.16 Repeat the test from 1.4.13 to 1.4.15 with Y-phase and B-phase.

(F) Metering Current Transformer Polarity Test

- 1.4.17 Temporarily short the R, Y, B & N primary bars on one side of the protection current transformers.
- 1.4.18 Connect the primary injection test set on R-phase and Y-phase on primary bars on the other side of the metering current transformers.
- 1.4.19 Connect an ammeter to the R-phase of CT to monitor the secondary current.
- 1.4.20 Connect a milli-ammeter to earth cable to monitor the spill current.
- 1.4.21 Inject 50% and 100% of the CT ratio through the primary bars and record the spill current respectively. Same time to record the secondary current of the R-phase.
- 1.4.22 Repeat test mentioned from 1.4.18 to 1.4.21 with Y-phase by connecting the primary injection test set on Y-phase and B-phase
- 1.4.23 Repeat test mentioned from 1.4.18 to 1.4.21 with B-phase by connecting the primary injection test set on B-phase and R-phase

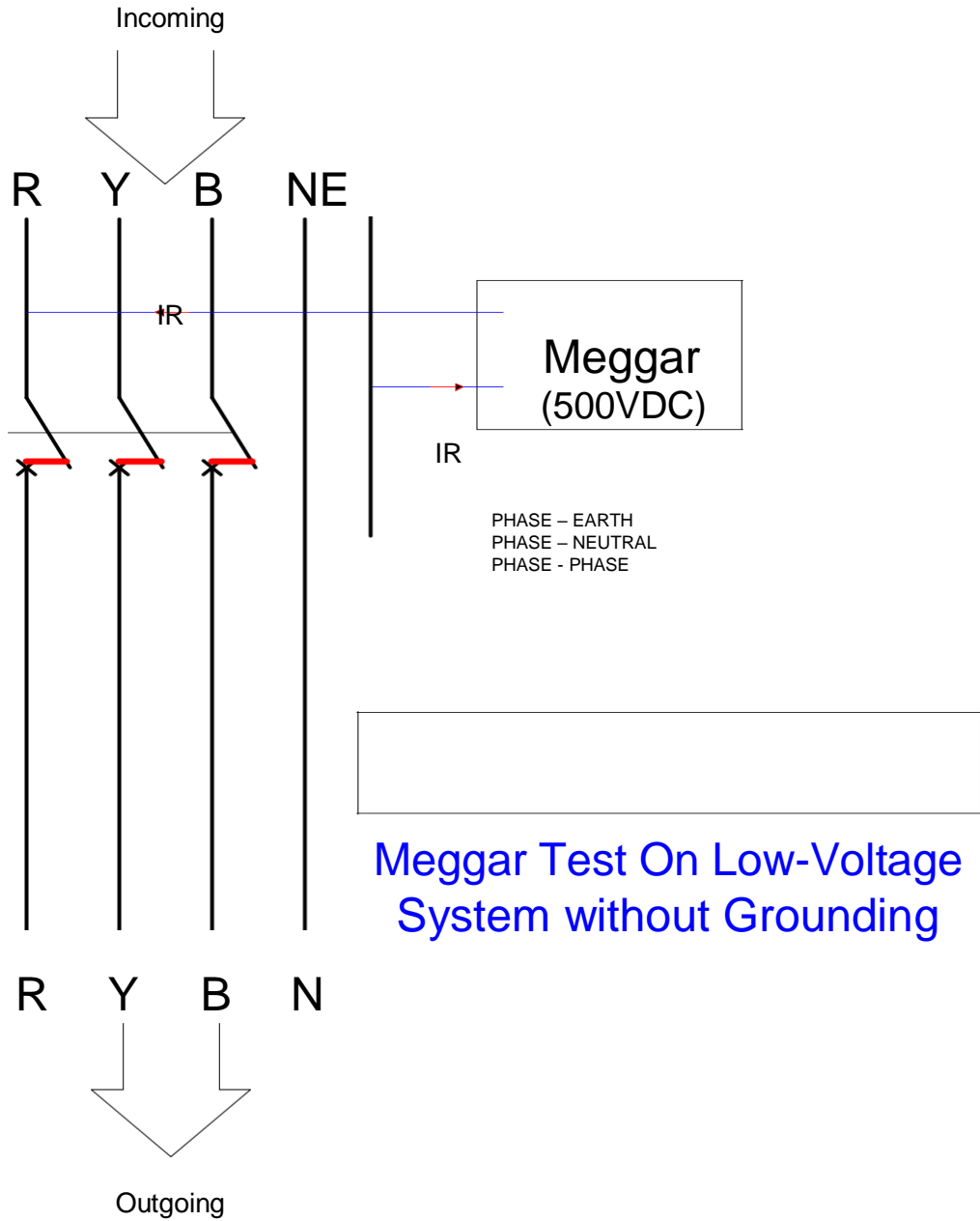
2. Safety & Risk Control

2.1 Safety Arrangement

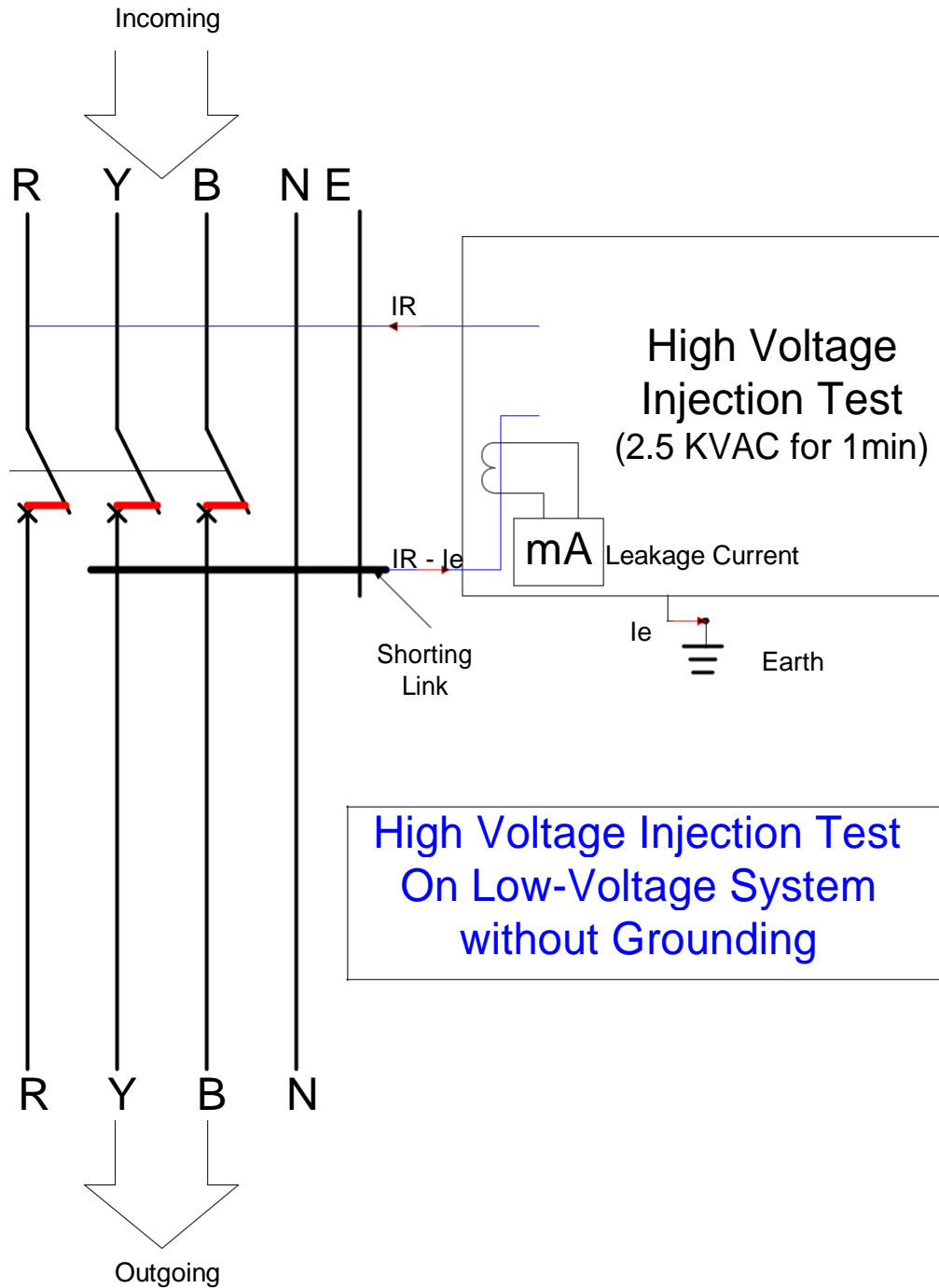
To control the risks during the FAT, the following arrangement will be done

- (A) Safety barriers will be installed surrounding the area where the FAT is going to be carried out.
- (B) Danger signs will be hanged to warn the people who approach the FAT area
- (C) RED colour warning lamp will be made to be flashing during supplying power to the board for testing
- (D) Fire extinguisher will be placed for emergency usage at FAT area
- (E) A First aid box will be placed at FAT area for emergency purpose

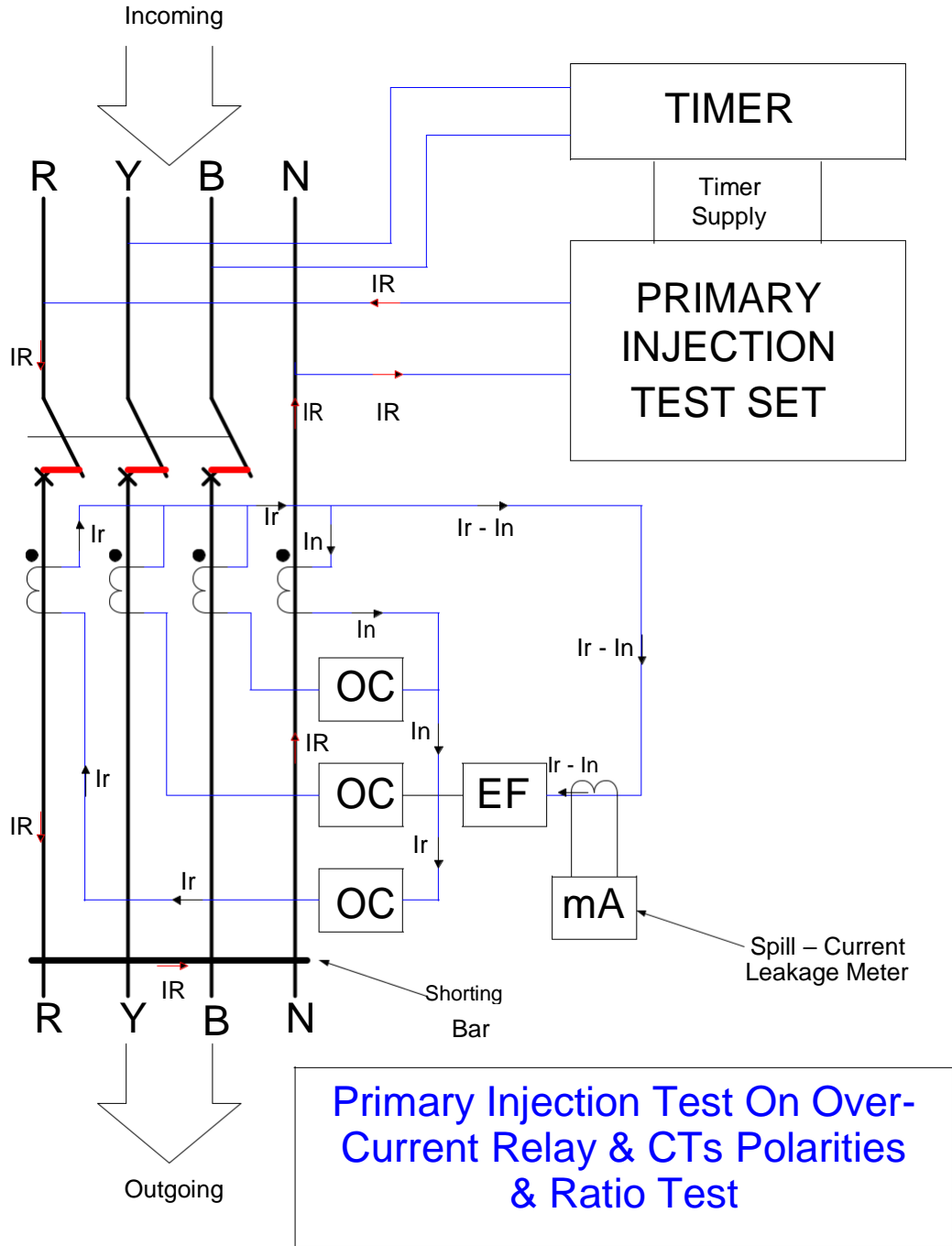
**4. Appendix : Test Circuits
(A) Test Circuit of Insulation Test (Meggar)**



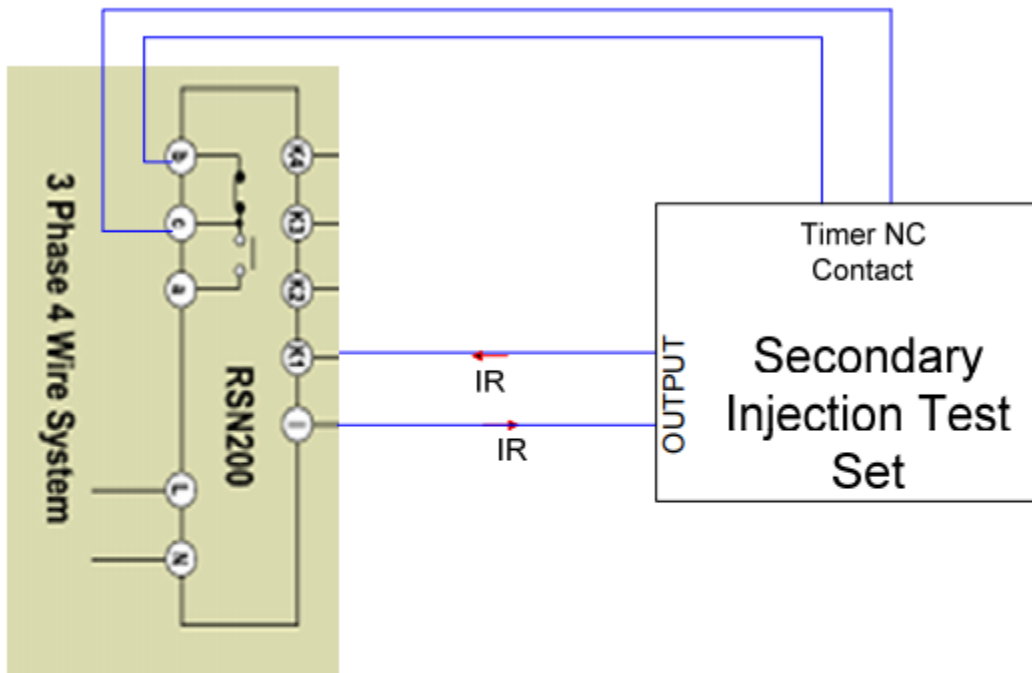
(B) Test Circuit of High Voltage Injection Test



(C) Test Circuit of Primary Current Injection Test



(C) Test Circuit of Secondary Current Injection Test



**Secondary Injection Test On
IDMTL Relay**

(D) Test Circuit of Metering Current Transformer Polarity & Ratio Test

