Certificate No 15843

ASTA CERTIFICATION SERVICES

(Incorporated in the year 1938) ASTA House, Chestnut Field, Rugby, CV21 2TL, England

CERTIFICATE OF TYPE TEST

Laboratory Ref. No. 101945AC

APPARATUS: Two ring-type 0.66/3/- kV (Um/Insulation level), 50 Hz, cast resin current transformers comprising one single-ratio 2500/5 A measuring current transformer and one single-ratio 2250/5 A protective current transformer.

DESIGNATION: NITECH Current Transformers
2500/5A Type EMR-130 and 2250/5A Type EPR-110

MANUFACTURER: Dixson Industrial (s) Pte Ltd
No.32 Ang Mo Kio Industrial Park 2, #03-12,
Sing Industrial Complex,
Singapore 569510

TESTED BY: Testing & Certification Australia
18 Mars Road Lane Cove NSW 2066 Australia

DATE(S) OF TESTS: 13 December 2004 to 5 January 2005

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this certificate has been subjected to the series of proving tests in accordance with

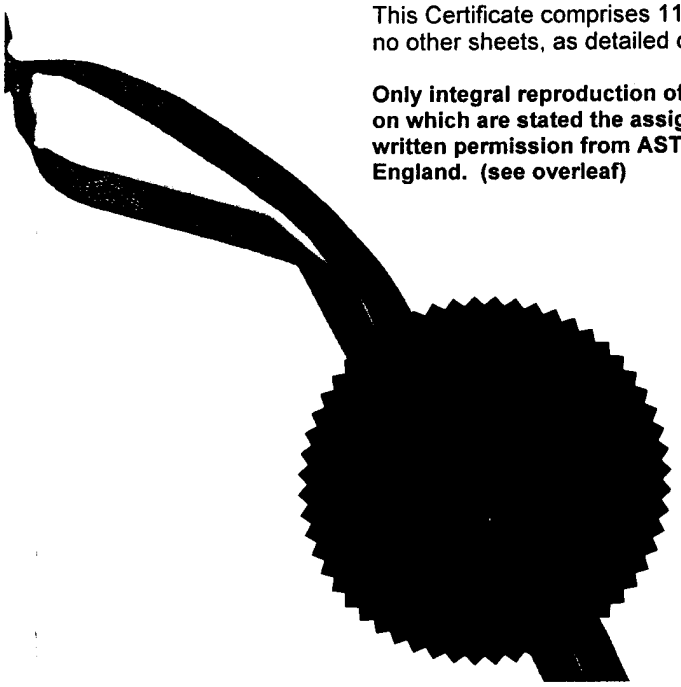
IEC Publication 60044-1 : 2003 Consolidated Edition 1.2 and BSEN 60044-1 : 1999 with Amendments No. 1 and 2, Clauses 7.1, 7.2, 8.3, 8.4, 11.4, 12.4 and 12.5

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard(s) and to justify the ratings assigned by the manufacturer as stated below.

Rated short-time thermal and dynamic current (Clause 7.1)	: 63 kA for 3 s, 158 kA peak
Rated continuous thermal current (Clause 7.2)	: Equal to rated primary current
Power-frequency withstand and Inter-turn overvoltage tests (Clauses 8.3 and 8.4)	: Complied
Accuracy of measuring current transformers (Clause 11.4) 2500/5	: Class 1 M
Current error, phase displacement and composite error of protective current transformers (Clauses 12.4 and 12.5) 2250/5	: Class 5P20

The record of Proving Tests applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Certificate comprises 11 pages, 1 diagram, 1 oscillogram, 6 photographs, 4 drawings and no other sheets, as detailed on page 1.



UKAS PRODUCT CERTIFICATION
010

M. A. Carstedt
ASTA Observer

C. Nicholls
DIRECTOR

8th February 2005 Date

Record Of Proving Tests

ASTA

Laboratory Reference No: 101945

CONTENTS

APPARATUS TESTED

Two ring-type 0.66/3/- kV* (Um/Insulation level), 50 Hz, cast resin current transformers without primary conductor and primary insulation, comprising one single-ratio 2500/5 A measuring current transformer and one single-ratio 2250/5 A protective current transformer.

Designated by the client as NITECH Current Transformers 2500/5A Type EMR-130 and 2250/5A Type EPR-110.

Two samples of each CT ratio were submitted for the tests.

Item #	Ratio	Class	Rated burden VA	Serial number	Rated primary current A	Secondary winding cross-sectional area mm^2	Secondary resistance at 75°C Ω
1	2500/5	1	30	019742	2500	2.0	0.3407
2	2500/5	1	30	019743	2500	2.0	0.3419
3	2250/5	5P20	15	050573	2250	2.0	0.6365
4	2250/5	5P20	15	050574	2250	2.0	0.6338

The manufacturer has assigned a rated short-time thermal current for the 2500/5 and 2250/5 current transformers of 63 kA rms for 3 s, and a rated dynamic current of 158 kA peak, with secondary windings short-circuited.

The secondary winding conductors are enamel insulated copper wire.

The core and secondary winding are encapsulated in epoxy resin insulation.

* The dash indicates the absence of an impulse voltage level assigned by the manufacturer.

Items 2 and 3 were subjected to short-circuit tests with before and after criteria tests and Items 1 and 4 were subjected to power frequency withstand, inter-turn overvoltage and temperature-rise tests.

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

CLIENT

Dixson Industrial (s) Pte Ltd
No.32 Ang Mo Kio Industrial Park 2, #03-12,
Sing Industrial Complex,
Singapore 569510

DATE OF RECEIPT OF TEST ITEMS

10 November 2004

ORDER NUMBER

E-mail dated 30/11/2004

MANUFACTURER

The manufacturer has declared that the apparatus was manufactured at the following location:

Dixson Industrial (s) Pte Ltd
No.32 Ang Mo Kio Industrial Park 2, #03-12,
Sing Industrial Complex,
Singapore 569510

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Record Of Proving Tests

ASTA

Laboratory Reference No: 101945

LABORATORY

The apparatus was tested at:

Testing & Certification Australia
Lane Cove Testing Station
18 Mars Road
Lane Cove NSW 2066 Australia
Telephone 61 (0)2 9410 5202, Facsimile 61 (0)2 9428 2645

The laboratory accreditation details are:

This laboratory is accredited by the National Association of Testing Authorities, Australia, Accreditation Number 62. The tests reported herein have been performed in accordance with its terms of accreditation.

Quality Management System Certified by NCS International Pty Limited to AS / NZS ISO 9001, Certification Number 12644.

ASTA Accredited Laboratory to ISO / IEC 17025 and ASTA Publication 31, Registration Number 5118.

Quality Management System Certified by ASTA Certification Services to ISO 9001, Registration Number 14063.

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

SCHEDULE OF TESTS

TEST CONDITIONS

Short-time current test

1. Test supply: two phases of a three-phase 50 Hz supply with the supply neutral earthed and the short-circuit point not earthed, see Figure 1.
2. For the short-time current tests on the 2250/5 and 2500/5 CTs the primary conductor consisted of a 2" copper tube having a CSA of approximately 900 mm². No special mounting arrangements were provided with the CTs. The 2250/5 and 2500/5 CTs were mounted on the copper busbar with sheet cork packed between the CT and the copper busbar to centralise the CT and held in place using rope.
3. For the short-time current tests a cable short was placed between the secondary terminals of the CTs.

TEST CONDITIONS (Continued)

Temperature-rise tests

4. The current transformers were stood on a platform and copper conductors as listed in Table 1 were passed through the centre of the CT window.
5. The secondary windings were connected to unity power factor burdens corresponding to the rated output. A 50 Hz current equal to the rated continuous thermal current was passed through the primary conductor until stable CT secondary winding temperatures were achieved.
6. Copper-constantan thermocouples were used to monitor the surface temperatures of the CT to determine when the CT had attained a stable temperature-rise. (i.e. the variation did not exceed 1 K/h for 1 hour).
7. The ambient temperature was the average of three thermocouples suspended in oil cups with a ½ hour time constant and positioned around the CT at approximately the same height and at a distance of about 1 metre from the CT. The ambient temperature was between 23 °C and 28 °C.
8. The temperature-rise of the windings was measured using the increase in resistance method. (Refer to 11 page for test results).
9. Allowable temperature-rise limits K

Secondary winding (Class B enamel insulated copper wire)	85
Secondary winding inter layer tape (Class B insulating tape)	85
Surrounding medium (Class B epoxy resin)	85

Note: In accordance with Clause 4.6 the maximum allowable temperature-rise is limited to the lowest class of insulation of either the winding or the surrounding medium.

The maximum allowable temperature-rise for the test was 85 K.

Table 1 – Primary conductor sizes for the temperature-rise tests

Item	Ratio	Class	Rated burden VA	Serial No.	Rated primary current A	Primary Conductor size
1	2500/5	1	30	019742	2500	2 - 100 mm x 10 mm copper busbars
4	2250/5	5P20	15	050574	2250	2 - 100 mm x 10 mm copper busbars

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Power-frequency withstand tests on secondary windings before temperature-rise tests (Clause 8.3 of IEC 60044-1 and BSEN 60044-1)

Aluminium foil was wrapped around the CTs (Items 1 and 4) up to within 20 mm from the terminals. A test voltage of 3 kV rms was applied for 1 minute between the short-circuited secondary winding and the aluminium foil.

Result: No puncture or flashovers.

Date of tests: 16 December 2004

Inter-turn overvoltage tests before short-time current tests (Clause 8.4 of IEC 60044-1 and BSEN 60044-1)

The current transformers withstood tests of inter-turn insulation at the following test voltages applied for 30 seconds using Procedure B of Clause 8.4 at 200 Hz.
Note: Maximum peak voltage of 4.5 kV or rated secondary current which ever is achieved first.

Item	Ratio	Class	Rated burden VA	Serial number	Inter-turn overvoltage kV peak for 30 s	Test current A
1	2500/5	1	30	019742	1.60	5.0
4	2250/5	5P20	15	050574	4.24	5.0
Date of tests :		16 December 2004				

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Record Of Proving Tests

ASTA

Laboratory Reference No: 101945

Short-time current test (Clause 7.1 of IEC 60044-1 and BSEN 60044-1)

Test at rated short-time thermal current of 63 kA rms for 3 s and
rated dynamic current of 158 kA peak

Condition before test

CTs as after the "Criteria tests before short-time withstand test", temperature before test 27 °C

Item	Ratio	Class	Serial No.	Test Burden
2	2500/5	1	019743	Secondary terminals shorted with cables of
3	2250/5	5P20	050573	negligible impedance.

Photograph No. 24116 B

Diagram Reference
Figure 1

Test No. 8222.	Test	Applied Voltage V rms	Primary current Asymmetrical kA peak	Symmetrical kA rms	Phase	Duration s	I^2t equivalent
002	Short-time thermal & dynamic current	459	158	69.5		2.55	64.1 kA rms for 3 s

Observations during test

No visible disturbance.

Condition after test

For condition in accordance with Clause 7.1 of IEC 60044-1 and BSEN 60044-1,
requirements a) to d) see pages 8, 9, 10, and 11.

Date of test : 14 December 2004

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Short-time current test (Clause 7.1 of IEC 60044-1 and BSEN 60044-1)

After the short-time current tests, the current transformers were allowed to cool to ambient temperature (21 °C to 27 °C). They then satisfied the following requirements:

a) No visible external damage.

b) The values of current and phase errors did not differ from those recorded before the test by more than half the limits of error appropriate to its accuracy class.
See page 10.

c) The current transformers withstood the power frequency withstand test Clause 8.3 and inter-turn over voltage test Clause 8.4 of IEC 60044-1 and BSEN 60044-1 at 90 % of the specified voltages and currents as described on page 9. Dielectric tests to Clause 8.2 are not applicable, as the window-type current transformers do not have a primary conductor or primary insulation.

d) The current transformers were cut open for inspection. The insulation next to the surface of the secondary conductors showed no deterioration.

See Photographs No. 24116 / L, M, R and S

Date of inspection: 5 January 2005

Power-frequency withstand tests on secondary windings after short-circuit test (Clause 8.3 of IEC 60044-1 and BSEN 60044-1)

Aluminium foil was wrapped around the CTs (items 2 and 3) up to within 20 mm from the terminals. A test voltage of 2.7 kV rms was applied for 1 minute between the short-circuited winding and the aluminium foil.

Result: No puncture or flashovers.

Date of tests: 16 December 2004

Inter-turn overvoltage tests after short-circuit test (Clause 8.4 of IEC 60044-1 and BSEN 60044-1)

The current transformers withstood tests of inter-turn insulation at the following test voltages applied for 30 seconds using Procedure B of Clause 8.4 at 200 Hz.
Note: Maximum peak voltage of 4.05 kV (90% of 4.5 kV) or 4.5 A (90% of rated secondary current) which ever is achieved first.

Item	Ratio	Class	Rated burden VA	Serial number	Inter-turn overvoltage kV peak for 30 s	Test current A
2	2500/5	1	30	019743	1.44	4.5
3	2250/5	5P20	15	050573	3.68	4.5
Date of tests :		16 December 2004				

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Record Of Proving Tests

ASTA

Laboratory Reference No: 101945

Tests for accuracy (Clause 11.4 of IEC 60044-1 and BSEN 60044-1)

Summary of results before and after short-time current test.

CT	% of rated current	Burden	Before short-time current test		After short-time current test	
			Current error %	Phase error cR	Current error %	Phase error cR
Item 2 Ratio : 2500/5 Class : 1 Serial No. 019743	5	25% 7.5 VA at 0.8 PF	-0.05	0.27	-0.06	0.29
	20		0.02	0.16	0.01	0.17
	100		0.06	0.06	0.05	0.06
	120		0.07	0.05	0.06	0.05
	5	100% 30 VA at 0.8 PF	-0.41	0.39	-0.40	0.35
	20		-0.25	0.20	-0.25	0.17
	100		-0.15	0.04	-0.12	0.01
	120		-0.18	0.08	-0.13	0.03
Date of tests :			13 December 2004		14 December 2004	

Current error, phase displacement and composite error (Clauses 12.4 and 12.5 of IEC 60044-1 and BSEN 60044-1)

Summary of results before and after short-time current test.

CT Serial No. (Item 3)	Ratio	% of rated current	Burden*	Before short-time current test			After short-time current test		
				Current error	Phase error	Comp-osite error	Current error	Phase error	Comp-osite error
			VA / PF	%	cR	%	%	cR	%
050573	2250/5	100	15 / 0.8	0.41	0.01	0.06	0.37	0.04	0.07
Date of tests :				13 December 2004			14 December 2004		

* Note: Composite error calculated using unity power factor for the burden.

13 December 2004 to 5 January 2005
Dates of Tests

M. A. Carstedt
ASTA Observer

Temperature-rise tests (Clause 7.2 of IEC 60044-1 and BSEN 60044-1)

Test Results

Item	Ratio	Class	Rated burden VA	Serial No.	Rated primary current A	Temperature-rise K	(allowable)
1	2500/5	1	30	019742	2500	18.9	85
4	2250/5	5P20	15	050574	2250	23.1	85
Date of tests : 17 and 20 December 2004							

See Photograph No. 24116 H

PHOTOGRAPHS

Number	Caption
24116 /	
B	Short-circuit test set-up before Test 8222.002
H	Temperature-rise set up of 2250/5 A current transformer
L	Typical label for 2500/5 A current transformer
M	Typical label for 2250/5 A current transformer
R	2500/5 A current transformer
S	2250/5 A current transformer

Record Of Proving Tests

ASTA

Laboratory Reference No: 101945

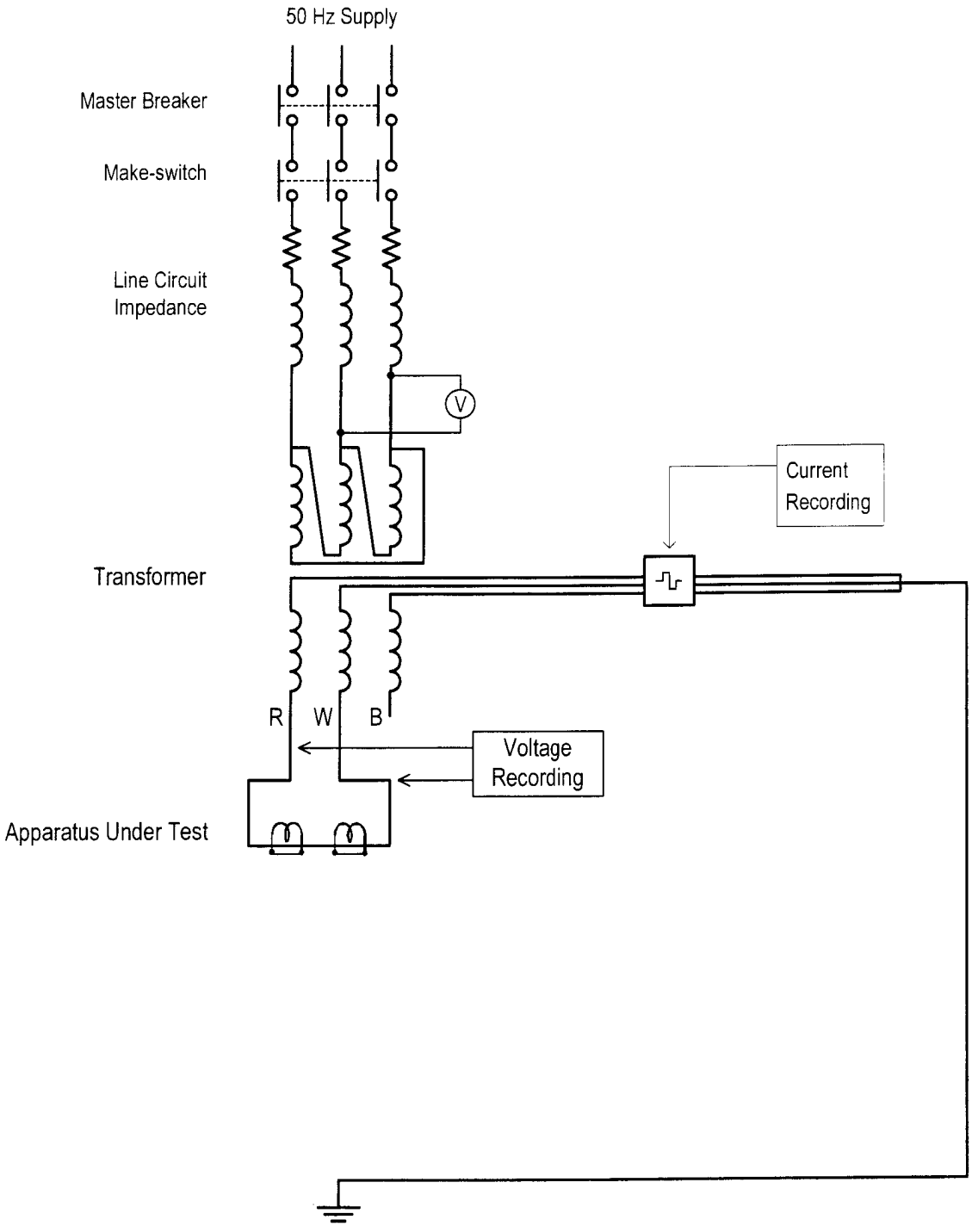
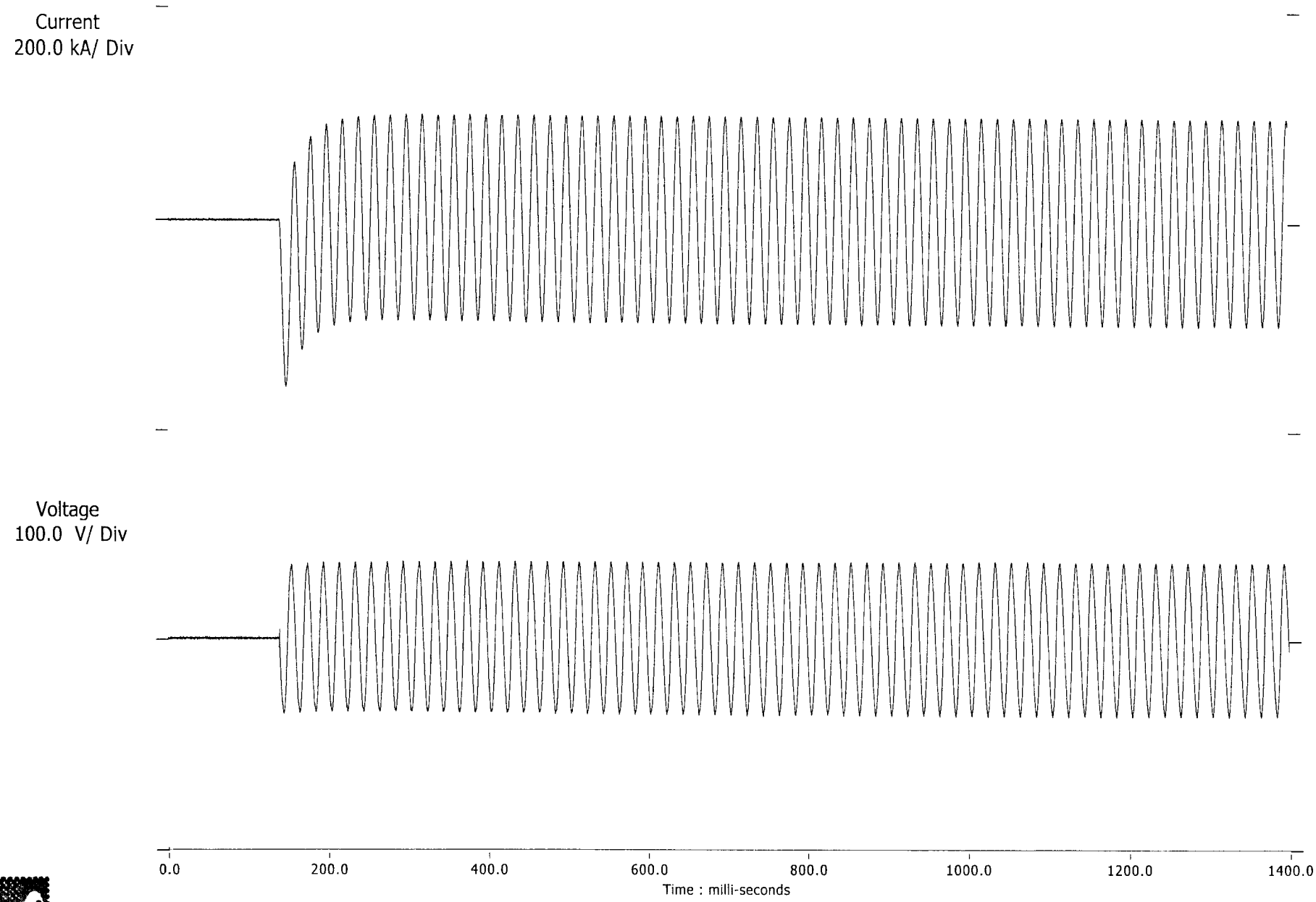


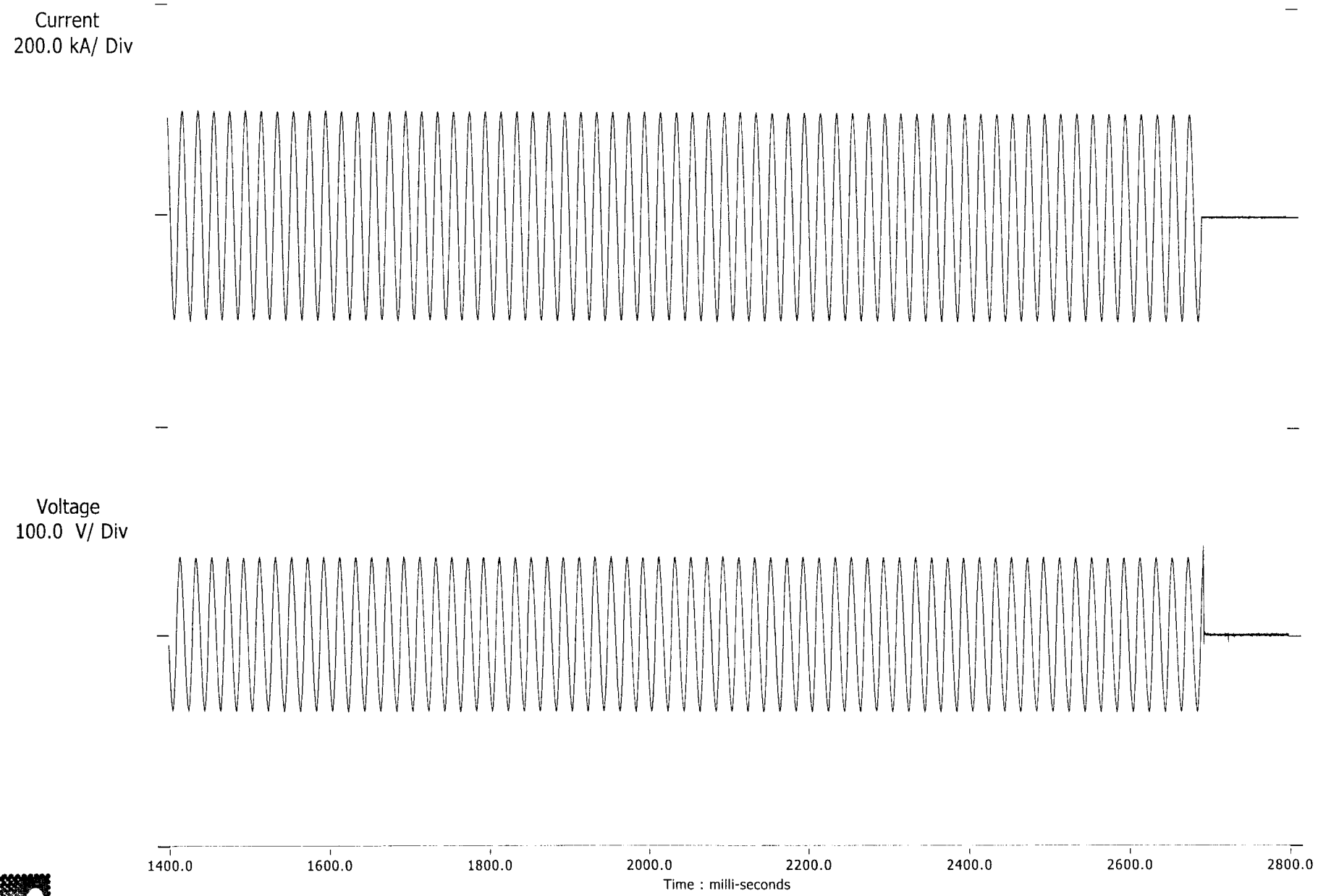
FIGURE 1 Test Circuit Diagram

M. A. Carstedt
ASTA Observer



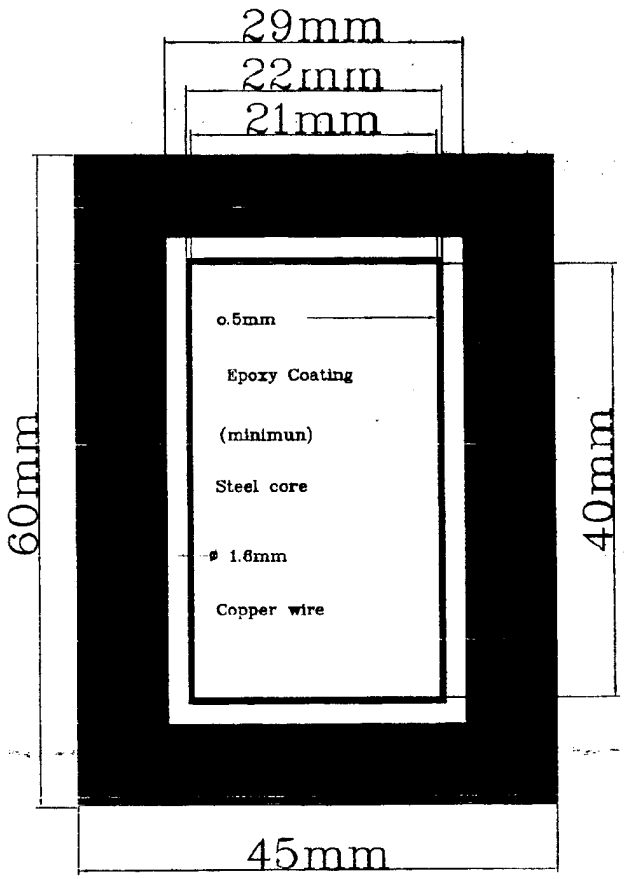
Testing &
Certification
Australia

OSC. No. : 8222.002



Testing & Certification Australia

OSC. No. : 8222.002



SECTION A–A

Scale 1.5:1

Manufacturer: DIXSON INDUSTRIAL (S) PTE LTD
Address: NO.32 Ang Mo kio Industrial Park 2
Sing Industrial Complex, #03–12.
SINGAPORE 569510
TEL/FAX: +65 64812240 / 64811371

Number of turns for CT: 450 Turns.

Materials: Diameter 1.6mm enamelled copper wire.
Epoxy for coating steel core–5700 Epoxy Power Coating.
Epoxy for final coating–Mixture of Casting Resin 5957A and Curing Agent 5957B.
Steel core–0.27mm Thick Silicon Steel.

Two layers of winding. The 1st layer is coated in epoxy and wrapped with PVC tape of thickness 0.15mm with isulation class B, winding is then fully coated in epoxy.

TESTING &
CERTIFICATION AUSTRALIA
LABORATORY REFERENCE No.101945
This drawing/schedule applies to the apparatus tested.
M.A. Cantelt 19/1/05
Signature on behalf of the Testing Authority. Date

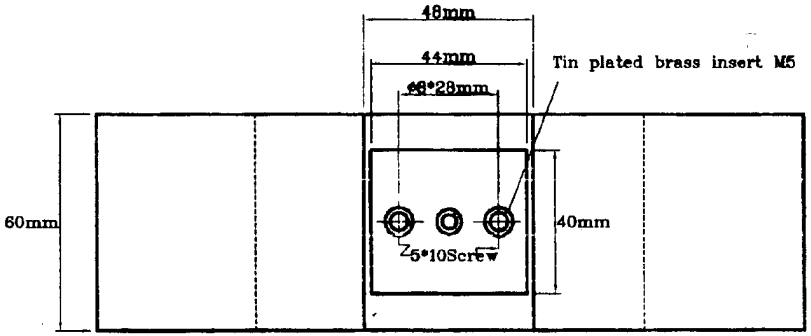
I Frank Lin Of Dixson Industrial (S) Pte Ltd
Certify that this drawing is a true representation
of the apparatus tested.

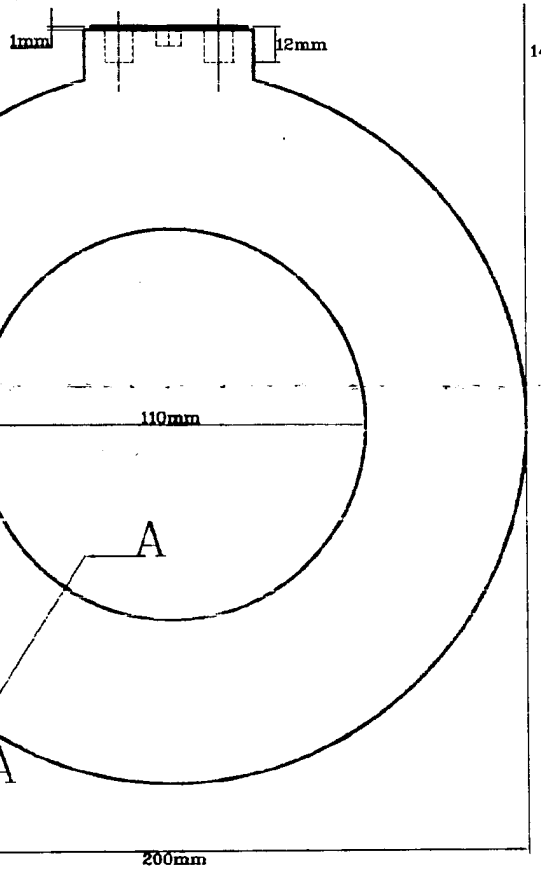
Frank

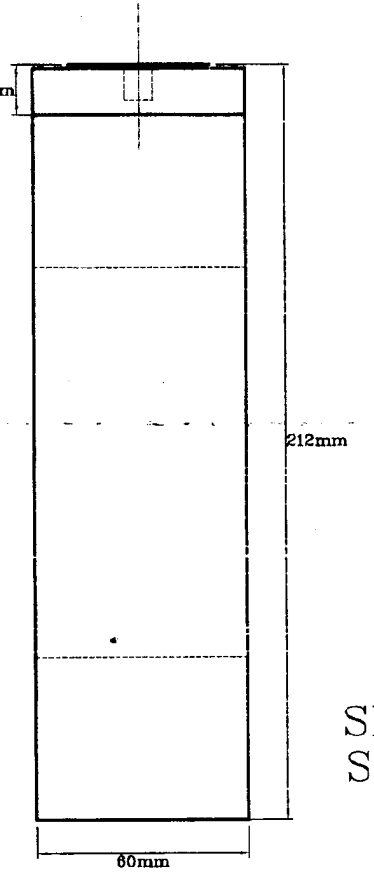
TITLE: NITECH 2250/5 Class5P20 15VA Current Transformer	DRAWN BY: Mr Frank Lin
DRAWING NUMBER: 2250/5 1 OF 2 DATE ISSUED: 25 OCT 2004	APPROVED BY: Mr Peter Lin

I Mr Frank Lin of Dixson Industrial (S) Pte Ltd certify that this drawing is a true representation of the apparatus tested.

TOP VIEW
Scale 1:2





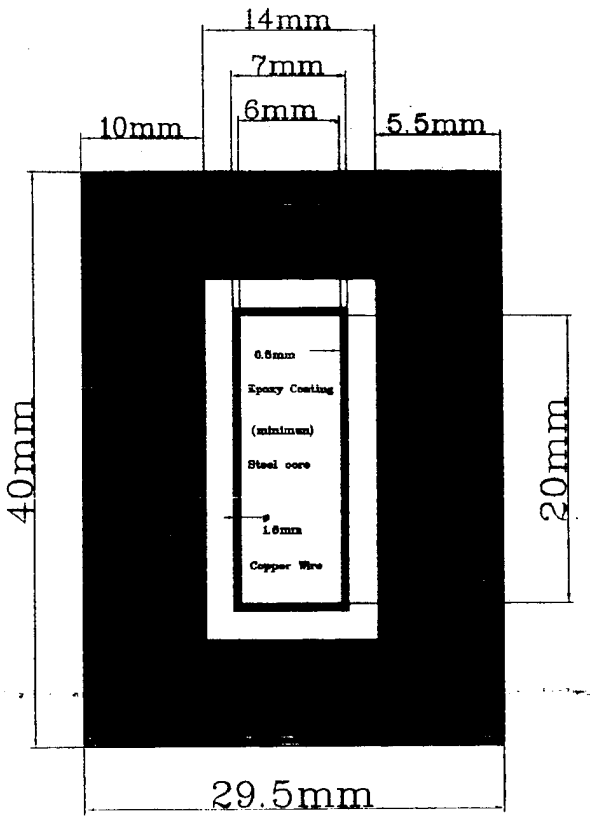


PLAN VIEW
Scale 1:2

SIDE VIEW
Scale 1:2

TESTING &
CERTIFICATION AUSTRALIA
LABORATORY REFERENCE No. 101945
This drawing/schedule applies to the apparatus tested.
M.A. Cantelt 18/1/05
Signature on behalf of the Testing Authority. Date

TITLE: NITECH 2250/5 Class5p20 15VA Current Transformer	DRAWN BY: Mr Frank Lin
DRAWING NUMBER: 2250/5 2 OF 2	DATE ISSUED: 25 OCT 2004
	APPROVED BY: Mr Peter Lin



SECTION A–A

Scale 2:1

Manufacturer: DIXSON INDUSTRIAL (S) PTE LTD
Address: NO.32 Ang Mo Kio Industrial Park 2,
Sing Industrial Complex, #03–12.
SINGAPORE 569510
TEL/FAX: +65 64812240 / 64811371

Number of turns for CT: 500 Turns.

Materials: Diameter 1.6mm enamelled copper wire.

Epoxy for coating steel core–5700 Epoxy Power Coating.

Epoxy for final coating–Mixture of Casting Resin 5957A and Curing Agent 5957B.

Steel core–0.27mm Thick Silicon Steel.

Two layers of winding. The 1st layer is coated in epoxy and wrapped with PVC tape of thickness 0.15mm with isulation class B, winding is then fully coated in epoxy.

TESTING &
CERTIFICATION AUSTRALIA
LABORATORY REFERENCE No. 101945
This drawing/schedule applies to the apparatus tested.
M.A. Cantell 18/1/05
Signature on behalf of the Testing Authority. Date

I Frank Lin Of Dixson Industrial (S) Pte Ltd
Certify that this drawing is a true representation
of the apparatus tested.

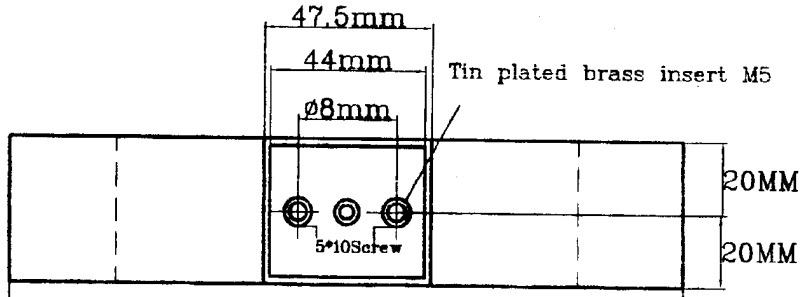
TITLE: NITECH 2500/5 Class1 30VA Current Transformer	DRAWN BY: Mr Frank Lin
DRAWING NUMBER: 2500/5 1 OF 2	DATE ISSUED: 25 OCT 2004
	APPROVED BY: Mr Peter Lin

I Mr Frank of Dixson Industrial (S) Pte Ltd certify that this drawing is a true representation of the apparatus tested.

Frank

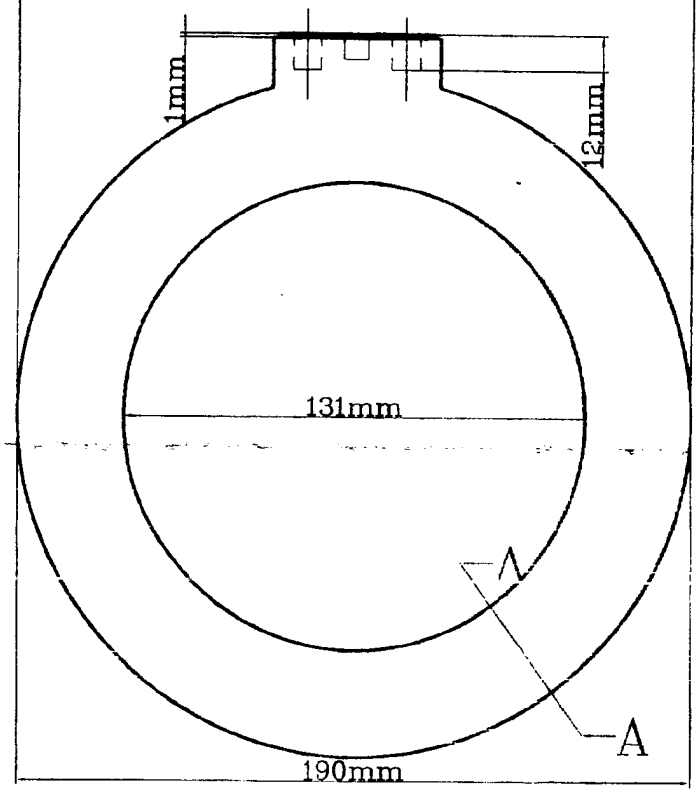
TOP VIEW

Scale 1:2



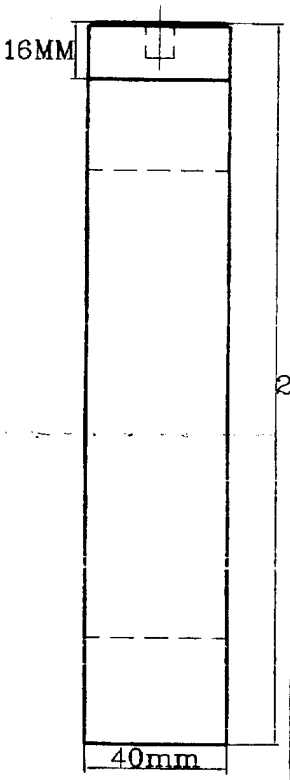
PLAN VIEW

Scale 1:2



SIDE VIEW

Scale 1:2



TESTING & CERTIFICATION AUSTRALIA
LABORATORY REFERENCE No. 101945
This drawing/schedule applies to the apparatus tested.
M.A Cantelt 19/1/05
Signature on behalf of the Testing Authority. Date

TITLE: NITECH 2500/5 Class1 30VA Current Transformer	DRAWN BY: Mr Frank Lin
DRAWING NUMBER: 2500/5 2 OF 2 / DATE ISSUED: 25 OCT 2004	APPROVED BY: Mr Peter Lin