



Communication Certification Laboratory

December 19, 2006

Samuel Smith
Adept Systems Inc.
2966 Fort Hill Road
Eagle Mountain, UT 84043

Dear Samuel,

Communication Certification Laboratory has completed the testing and evaluation of the GRouter4 GR4-E and Grouter4 GR4-W to the requirements of IEC 60950-1:2001. A copy of the report is provided for your files. If there is anything else we can do, or if you have any questions, please let me know.

Sincerely yours,

COMMUNICATION CERTIFICATION LABORATORY

Joseph W. Jackson
VP - Marketing

Enclosures

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CCL

Test Report to EN 60950-1:2001

For:

Adept Systems Inc,
2966 Fort Hill Road
Eagle Mountain, UT 84005-4108

Models: GRouter4 GR4-E, GRouter4 GR4-W
CCL Test Report Number: 89-0748

This report has been prepared by Communication Certification Laboratory to verify compliance of the Adept Systems Inc. GRouter4 GR4-E, GRouter4 GR4-W, with the requirements of EN 60950. The test results presented in this report relate only to the object tested. This report may not be reproduced except in full.

I, individually and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

COMMUNICATION CERTIFICATION LABORATORY



Robert Keller
Senior Engineer

Date: December 18, 2006

EXPLANATION OF CATEGORIES OF COMPLIANCE

Each of the technical clauses of EN 60950 is evaluated within the body of this report. The evaluation and/or its results are summarized by one of the following categories:

Note: For the purposes of these definitions "conditions" is intended to mean circumstances or situation. As an example, for the requirements of Clause 2.4 of EN 60950 (limited current circuits), an EUT that does not include this type of circuitry would be judged as not meeting the conditions of the clause. "Criteria" is meant to indicate the standard or yardstick dictated by the clause.

- "Pass" This indicates that the equipment under test (EUT) was evaluated to, and met the conditions and criteria of the specified clause.
- "Fail" This indicates that the EUT was evaluated to, and met the conditions of the specified clause, but did not meet the criteria of the clause.
- "Not Affected" This designation would only apply in the case of equipment being evaluated for a variation of permit. It would apply to the equipment when engineering evaluation shows that the equipment meets the conditions of the relevant clause but that the variation or modification is such that it would not affect compliance to the criteria of the clause.
- "Noted" This indicates that the clause is informational only and that no testing or evaluation was performed, notwithstanding the fact that the information may affect the testing and evaluation performed under another clause.
- "N/A" This indicates that the EUT was evaluated to, and did not meet the conditions of the specified clause and was therefore not tested to show compliance with the criteria.
- "Not Tested" This indicates that the EUT was evaluated to, and met the conditions of the specified clause, but was not tested to show compliance. Reasons for this may vary, but in general it would be at the request of the applicant.

SUMMARY OF TEST RESULTS

With the exception of the clauses noted below, all clauses within this report were marked as "PASS", "NOTED", or "N/A"

The following clauses were marked as "FAIL":

No clauses noted

The following clauses were marked as "NOT TESTED":

No clauses noted

Introduction

Applicant: Adept Systems Inc.

Product Identification: GRouter4 GR4-E, GRouter4 GR4-W

Type of Equipment: The GRouter4 is a device for use in LonWorks systems to allow bi-directional communications between EIA 709.1 and IP based systems. The GR4-E provides an Ethernet port while the GR4-W provides a WiFi radio link for connecting to the network. The GRouter4 receives power from a customer supplied 5 VDC source. Power for testing was provided by an Addonics ST-7.5W 5 VDC power adapter.

Product Information:

Models: GRouter4 GR4-E, GRouter4 GR4-W

General: The above models are identical in construction except for model designation, SELV circuitry, and minor mechanical variations

Provided Documents:

- General description of the equipment tested
- Operator Instructions
- Installation Instructions
- Service Instructions
- Component Data Sheets, Certifications and/or Construction drawings
- Circuit Schematics
- Prints of Printed Circuit Boards
- Photographs of the Equipment as Tested

1. Class of Equipment: III
2. Connection to Supply: N/A
3. Type of Power System: N/A
4. Mobility: Desktop
5. Weight of Equipment: $\leq 0.05\text{kg}$
6. Pollution Degree: 2
7. Maximum Rated Ambient Temperature: Not specified

8. Accessory: None
9. Installation: May be installed in the field in accordance with the installation instructions provided with the equipment.
10. Conditions of Acceptability: None

Product Description:

Enclosure: Dimensions: 94mm x 34mm x 1.6mm thick. Lexan 940 plastic, flame rated 94V-0.

1. GRouter4 GR4-E main PCB: Dimensions: 90mm x 75mm x 1.6mm thick. Flame rated 94V-0.
Contains SELV circuits only.
 - a. Lithium Battery: UL
Manufacturer: Panasonic
Part Number: BR2325
Ratings: 3Vdc, 165mAh, 1uA reverse charging
2. GRouter4 GR4-W main PCB: Dimensions: 90mm x 75mm x 1.6mm thick. Flame rated 94V-0.
Contains SELV circuits only.

Test and evaluation

1.5 *Components*

1.5.1 *General:*

Evaluation - Components comply with the requirements of this standard or with the safety aspects of the relevant IEC component standards.

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.2 *Evaluation and testing of components*

Definition -

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.3 *Thermal Controls:*

Evaluation - Thermal controls were tested in accordance with Annex K.

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.4 *Transformers:*

Evaluation - Transformers comply with the relevant requirements of AS 3260, including Annex C.

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.5 *Interconnecting cables:*

Evaluation - All interconnecting cables comply with the relevant requirements of this standard and shall not present a hazard whether they are detachable or non-detachable.

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.6 *Capacitors in Primary Circuits:*

Evaluation -

- Capacitors connected between two line conductors, or between one line conductor and the neutral conductor of the mains supply shall comply with IEC 60384-14:1993, subclass X1 or X2. The duration of the damp heat, steady test as specified in 4.12 of IEC 60384-14:1993 shall be 21 days.
- Capacitors connected between the Primary Circuit and protective earth shall comply with IEC 60384-14:1993, subclass Y1, Y2, or Y4, as applicable

Pass Fail Not Affected
 Noted N/A Not Tested

1.5.7 *Double or Reinforced Insulation bridged by components*

1.5.7.1 *Bridging capacitors:*

Evaluation - Bridging capacitors are applied in the proper number and comply with the relevant requirements of IEC 60384-14:1993 and are applied properly.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.5.7.2 *Bridging resistors*

Evaluation - Bridging resistors comply with the requirements for spacing between terminals and are applied properly.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.5.7.3 *Accessible parts*

Evaluation - Accessible conductive parts that are bridged by components comply with requirements for Limited Current Circuits.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.5.8 *Components in equipment for IT Power Systems:*

Evaluation and/or Test - Components connected between line and earth are capable of withstanding the stress due to voltage equal to the line to line voltage. Capacitors must comply with Y1, Y2, or Y4.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.6 *Power Interface*

1.6.1 *AC Power Distribution Systems*

Definition -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.6.2 *Input current:*

Test - The input current of the equipment at normal load and rated voltage. Allow the current to stabilize. The measured current (rms) shall not exceed the rated current by more than 10%.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.6.3 *Voltage limit of hand-held equipment:*

Evaluation - The rated voltage of the equipment does not exceed 250V.

Pass Fail Not Affected
 Noted N/A Not Tested

1.6.4 *Neutral conductor:*

Evaluation and/or Test - The neutral conductor is insulated from earth as if it were a line conductor.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7 *Marking and Instructions*

1.7.1 *Power rating:*

Evaluation - Equipment provides required labels and markings.

Equipment is not provided with a means for direct connection to the supply mains.

<input type="checkbox"/> Rated voltage	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Rated frequency	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Rated current	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Symbol for nature of supply	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Manufacturer name or trade-mark or identification mark.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Model or type reference	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
<input type="checkbox"/> Symbol for class II equipment	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
	<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.2 *Safety instructions:*

Evaluation -

No special operating instructions are required.

Special Safety Instructions are provided as required.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.3 *Short duty cycles:*

Evaluation - The equipment is marked, as required, with the rated operating time.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.4 *Supply voltage adjustment:*

Evaluation - The method of adjustment is in the installation instructions and the means of adjustment is simple and obvious. The required label is supplied near the power rating marking.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.5 *Power outlets on the equipment:*

Evaluation - Outlet is properly marked showing the maximum permissible load.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.6 *Fuse identification:*

Evaluation - Markings provided showing:

- rated current; and
- voltage rating.
- fuse type (time delay).

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.7 *Wiring terminals:*

1.7.7.1 *Protective earthing and Bonding terminals:*

Evaluation - The terminals are properly marked.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.7.2 *Terminals for A.C. Mains Supply conductors:*

Evaluation -

- Neutral terminal indicated by letter N; and
- sequence of phase rotation for three phase equipment is unambiguous.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.8 *Controls and indicators:*

1.7.8.1 *Identification, location and marking:*

Evaluation - Indicators, switches and other controls affecting safety are identified or placed so as to indicate clearly which function they control. Markings are located:

- on or adjacent the switch; or
- elsewhere, where it is obvious which switch the marking applies to.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.8.2 *Colours:*

Evaluation - Colours of controls and indicators, affecting safety, comply with IEC 60073.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.8.3 *Symbols:*

Evaluation - Symbols used to indicate "ON" and "OFF" conditions are proper.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.8.4 *Markings using figures:*

Evaluation - Zero is used to indicate the off position, and higher figures are used to indicate greater output, input, etc.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.9 *Isolation of multiple power sources:*

Evaluation - Definite marking shows which disconnect devices provides isolation from power and which disconnect device isolates each section of the equipment.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.10 *IT power systems:*

Evaluation - Equipment installation instruction indicate IT power system.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.11 *Thermostat and other regulating devices:*

Evaluation - Devices are provided with an indication for the direction of adjustment to increase or decrease the value of the characteristic being adjusted.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.12 *Language:*

Evaluation - Instructions and markings related to safety will be provided in a language which is acceptable in the country in which the equipment is to be installed.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

1.7.13 *Durability:*

Evaluation and Test - Rub the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit (cleaning solvent). The markings remained legible.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.14 *Removable parts:*

Evaluation - Markings are not placed on removable parts.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.15 *Replaceable batteries:*

Evaluation - Markings provided show warning statement close to the battery or in the service instructions.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.16 *Operator access with a tool:*

Evaluation - If a tool is used to gain access to an operator access area, the same tool can not be used to gain access to a hazard area or the compartment must be marked to discourage operator access.

Pass Fail Not Affected
 Noted N/A Not Tested

1.7.17 *Equipment for restricted access locations:*

Evaluation - The installation instructions contain a statement that the equipment is intended only for installation in a restricted access location.

Pass Fail Not Affected
 Noted N/A Not Tested

2 *PROTECTION FROM HAZARDS*

2.1 *Protection against electric shock and energy hazards*

2.1.1 *Protection in operator access areas:*

Definition -

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.1 *Access to energized parts:*

Evaluation and Test - (test finger) Protection against operator contact with:

- bare parts of ELV Circuits; and
- bare parts at Hazardous Voltages; and
- Functional or Basic Insulation of parts or wiring at ELV or Hazardous Voltage; and
- unearthed conductive parts separated from ELV or Hazardous Voltage by Operational or Basic Insulation only; and
- bare parts of certain TNV circuits.

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.2 *Battery compartments:*

Evaluation -

- Compartment door requires a deliberate technique to open; and
- TNV not accessible when the door is closed; and
- proper markings are applied.

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.3 *Access to ELV wiring:*

Evaluation and test: Internal accessible wiring at ELV:

- meets requirements for Supplementary Insulation; or
- Not subject to damage, stress, or operational handling; is routed and fixed so as not to touch unearthed accessible metal parts; does have proper distance through insulation, and passes the electric strength test for Supplementary Insulation.

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.4 *Access to Hazardous voltage circuit wiring:*

Evaluation and test: Insulation of internal wiring at Hazardous Voltage that is Operator accessible or that is not routed and fixed to prevent it from touching unearthed accessible conductive parts has adequate distance through insulation and dielectric withstand strength.

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.5 *Energy hazards:*

Evaluation - There is no energy hazard in operator access areas.

Pass Fail Not Affected
 Noted N/A Not Tested

2.1.1.6 *Manual controls:*

Evaluation - Conductive shafts of operating knobs, handles, and levers and the like are not connected to Hazardous Voltages, ELV Circuits, or TNV Circuits. Conductive operator points earthed through a pivot or bearing are:

- separated from Hazardous Voltages by Double or Reinforced Insulation; or
- covered by Supplementary Insulation over accessible parts.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.1.1.7 *Discharge of capacitors in the Primary Circuit:*

Evaluation - No risk of electric shock from stored charge on capacitors connected to the A.C. Mains Supply.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.1.2 *Protection in service access areas:*

Evaluation - Bare parts are properly located or guarded.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.1.3 *Protection in restricted access locations:*

Evaluation - Secondary Circuits at Hazardous Voltage that comply with 2.3.1, are permitted access with test finger but not to accidental contact. Bare parts that involve an energy hazard are properly located or guarded.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.2 *SELV Circuits*

2.2.1 *General:*

Evaluation - Applicable voltages at safe levels under both normal and single fault conditions.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.2.2 *Voltages under normal conditions:*

Evaluation and Test - Measured the applicable voltages (SELV to SELV and SELV to earth or body) under normal conditions. The voltages do not exceed 42.4 V peak or 60 V dc.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.2.3 Voltages under fault conditions:

Evaluation and Test - Measured the applicable voltages under single fault conditions. The voltages do not exceed 42.4 V peak or 60 Vdc for longer then 0.2 s, and a limit of 71 V peak or 120 Vdc was not exceeded. Evaluated to methods of clause 2.2.3.1 through 2.2.3.3.

Pass Fail Not Affected
 Noted N/A Not Tested

2.2.3.1 Separation by Double or Reinforced Insulation (Method 1):

Evaluation -

Pass Fail Not Affected
 Noted N/A Not Tested

2.2.3.2 Separation by earthed screen (Method 2):

Evaluation -

Pass Fail Not Affected
 Noted N/A Not Tested

2.2.3.3 Protection by earthing of the SELV circuit (Method 3):

Evaluation -

Pass Fail Not Affected
 Noted N/A Not Tested

2.2.4 Connection of SELV circuits to other circuits:

Evaluation - SELV Circuits are permitted to be connected to other circuits provided:

- the SELV Circuit is separated by Basic Insulation from any Primary Circuit; and
- the SELV Circuit meets the limits of 2.2.2; and
- the SELV Circuit meets the limits of 2.2.2 in the event of a single fault.

Pass Fail Not Affected
 Noted N/A Not Tested

2.3 TNV circuits

2.3.1 Limits:

Evaluation -

a) TNV-1 circuit voltages do not exceed:

the limits of 2.3.2 for SELV circuits under normal operating conditions

the limits of figure 15 measured across 5 kΩ in single fault conditions

Pass Fail Not Affected

Noted N/A Not Tested

b) TNV-2 and TNV-3 circuit voltages comply with:

$\frac{U_{ac}}{70.7} + \frac{U_{dc}}{120} \leq 1$ for voltages other than ringing signals

the limits of figure 15 measured across 5 kΩ in single fault conditions

the criteria of either M.2 or M.3 for ringing signals

Pass Fail Not Affected

Noted N/A Not Tested

2.3.2 Separation from other circuits and from accessible parts:

Evaluation - There is Basic or better Insulation between TNV-2 and TNV-3 circuits and

Operator-accessible conductive parts; or

SELV circuits; or

TNV-1 circuits.

Basic Insulation is not required when:

the SELV circuit, TNV-1 circuit or accessible conductive part is connected to the protective earthing terminal in accordance with 2.6; and

for Pluggable Equipment Type A, the installation instructions specify that the earthing terminal is to have a permanent connection to earth; and

for Pluggable Equipment Type B, the equipment complies with Pluggable Equipment Type A or instructions are given in installation manual or a marking is on the equipment specifying the user to disconnect all Telecommunication Network connectors; and

the test of 2.3.5 is applied if the TNV circuits are intended to receive signals or power that are generated externally.

Pass Fail Not Affected

Noted N/A Not Tested

2.3.3 *Separation from hazardous voltages:*

Evaluation - TNV separated from hazardous voltages by:

- Double or Reinforced Insulation; or
- Basic Insulation with a protective screen.

Pass Fail Not Affected
 Noted N/A Not Tested

2.3.4 *Connection of TNV circuits to other circuits:*

Evaluation and Test - TNV Circuits connected to other circuits are separated from Primary Circuits by Basic Insulation. The limits of figure 2D are not exceeded in the event of single fault.

Pass Fail Not Affected
 Noted N/A Not Tested

2.3.5 *Operating voltages generated externally:*

Evaluation and Test - Voltage limits are not exceeded as a result of the specified test.

Pass Fail Not Affected
 Noted N/A Not Tested

2.4 *Limited current circuits*

2.4.1 *General:*

Evaluation and Test - Circuits meet requirements of 2.4.2 and are not exceeded even in the event of a single failure.

Pass Fail Not Affected
 Noted N/A Not Tested

2.4.2 *Limit Values:*

Evaluation and Test -

- The current does not exceed 0.7 mA peak or 2 mA dc. For frequencies above 1 kHz, the limit of 0.7 mA is multiplied by the value of the frequency in kilohertz (but shall not exceed 70 mA peak).
- Circuit capacitance for parts at less than 450 V peak or dc, shall not exceed 0.1 µF.
- Circuit capacitance for parts exceeding 450 peak V but less than 1500V peak or dc, shall not exceed $45/U$ nF where U is expressed in kilovolts.
- Circuit capacitance for parts exceeding 1500V peak or dc, shall not exceed $700/U^2$ nF where U is expressed in kilovolts.

Pass Fail Not Affected
 Noted N/A Not Tested

2.4.3 Connection of Limited Current Circuits to other circuits:

Evaluation - Limited Current Circuits connected to other circuits meet requirements even under fault conditions.

Pass Fail Not Affected
 Noted N/A Not Tested

2.5 Limited power source:

Evaluation - Limited power sources shall incorporate an isolating transformer and meet the requirements of table 2B and table 2C.

- The output of the isolating transformer is inherently limited; or
- A fixed impedance limits the output; or
- An overcurrent protective device is used; or
- A regulating network limits the output (normal and single fault conditions); or
- The circuit includes a regulating network and an overcurrent protective device.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6 Provisions for Earthing and Bonding

2.6.1 Protective earthing:

Evaluation - The following parts are connected to main protective earthing terminal:

- Accessible conductive parts that might assume Hazardous Voltage in the event of a single failure.
- Parts requiring to be earthed to maintain the integrity of the SELV circuit
- Parts requiring to be earthed to maintain the integrity of the TNV circuit
- SELV, TNV and accessible conductive parts if power source is not a Telecommunications Network
- Transformer screens and components that might assume Hazardous Voltage in the event of a single failure.
- SELV, TNV circuits that require earthing to eliminate touch current to a Telecommunication Network
- Conductive parts in service access areas are reliably earthed or properly labeled.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.2 Functional Earthing:

Evaluation -

- Meets requirements for separation from Hazardous Voltages, and
- if connected to Protective Earth, complies with requirements, and
- the terminal is properly marked, and
- colour of conductors are not the same as Protective Earth conductors except in special cases.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.3 *Protective Earthing and Protective Bonding Conductor*

2.6.3.1 *Sized of Protective Earthing Conductors:*

Evaluation - Conductors are of proper sized as given in table 3B

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.6.3.2 *Size of Protective Bonding Conductors:*

Evaluation -

- Conductors are of proper sized as given in table 3B, or
- conductors comply with the requirements of 2.6.3.3, or

- components are rated the same as or greater that conductors supplying power

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.6.3.3 *Resistance of protective earthing conductors and their terminations:*

Evaluation and Test -

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.6.3.4 *Colour of installation:*

Evaluation - Earthing insulation is:

- green/yellow
- transparent (braided earth conductor)
- not subject to misinterpretation of the use of the conductor (ribbon cables, printed circuits, etc.) (any color allowed).

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.6.4 *Terminals*

2.6.4.1 *Protective earthing and bonding terminals:*

Evaluation -

- Terminals comply with table 3E, or
- Main protective earthing terminal is readily accessible and because of size, is provided with factory installed securement

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.6.4.2 *Separation of protective earthing conductor from protective bonding conductors:*

Evaluation - There are separate terminals for protective earthing conductors and protective bonding conductors

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5 *Integrity of protective earthing*

2.6.5.1 *Interconnection of equipment:*

Evaluation - Protective earth connections properly applied to assemblies.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.2 *Components in protective earthing conductors and protective bonding conductors:*

Evaluation - Protective earthing conductors do not contains switches

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.3 *Disconnection of protective earth:*

Evaluation - Disconnecting one point does not break protective earth connection to other parts unless the potential hazard is removed as same time.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.4 *Parts that can be removed by an Operator:*

Evaluation - Protective earthing connection made first and removed last.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.5 *Parts removed during servicing:*

Evaluation -

- Protective earthing connections do not have to be disconnected for servicing.
- Potential hazard removed at same time.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.6 *Corrosion resistance:*

Evaluation - Contact points not subject to significant corrosion as outlined in annex J.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.7 *Screws for protective earthing:*

Evaluation - Screws provide protective earthing and proper protective bonding.

Pass Fail Not Affected
 Noted N/A Not Tested

2.6.5.8 *Reliance of telecommunication network:*

Evaluation - Protective earthing does not rely on the Telecommunications Network.

Pass Fail Not Affected
 Noted N/A Not Tested

2.7 *Overcurrent and earth fault protection in Primary Circuits*

2.7.1 *Basic requirements:*

Evaluation - Protection against excessive currents, short circuits and earth faults in Primary Circuits are provided as:

- An integral part of the equipment; or
- as part of the building installation.
- Pluggable Equipment Type B complies

Pass Fail Not Affected
 Noted N/A Not Tested

2.7.2 *Faults not covered in 5.3:*

Evaluation -

Pass Fail Not Affected
 Noted N/A Not Tested

2.7.3 *Short-circuit backup protection:*

Evaluation - Adequate breaking capacity to interrupt the maximum fault current which can flow is provided by:

- Protective devices integral to the equipment.
- Short circuit back-up protection provided by the building installation.
- Appropriate instructions are provided for permanently connected equipment and pluggable equipment type B.

Pass Fail Not Affected
 Noted N/A Not Tested

2.7.4 *Number and location of protective devices:*

Evaluation - Protective systems or devices are in such number and so located as to detect and interrupt the excessive current flowing in any possible fault current path.

Pass Fail Not Affected
 Noted N/A Not Tested

2.7.5 Protection by several devices:

Evaluation - Where protective devices are used in more than one pole of a supply to a given load, those devices are located together.

Pass Fail Not Affected
 Noted N/A Not Tested

2.7.6 Warning to service personnel:

Evaluation - Suitable warning is provided to alert Service Personnel of possible hazards when:

- fuses are employed in the neutral of single phase Class I equipment connected to a polarized supply; and
- where, after operation of the protective device, parts of the equipment that remain under voltage might represent a hazard during servicing.

Pass Fail Not Affected
 Noted N/A Not Tested

*2.8 Safety Interlocks**2.8.1 General:*

Evaluation - Safety interlocks are provided where operator access involves areas normally presenting hazards.

Pass Fail Not Affected
 Noted N/A Not Tested

2.8.2 Protection requirements:

Evaluation and Test - Safety interlocks are designed so that the hazard is removed before contact, by the test finger, with hazardous parts is possible.

Pass Fail Not Affected
 Noted N/A Not Tested

2.8.3 Inadvertent reactivation:

Evaluation - Interlock prevents inadvertent reactivation of the hazard while the hazard is exposed.

Pass Fail Not Affected
 Noted N/A Not Tested

2.8.4 Fail-safe operation:

Evaluation -

- The probable failure mode of the interlock system will not create a hazard for which protection is required; or
- failure of the interlock system is not likely to occur during the normal life of the equipment.

Pass Fail Not Affected
 Noted N/A Not Tested

2.8.5 Interlocks with moving parts:

Evaluation and Test - Moving mechanical parts in interlock system have adequate endurance.

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.6 Overriding an interlock:

Evaluation -

- Requires intentional effort to operate, and
- resets automatically or prevents normal operation unless restored, and
- requires a tool and is not operable by test finger, and
- is not by-passable for an extreme hazard unless other protection mandated by equipment.

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.7 Switches and relays in interlock systems:

Evaluation - Switches and relays comply with requirements and pass all applicable tests.

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.7.1 Contact gaps:

Evaluation and Test - Gap is not less than:

- that for a primary power disconnect device for devices in primary circuits.
- the clearance values in 2.10.3.3

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.7.2 Overload test:

Test -

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.7.3 Endurance test:

Test -

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.7.4 Electric strength test:

Test - Dielectric test performed after tests 2.8.7.3 and 2.8.7.3.

- Pass Fail Not Affected
- Noted N/A Not Tested

2.8.8 Mechanical actuators:

Evaluation - Actuator is not over stressed.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.9 Electrical Insulation

2.9.1 Properties of insulating materials:

Evaluation and Test - Material is adequate for the appropriate application

- Material is not natural rubber nor does it contain asbestos.
 - Material is not hygroscopic.
 - Data could not confirm the material is non-hygroscopic so it was tested to 2.9.2 and 5.2.2.
- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.9.2 Humidity conditioning:

Test -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.9.3 Requirements for insulation:

Evaluation and Test - Insulation complies with the heating requirements of 4.5.1. Also:

- the applicable electric strength requirements of 5.2; and
 - the requirements of Clearance, Creepage Distance and solid insulation of 2.10.
- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

2.9.4 Insulation parameters:

Definitions -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.9.5 Categories of insulation:

Definitions -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10 Clearances, Creepage Distances, and distances through insulation

2.10.1 General:

Definitions -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.2 Determination of working voltage:

Definitions -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.3 Clearances

2.10.3.1 General:

Definitions -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.3.2 Clearances in Primary Circuits:

Test -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.3.3 Clearances in Secondary Circuits:

Test -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.3.4 Measurement of transient levels:

Test -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.4 Creepage distances:

Test -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

2.10.5 Solid insulation:

Test - Adequacy of solid insulation is verified by tests in 5.2

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.5.1 Minimum distances through insulation:

Evaluation and Test - The equipment provides the proper distance through insulation or layers of insulation.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.5.2 Thin sheet material:

Evaluation and Test - Thin sheet material is not subject to handling or abrasion during Operator servicing and

- Supplementary Insulation comprises at least two layers of appropriate material each of which will pass the electric strength test; or
- Supplementary Insulation comprises at least three layers of appropriate material for which all combinations of two layers together will pass the electric strength test; or
- Reinforced Insulation comprises at least two layers of appropriate material each of which will pass the electric strength test; or
- Reinforced Insulation comprises at least three layers of appropriate material for which all combinations of two layers together will pass the electric strength test.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.5.3 Printed boards:

Evaluation and Test - For Supplementary or Reinforced Insulation between conductor layers in printed circuits boards

- minimum distance through insulation is 0.4 mm; or
- meets requirements according to table 2M.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.5.4 *Wound components:*

Evaluation and Test - Insulation between windings complies with 2.10.5.1 or 2.10.5.2, unless one of the following constructions are used:

- wire that has insulation that complies with 2.10.5.1; or
- wire having multi-layered extruded or spirally wrapped insulation (where layers can be individually tested for electric strength) complies with 2.10.5.2 and passes the tests of annex U; or
- wire having multi-layered extruded or spirally wrapped insulation (where only the finished wire can be tested) complies with annex U.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6 *Coated printed boards*

2.10.6.1 *General:*

Evaluation - Printed boards are coated with a suitable coating material; one or both conductive parts and at least 80% of the distances over the surface between the conductive parts are coated; and manufacturing is subject to a quality control program.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6.2 *Sample preparation and preliminary inspection:*

Evaluation - A genuine sample shows no evidence of pinholes or bubbles in the coating or breakthrough of conductive tracks and corners.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6.3 *Thermal cycling:*

Test -

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6.4 *Thermal ageing:*

Test - Genuine sample was aged in oven according to figure 2G:

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6.5 *Electric strength test:*

Test - Genuine sample was subjected to humidity conditioning of 2.9.2 and withstood relevant electric strength test of 5.2.2.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.6.6 Abrasion resistance test:

Test - Genuine sample was tested for abrasion and coating layer was not loosened nor was it pierced and sample withstood electric strength test as specified in 5.2.2.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.7 Enclosed and sealed parts:

Evaluation and Test - Enclosed or sealed components evaluated to the Clearance and Creepage Distance requirements for pollution degree 1. Part was subject to thermal cycling tests, humidity conditioning, and electric strength tests.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.8 Spacings filled by insulating compound:

Evaluation - Potted components or assemblies were subject to requirements for distance through insulation only.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.9 Component external terminations:

Evaluation and Test - Components meet requirements for spacing , insulation, and abrasion resistance test.

Pass Fail Not Affected
 Noted N/A Not Tested

2.10.10 Insulation in varying dimensions:

Evaluation - The Clearance and Creepage Distances and distance through insulation vary properly in accordance with the working voltage variations..

Pass Fail Not Affected
 Noted N/A Not Tested

3 WIRING, CONNECTIONS and SUPPLY*3.1 General**3.1.1 Current protection and overcurrent protection:*

Evaluation - The cross-sectional area of internal wires and interconnecting cables are adequate. All internal wiring and interconnecting cables used in distribution of primary power is protected against overcurrent and short circuit by suitably rated protective devices.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.2 *Protection against mechanical damage:*

Evaluation - Wireways are smooth and free from sharp edges. Wires are protected so that they do not come into contact with burrs, cooling fins, moving parts, etc. Holes in metal have smooth well-rounded surfaces or are provided with bushings.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.3 *Securement of internal wiring:*

Evaluation - Internal wiring is routed, supported, and clamped in a manner that reduces likelihood of
 excessive strain on wire and terminal connections.; and
 secured to prevent loosening of terminal connections; and
 damage of conductor insulation.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.4 *Insulation of conductors:*

Evaluation and Test - Insulation is fulfills requirements of 2.10.5 and is capable of withstanding applicable electric strength test specified in 5.2.2.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.5 *Beads and ceramic insulators:*

Evaluation and Test - Beads and similar ceramic conductors
 are fixed or supported so that they cannot change their position; and
 they do not rest on sharp edges or sharp corners.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.6 *Screws for electrical contact pressure:*

Evaluation - Screws engage at least two complete threads, including insulating type. Insulating screws are not used at electrical connections, including protective earth.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.7 *Non-metallic materials in electrical connections:*

Evaluation - Contact pressure not transmitted through insulating material.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.8 *Self-tapping and spaced thread screws:*

Evaluation - Spaced thread (sheet metal) screws are not used for the connection of current carrying parts unless provided with a suitable means of locking. Self-tapping (thread-cutting or thread-forming) screws generate full form of standard machine screw thread.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.9 *Termination of conductors:*

Evaluation and Test - Conductors are terminated in a manner that does not reduce Clearances or Creepage Distances. On solder connections, their reliance is not placed on the connection alone to maintain the conductor in position.

Pass Fail Not Affected
 Noted N/A Not Tested

3.1.10 *Sleeving on wiring:*

Evaluation - The sleeving used for Supplementary Insulation is retained in position by a positive means.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2 *Connection to A.C. Mains supply*

3.2.1 *Means of connection:*

Evaluation -Disconnect device used:

- plug on the power supply cord
- appliance coupler
- isolating switch
- circuit-breaker
- other

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.2 *Multiple supply connections:*

Evaluation and Test - Equipment is provided with

- separate means of connection for different circuits; and
- supply plug is not interchangeable; and
- bare parts of an ELV and/or a Hazardous Voltage circuit are not Operator accessible.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.3 *Permanently connected equipment:*

Evaluation - Permanent connection is

- set of terminals; or
 - permit connection of supply wires after equipment has been fixed to support; and
 - is provided with proper entries for suitable connection.
- non-detachable power supply cord.
- Also, the equipment's Rated Current does not exceed 16A, so cables and conduits comply with Table 3A.
- Conduit and cable entries and knock-outs for supply connectors are designed or located that the introduction of the conduit and cable does not effect the protection against electric shock, or reduce Clearances or Creepage distances.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.4 *Appliance inlets:*

Evaluation and Test - Appliance inlets:

- do not allow access to Hazard Voltages during insertion or removal of the connector; and
- allow insertion without difficulty; and
- do not require the connector to support the equipment.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.5 *Power supply cords:*

Evaluation - Power supply cords are one the following:

- Rubber supply cords are of synthetic rubber and not lighter than ordinary tough rubber-sheathed flexible cord according to IEC 60245.
- Polyvinyl chloride insulated cords are not lighter than light PVC sheathed flexible cord according to IEC 60227 for equipment of mass < 3 kg and not lighter than ordinary PVC for equipment of mass > 3 kg.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.6 Cord anchorages and strain relief:

Evaluation - Non-Detachable Power Supply Cords:

- are secured so connecting points of the cord are relieved from strain; and
- the outer covering of the cord is protected from abrasion.
- It is not possible to push the cord back into the equipment if this results in a hazard.
- Containing Protective earthing Conductor, the conductor is the last to take strain.
- The cord anchorage provides Supplementary Insulation.

The cord anchorage is such that:

- cord replacement does not impair the safety of the equipment; and
- it is clear how relief from strain is to be obtained for ordinary replacement cords; and
- the cord is not clamped by a screw which bears directly on the cord; and
- methods such as tying the cord into a knot are not used; and
- the cord cannot rotate in relation to the body to such an extent that mechanical strain is imposed on the connections.

Where tests are necessary - Attempt to push the cord into the equipment. It shall not be possible to push the cord to such an extent that the cord or internal parts of the equipment could be damaged.

Subject the cord to 25 steady pulls (1 s duration) of the value shown in Table 3C.

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

3.2.7 Protection against mechanical damage:

Evaluation -

- Cord not exposed to sharp edges and extends within the equipment.

Inlet Bushings:

- are reliably fixed; and
- require use of tool for removal.
- in a non-metallic enclosure is of insulating material.
- that are secured to a conductive part that is not protectively earthed meets requirements for Supplementary Insulation.

- | | | |
|--------------------------------|---|---------------------------------------|
| <input type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> Not Affected |
| <input type="checkbox"/> Noted | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Not Tested |

3.2.8 Cord guards:

Evaluation and Test - A cord guard is provided at the supply cord inlet opening of equipment which has a Non-Detachable Power Supply Cords, and which is hand held or intended to be moved during operation. Also, the cord guard:

- is designed as to protect the cord against excessive bending where it enters the equipment; and
- is of insulating material; and
- is fixed in a reliable manner; and
- is projected outside the equipment beyond the inlet opening for a distance of at least 5 times the overall diameter or, for flat cords, at least 5 times the major overall cross-sectional dimensions of the cord; and
- complies with the test requirements of stress and temperature.

Pass Fail Not Affected
 Noted N/A Not Tested

3.2.9 Supply wiring space:

Evaluation - Supply wiring space:

- allows conductors to be introduced and connected easily; and
- is designed so that the uninsulated end of a conductor is unlikely to become free from its terminal or cannot come into contact with accessible conductive parts; and
- permits checking that the conductors are correctly connected and positioned; and
- allows covers to be fitted without risk of damage to the supply conductors; and
- covers giving access to terminals can be removed with a commonly available tool.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3 Wiring terminals for connection of external conductors

3.3.1 Wiring terminals:

Evaluation - Connection to terminals made by effective means.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.2 Connection of Non-Detachable Supply Cords:

Evaluation and Test - The connection of the individual conductors to the internal wiring of the equipment provides a reliable electrical and mechanical connection without exceeding the temperature limits.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.3 *Screw terminals:*

Evaluation - Screws and nuts have proper thread pitch and strength. They are not used to fix other conductor unless arranged such that displacement of any conductor is unlikely.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.4 *Conductor sizes to be connected:*

Evaluation - Terminal and conductor size match.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.5 *Wiring terminal sizes:*

Evaluation and Test - Wring terminals comply with the minimum sizes in table 3E.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.6 *Wiring terminal design:*

Evaluation - Terminals:

- clamp the conductor between metal surfaces with sufficient contact pressure without damage to the conductor; and
- do not allow the conductor to slip out when the clamping screws or nuts are tightened; and
- provide the appropriate fixing hardware.

Terminals are fixed so:

- the terminal itself does not work loose; and
- do not subject internal wiring to stress
- do not allow reduction of creepage distances and clearances.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.7 *Grouping of wiring terminals:*

Evaluation - Terminals are grouped according to their proper circuit.

Pass Fail Not Affected
 Noted N/A Not Tested

3.3.8 *Stranded wire:*

Evaluation and Test - The end of the stranded conductor is properly secured where soldered. Terminals do not allow escaped strands of conductors to cause a hazard (8 mm loose strand test).

Pass Fail Not Affected
 Noted N/A Not Tested

3.4 *Disconnection from a.c. mains power*

3.4.1 *General requirement:*

Evaluation - Disconnect device provided.

Pass Fail Not Affected
 Noted N/A Not Tested

3.4.2 *Disconnect devices:*

Evaluation - Contact separation > 3 mm. Connected closely to the incoming supply. The equipment has the following disconnect device:

- plug on the power supply cord; or
- a mains plug that is part of Direct Plug-In Equipment; or
- an appliance coupler; or
- isolating switches; or
- circuit-breakers; or
- equivalent device.

Pass Fail Not Affected
 Noted N/A Not Tested

3.4.3 *Permanently connected equipment:*

Evaluation - The disconnect device is provided as part of equipment and is accompanied by instructions provided in accordance with 1.7.2.

Pass Fail Not Affected
 Noted N/A Not Tested

3.4.4 *Parts which remain energized:*

Evaluation - Supply side parts guarded to prevent accidental contact by service personnel.

Pass Fail Not Affected
 Noted N/A Not Tested

3.4.5 *Switches in flexible cords:*

Evaluation - Isolating switch not located in flexible cord.

Pass Fail Not Affected
 Noted N/A Not Tested

3.4.6 *Single-phase equipment:*

Evaluation - Disconnect device disconnects both poles simultaneously or instructions are given for the provision of an additional two-pole disconnect device in the building installation when the equipment is used where identification of the neutral in the mains supply is not possible.

Pass Fail Not Affected
 Noted N/A Not Tested

*3.4.7 Three-phase equipment:***Evaluation** - The disconnect device disconnects all phase conductors simultaneously.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

*3.4.8 Switches as disconnect devices:***Evaluation** - On and off positions properly marked in accordance with 1.7.8.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

*3.4.9 Plugs as disconnect devices:***Evaluation** - Proper installation instructions supplied in accordance with 1.7.2.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

*3.4.10 Interconnected equipment:***Evaluation** - Proper devices, guards, and instruction markings are provided.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

*3.4.11 Multiple power sources:***Evaluation** - Instruction markings provided.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

*3.5 Interconnection of equipment**3.5.1 General requirements:***Definition** - Interconnecting circuits provide continued conformance with the requirements of 2.3 for SELV circuits and with the requirements of clause 6 for TNV circuits after making connections between equipments.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

3.5.2 *Types of interconnecting circuits:*

Evaluation - Interconnecting circuits are:

- an SELV or a limited current circuit; or
- a TNV-1, TNV-2 or TNV-3; or
- a hazardous voltage circuit.
- not ELV except as permitted under 3.5.3.

Pass Fail Not Affected
 Noted N/A Not Tested

3.5.3 *ELV interconnecting circuits:*

Evaluation - ELV interconnecting circuits are part of specifically complementary equipment arrangements, and continue to meet the requirements of the standard when connected.

Pass Fail Not Affected
 Noted N/A Not Tested

4 *PHYSICAL REQUIREMENTS*

4.1 *Stability:*

Test - With doors, drawers, etc. closed, tilt the equipment to an angle of 10°

Floor standing equipment and equipment 1 m or more in height with a mass of > 25 kg - Apply a force equal to the lesser of 20% of the weight of the equipment and 250 N in any non-upward direction at the least favorable point lower than 2 m.

Floor standing equipment - Apply a downward force of 800 N at the point of maximum moment which could be used as a working surface or foothold.

The unit does not become physically unstable.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2 *Mechanical Strength*

4.2.1 *General:*

Evaluation - The enclosure has adequate mechanical strength and is constructed to withstand rough handling as would occur in normal use.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.2 *Steady force test, 10 N:*

Test - Steady force test: 10 ± 1 N on components and parts other than parts serving as an Enclosure.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.3 *Steady force test, 30 N:*

Test - Steady force test: 30 ± 3 N force for a period of 5 s through the unjointed finger to the part of Enclosure that is located in an Operator Access Area, which is covered by door or cover.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.4 *Steady force test, 250 N:*

Test - Steady force test: 250 ± 10 N force for a period of 5 s through the test tool (contact over a circular plane surface 30 mm in diameter) to the external enclosure.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.5 *Impact test:*

Test - Horizontal surfaces - Drop a steel sphere (50 mm diameter, 500 ± 25 g.) from a height of 1300 mm above the surface of the sample.

Vertical surfaces - Suspend the sphere by a cord which allows a vertical displacement of 1300 mm when dropped.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.6 *Drop test:*

Test - Three drops from a height of $750\text{mm} \pm 10\text{mm}$ for desk-top equipment and $1000\text{ mm} \pm 10\text{mm}$ for Hand-Held Equipment, Direct Plug-In, and Transportable Equipment, in positions likely to produce the most adverse results onto specified surface.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.7 *Stress relief:*

Evaluation and Test - Shrinkage or distortion do not result in the exposure of hazardous parts.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.8 *Mechanical strength of cathode ray tubes:*

Evaluation - CRT complies with the relevant tests of IEC 60065.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.9 High-pressure lamp enclosures:

Evaluation - Mechanical enclosure have adequate strength to contain an explosion of the lamp.

Pass Fail Not Affected
 Noted N/A Not Tested

4.2.10 Wall or ceiling mounted equipment:

Evaluation and Test - The mounting means for equipment to wall or ceiling is adequate. A force three times the weight of the equipment but not less than 50N was applied for 1 min.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3 Construction Details

4.3.1 Edges and corners:

Evaluation - Edges and corners that could otherwise be hazardous are rounded and smoothed.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.2 Handles and manual controls:

Evaluation and Test - handles, knobs, grips, levers and the like are reliably fixed so that they will not work loose. A force was applied for 1 min.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.3 Adjustable controls:

Evaluation - Equipment requires the use of a Tool for the manual adjustment of control device.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.4 Securing of parts:

Evaluation and Test - Wires, screws, nuts, etc. are secured to withstand stress and located so as not to reduce insulation.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.5 Connections of plugs and sockets:

Evaluation - Mismatching of plugs and sockets in a manner that is likely to create a hazard is not possible.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.6 *Direct plug-in equipment:*

Evaluation and Test - No undue strain on the socket-outlet. An additional torque not exceeding 0.25Nm is applied to socket-outlet to maintain the engagement face in the vertical plane.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.7 *Heating elements in Earthed equipment:*

Evaluation - Heating elements in equipment are protected so that, under fault conditions, a fire hazard due to overheating is prevented. The temperature sensing devices disconnect the neutral conductor were applicable.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.8 *Batteries:*

Evaluation and Test - Equipment is designed to reduce the risk of fire, explosion and chemical leaks due to battery.

For User-replaceable batteries, the design reduces the likelihood of reverse polarity installation in the event it would create a hazard.

Battery circuits are designed so that:

- the output characteristics of the battery charging circuit is compatible with its rechargeable battery; and
- for non-rechargeable batteries, discharging at a rate exceeding the manufacturer's recommendations, and unintentional charging, are prevented; and
- for rechargeable batteries, charging and discharging at a rate exceeding the battery manufacturer's recommendations, and reversed charging, are prevented.

The batteries complies with tests.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.9 *Oil and grease:*

Evaluation - Insulation exposed to oil and grease has properties to resist deterioration.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.10 *Dust, powders, liquids and gases:*

Evaluation - Equipment constructed so that concentration of theses materials can exist and no hazard is created in normal operation.

Pass Fail Not Affected
 Noted N/A Not Tested

4.3.11 *Containers for liquids or gases:*

Evaluation - Equipment incorporates adequate safeguards against the risk of build-up of excessive pressure.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.3.12 *Flammable liquids:*

Evaluation - Liquid is kept in a closed reservoir, limited to less than 5 liters. Oils used for lubrication has a flash point higher than 149°C and the reservoir is of sealed construction. The system also provides for the expansion of the liquid and has a means for pressure relief. Printing inks have a flash point higher than 60°C and is under sufficient pressure to case atomisation. Replenishing liquids have a flash point less than 60°C and are under sufficient pressure and there is no likelihood explosion or fire hazard.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.3.13 *Radiation:*

Evaluation and Test - Harmful effects to persons and damage to materials affecting safety are prevented.

- Ionized radiation in complies with annex H
- The use of a laser is checked according to IEC 60825-1

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.4 *Protection against hazardous moving parts:*

4.4.1 *General:*

Evaluation - Moving parts of equipment are arranged, enclosed, or guarded to provide adequate protection against personal injury. Automatic Reset Thermal Cut-Outs or overcurrent protection devices, automatic timer starting, etc., are not incorporated if unexpected resetting might create a hazard.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.4.2 *Protection in operator access areas:*

Evaluation and Test - (test with test finger) Protection is provided by suitable construction to the access to hazardous moving parts.

Where it is not possible to provide full protection, access is permitted provided that:

- the hazardous moving part is directly involved in a process; and
- the hazard associated with the part is obvious to the Operator; and
- additional measures are taken as follows:
 an appropriate warning statement is provided in the operating instructions and a marking on the equipment and there is a means for the operator to easily stop the moving part that is in a obvious place.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.4.3 *Protection in restricted access locations:*

Evaluation - The requirements and compliance criteria in 4.4.2 apply.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.4.4 *Protection in service access areas:*

Evaluation - Protection is provided such that unintentional contact with hazardous moving parts is unlikely during servicing.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.5 *Thermal requirements:*

Definition -

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.5.1 *Temperature rises:*

Evaluation and Test - Equipment and its component parts do not attain excessive temperatures.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.5.2 *Resistance to abnormal heat:*

Evaluation and Test - Thermoplastic parts on which parts at hazardous voltage are directly mounted are resistant to abnormal heat.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.6 *Openings in enclosures:*

Evaluation - Comply with 4.6.1 and 4.6.2 as appropriate.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.6.1 *Top and side openings:*

Test - Openings are located and constructed that it is unlikely that objects will enter through openings and create hazards.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.6.2 *Bottoms of fire enclosure:*

Evaluation - No openings in the bottom of the enclosure, where flammable material may escape.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.6.3 *Doors or covers in fire enclosures:*

Evaluation - The door cover of the fire enclosure complies with one of the following:

- the door or cover is interlocked to comply with requirements of 2.8; or
- the door or cover complies with the following:
 - it is not removable
 - it is provided with a means to keep it closed; or
- a door or cover intended for occasional use by Operator is permitted to be removable provided that the equipment instructions include directions for correct removal and reinstallation of door and/or cover.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.6.4 *Openings in transportable equipment:*

Evaluation and Test - Equipment has provided means to prevent small metal objects from entering enclosure by:

- having openings that do not exceed 1mm in width regardless of length; or
- having a screen having a mesh with openings no greater than 2mm between center lines and with a thread or wire diameter not less than 0.45mm; or
- having internal barriers.

Where metallized parts of a plastic barrier are within 13mm of parts of circuits where available power is greater than 15VA, one of the following applies:

- access by a foreign metallic object is limited in accordance with the above acceptable measures; or
- there is a barrier between the bare conductive parts and the Enclosure; or
- fault testing was carried out simulating bridging along a direct path between a bare conductive part and the nearest metallized part of a barrier or Enclosure that is within 13mm of bare conductive part.

Pass Fail Not Affected
 Noted N/A Not Tested

4.6.5 *Adhesives for constructional purposes:*

Test - Performed ageing tests as described.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7 *Resistance to fire:*

Definition - Specifies requirements intended to reduce the risk of ignition and the spread of flame.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.1 *Reducing the risk of ignition and spread of flame:*

Definition - Two methods for providing protection against ignition or spread of flames.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.2 *Conditions for a Fire Enclosure:*

Definition - A Fire Enclosure is provided when temperatures of parts under fault conditions could ignite.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.2.1 *Parts requiring a fire enclosure:***Definition -**

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input checked="" type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.7.2.2 *Parts not requiring a fire enclosure:***Evaluation -** The following parts do not require fire enclosure:

- wiring and cables insulated with PVC, TFE, PTFE, FEP, neoprene or polyimide;
- components meeting the requirements of 4.7.3.2;
- connectors in Secondary Circuits supplied by power sources which are limited to a maximum of 15VA;
- connectors in Secondary Circuits supplied by limited power sources complying with 2.5;
- other components in Secondary Circuits supplied by limited power sources complying with 2.5 and mounted on materials of Flammability Class V-1;
- plugs and connectors forming part of a power supply cord or Interconnecting Cable;
- motors;
- other components in Secondary Circuits supplied by sources which are limited to 15VA and mounted on material of Flammability Class HB.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.7.3 *Materials:*4.7.3.1 *General:*

Evaluation - Use of components and parts inside the fire enclosure is such that the propagation of fire is minimized.

<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.7.3.2 *Materials for fire enclosures:***Evaluation -** The following requirements apply as appropriate.

- Fire enclosures of movable equipment of mass < 18 kg have flame rating of V-1 or passes clause A.2.
- For equipment of mass > 18 kg and stationary equipment, the fire enclosure is flame rated at 5V.
- Enclosure within 13 mm of arcing parts pass the test of clause A.3.
- Enclosure within 13 mm of high temperatures pass the test of clause A.4
- Components which fill an aperture in a fire enclosure are:
 - of Flammability Class V-1; or
 - pass the tests of clause A.2; or
 - complies with flammability requirements of relevant IEC component standard.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

4.7.3.3 *Materials for components and other parts outside Fire Enclosures:*

Evaluation - Materials for components and other parts located outside Fire Enclosures are of Flammability Class HB or HBF or do not present a hazard. Connectors comply with the flammability requirements.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.3.4 *Materials for components and other parts inside Fire Enclosures:*

Evaluation and Test - The equipment complies with the requirement for component flammability inside of an Enclosure.

Location	Material	Flame rating
PCB		94V-0

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.3.5 *Materials for air filter assemblies:*

Evaluation - Air filter assemblies that vent a Fire Enclosure are constructed of material Flammability Class V-2 or better or HF-2 or better.

Pass Fail Not Affected
 Noted N/A Not Tested

4.7.3.6 *Materials for high-voltage components:*

Evaluation and Test - Components operating at peak-to-peak exceeding 4kV have Flammability Class V-2, or Flammability Class HF-2, or comply with IEC 60065 -14.4.

Pass Fail Not Affected
 Noted N/A Not Tested

5 *ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS*

5.1 *Touch Current and Protective Conductor Current*

5.1.1 *General:*

Definition - Equipment is designed so that neither Touch Current nor Protective Conductor Current creates an electric shock hazard.

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.2 *Equipment under test (EUT):*

Test Definitions -

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.3 *Test Circuit:*

Test Definitions - Equipment tested using test circuit in figure 5A.

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.4 *Application of measuring instrument:*

Test Definitions -

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.5 *Test Procedure:*

Test Definitions -

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.6 *Test measurements:*

Test - Values measured do not exceed relevant limits in table 5A.

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.7 *Equipment with Touch Current exceeding 3.5 mA:*

Evaluation - Stationary Permanently Connected Equipment or Stationary Pluggable Equipment Type B having a main protective earthing terminal and having a Touch Current exceeding 3.5mA complies with all of the following:

- The r.m.s. Protective Conductive Current does not exceed 5% of the input current per phase; and
- the cross sectional area of the Protective Bonding Conductor is in accord with table 3B; and
- proper label provided.

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.8 Touch Currents to and from Telecommunications Networks

5.1.8.1 Limitation of the Touch Current to a Telecommunication Network:

Test - The Touch Current to the Telecommunication Network originating from a mains powered equipment is limited as per circuit in 5.1.3.

Pass Fail Not Affected
 Noted N/A Not Tested

5.1.8.2 Summation of Touch Currents from Telecommunications Networks:

Evaluation and Test - The summation of the Touch Current for the multiple Telecommunications Network connection meets requirements.

Pass Fail Not Affected
 Noted N/A Not Tested

5.2 Electric strength

5.2.1 General:

Evaluation and Test - The electric strength of the insulating materials used within the equipment is adequate.

Pass Fail Not Affected
 Noted N/A Not Tested

5.2.2 Test procedure

Test Definition - Tested to voltages specified in table 5B.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3 Abnormal operating and fault conditions

5.3.1 Protection against overload and abnormal operations:

Evaluation and Test - Equipment construction limits the risk of fire or electric shock due to mechanical or electrical overload or failure, or due to improper use, as far as practicable.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.2 Motors:

Test - Tested in accordance with the correct test of annex B of the standard.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.3 *Transformers:*

Test - Test in accordance with the procedures outlined in clause C.1.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.4 *Functional insulation:*

Evaluation - Meets the Clearance and Creepage Distance requirements as described in clause 2.10; or

Test - Withstands the electric strength tests as described in clause 5.2.2; or

Test - Short circuit.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.5 *Electromechanical components:*

Test - Complies with 5.3.8

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.6 *Simulation of faults:*

Test - Complies with 5.3.8 and clause C.1.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.7 *Unattended equipment:*

Test - The equipment intended for unattended use was subjected to the applicable tests.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.8 *Compliance criteria for abnormal operating and fault conditions*

5.3.8.1 *During the tests:*

Evaluation -

No fire occurred that could propagate beyond the equipment; and

No molten metal emitted; and

No deformation of enclosure resulting in accessibility; and

Temperature rise of insulating materials within limits.

Pass Fail Not Affected
 Noted N/A Not Tested

5.3.8.2 *After the tests:*

Evaluation - Electric strength test performed on:

- Reinforced Insulation; and
- basic or Supplementary Insulation forming Double Insulation; and
- basic Insulation between the Primary Circuit and accessible conductive parts of Class I Equipment.

The test specified in 5.2.2 is preformed if the following are applicable:

- The Clearance and the Creepage Distance has been reduced below the value specified in 2.10.; or
- The insulation shows visible signs of damage; or
- The insulation cannot be inspected.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

6 *CONNECTION TO TELECOMMUNICATION NETWORKS*

6.1 *Protection of Telecommunications Network Service personnel, and users of other equipment connected to the network, from hazards in the equipment*

6.1.1 *Protection from Hazardous Voltages:*

Evaluation - Circuitry connected to Telecommunications Network complies with requirements of and SELV and TNV circuit. Also, where the Telecommunications Network relies on protective earthing of the equipment, the installation instructions state the integrity of the protective earthing is ensured.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

6.1.2 *Separation of the Telecommunication Network from earth*

6.1.2.1 *Requirements:*

Evaluation and Test - There is adequate insulation between circuitry intended to be connected to a Telecommunications Network and earth.

- Surge suppressors bridging the insulation have a sparkover voltage of 1.6 times the rated voltage of the equipment.
- Insulation compliant with the electric strength test of 5.2.2 to applicable voltages is provided.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

6.1.2.2 Exclusions:

Evaluation - The requirements of 6.1.2.1 do not apply if:

- the equipment is permanently connected or pluggable equipment type B; or
- the equipment is intended to be installed by service personnel and that require the equipment to be connected to a socket-outlet with protective earthing; or
- the equipment has provision for a permanently connected protective earthing conductor and is provided with instructions for its installation.

Pass Fail Not Affected
 Noted N/A Not Tested

6.2 Protection of equipment users from overvoltages on Telecommunication Networks

6.2.1 Separation requirements:

Evaluation - Electrical separation is provided

Applicable Cases:

- a)
- b)
- c)

Pass Fail Not Affected
 Noted N/A Not Tested

6.2.2 Electric Strength Test procedure:

Test Definition -

Pass Fail Not Affected
 Noted N/A Not Tested

6.2.2.1 Impulse test:

Test -

- a) 7 kV 2.5 kV
- b) 1.5 kV
- c) 1.5 kV

Pass Fail Not Affected
 Noted N/A Not Tested

6.2.2.2 Steady-state test:

Test -

- a) 3 kV
- b) 1.5 kV
- c) 1.5 kV

Pass Fail Not Affected
 Noted N/A Not Tested

6.2.2.3 *Compliance criteria:*

Evaluation - No dielectric breakdown occurred.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

6.3 *Protection of the telecommunication wiring system from overheating:*

Evaluation - Power delivered over a Telecommunication Network to remote equipment is current limited to 1.3A. The gauge of wire used is suitable for current capability.

<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> Not Affected
<input type="checkbox"/> Noted	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Not Tested

EN 60950-1:2001

APPENDIX A

List of Equipment

Following is a list of the equipment used in evaluation of equipment to the requirements of EN 60950.

DESCRIPTION	MFG/MODEL	SERIAL NO.	RANGE/SPECIFICATION
Surge Generator	CCL built. Designed for compliance with IEC rec. K.17 (EN 60950 Appendix Q)		0 - 10 kV 10 x 700 μ s
Force Meter	Chatillion DPP500g	15382	0 - 500 g.
Force Meter	Chatillion DPP-25	884	0 - 25 lb.
Push Pull Stand	Chatillion DPP-25	20001	
High Voltage Generator	CCL built. Manually controlled electric strength tester.		0 - 2000 V rms 60 Hz.
Thermocouple Temperature Logging System	Fluke 2393A (2190A Digital Thermometer, 2300A Scanner, 2030A Printer)		20 channels
Thermocouple	Omega Engineering		Type J Iron-Constantan
Hi-Pot Tester	Rod-L M500BVS5-5.0-100		0 - 5 kV 100 mA ac max.
Scope Probes	Tektronix P6063B		1X: 1 M Ω , 105 pF 10X: 10 M Ω , 14 pF
High Voltage Probe	Tektronix P6015	010-0172-00	1000:1, 100 M Ω , 3 pF, dc to 75 MHz.
High Voltage Probe	Tektronix P6015	010-0131-02	
Multimeter	Fluke 8050A	2856221	0 - 1000 V dc 0 - 750 V ac 0 - 2000 mA (ac/dc) 0 Ω - 20 M Ω
Multimeter	Fluke 8050	2856230	
True RMS Voltmeter	Fluke 8921A	2056190	0 - 700 V rms (ac+dc) 10 Hz-2 MHz
True RMS Voltmeter	Fluke 8921A	3485006	
Multimeter	Hewlett - Packard 3478A	2301A11803	0 - 300 V rms 20 Hz-300 kHz 0 - 300 V dc 0 Ω - 30 M Ω
Multimeter	Hewlett - Packard 3478A	2301A14711	
Multimeter	Hewlett - Packard 3478A	2301A13292	
Multimeter	Hewlett - Packard 3478A	2545A24719	

DESCRIPTION	MFG/MODEL	SERIAL NO.	RANGE/SPECIFICATION
Multimeter	Hewlett - Packard 3478A	2619A41851	
True RMS Volt Meter	Hewlett - Packard 3400A	1218A18930	1 mV - 300 V, 10 Hz - 10 MHZ
Multimeter	Fluke 8060A	2940135	0 - 2000 mA 0 - 1000 V dc 0 - 750 V rms 0 Ω - 20 M Ω
Multimeter	Fluke 8060A	3450404	
Multimeter	Fluke 8060A	3450405	
Multimeter	Fluke 8060A	3450406	
Multimeter	Fluke 8060A	3220689	
Multimeter	Fluke 8060A	3500151	
Oscilloscope Display Mod	Tektronix 5103N	B072968 B062232	
Dual Trace Amp	Tektronix 5A18N	B081223	1 mV - 5 V/Div
Differential Amp	Tektronix 5A21N	B052218	50 μ V - 5 V/Div
Time Base	Tektronix Amp 5B10N	B074361	1 μ s - 5 s/Div
Digital Oscilloscope	Hewlett - Packard 54201A	2602A00384	1 ns - 1 s/Div 5 mV - 2 V/Div
Digital Oscilloscope	Tektronix 7603	B377471	
Digitizer	Tektronix 7D20	B062987	50 ns - 20 s/Div 5 mV - 5 V/Div
Test Finger/Pin	Charles M. Tansey		
Misc. test apparatus (floor, steel ball, ball pressure apparatus, etc.)	CCL built		
Environmental chamber	Associated Environment Systems		-40° F to 350° F 10% to 98% R.H. 8 cubic feet
Environmental chamber	Bally Case & Cooler		
Environmental chamber	Tenney Engineering Tenney Jr.		-112° F to 392° F 1.2 cubic feet

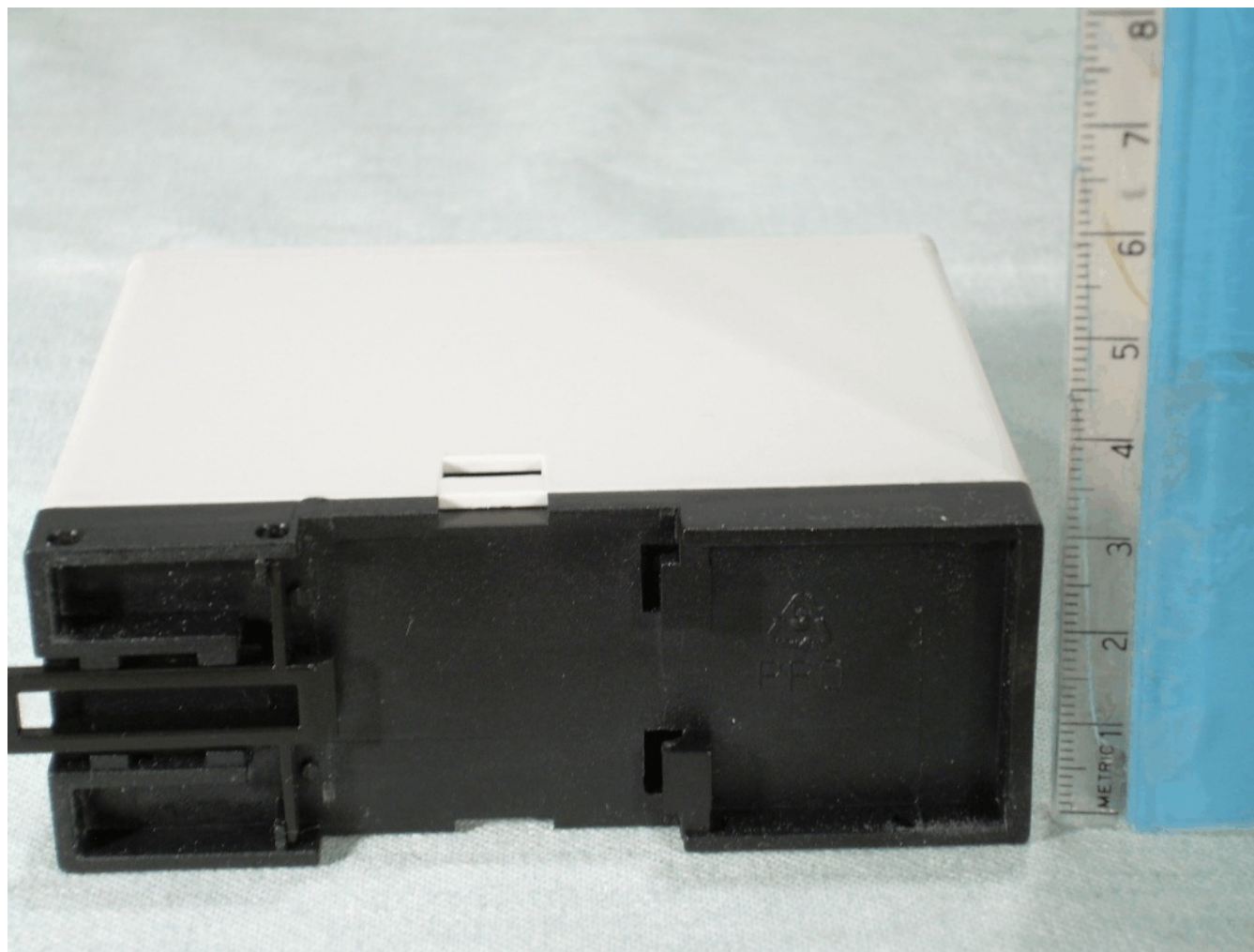
APPENDIX B

Photographs and Supporting Documents

Photograph 1: GRouter4 GR4-E connector view



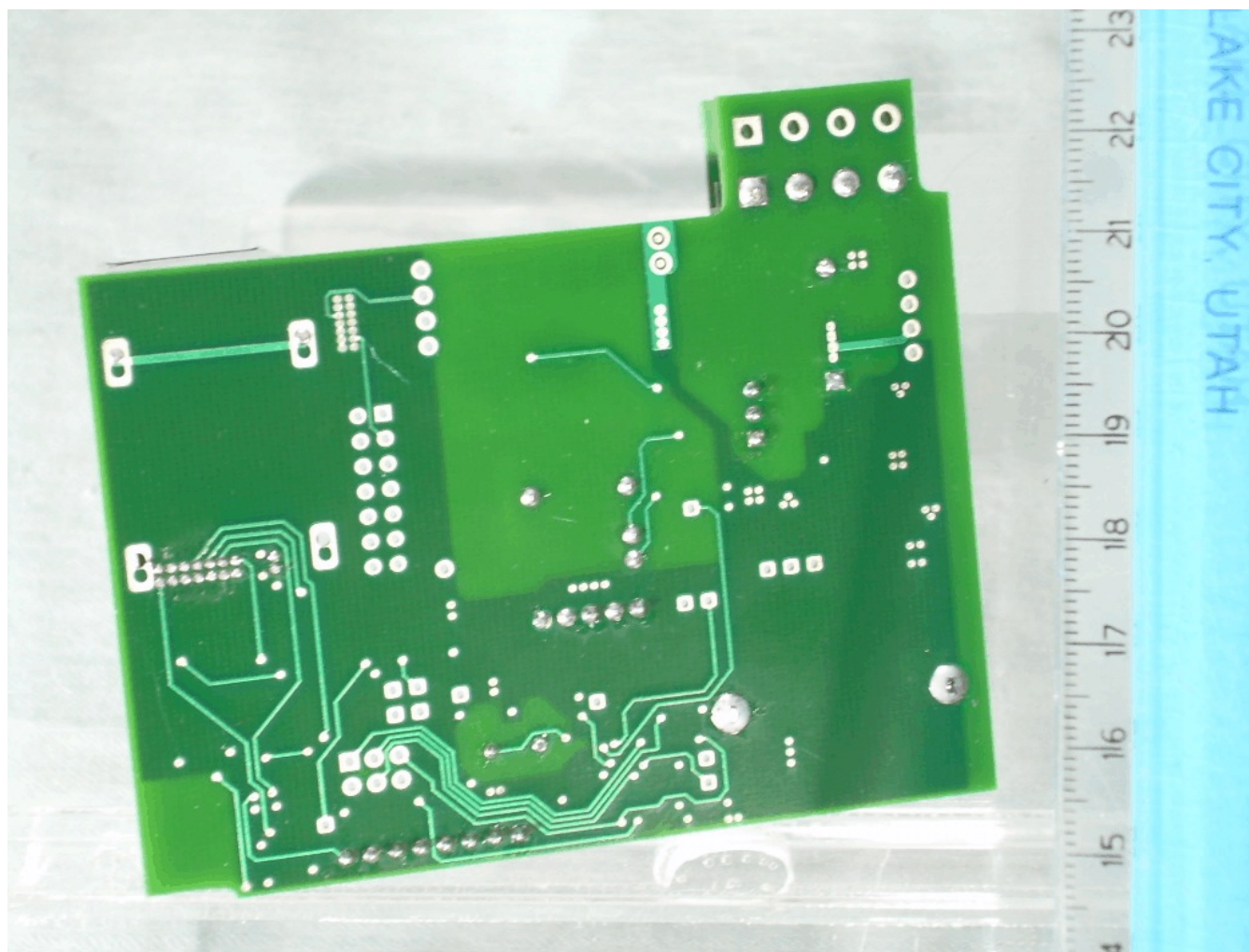
Photograph 2: GRouter4 GR4-E back view



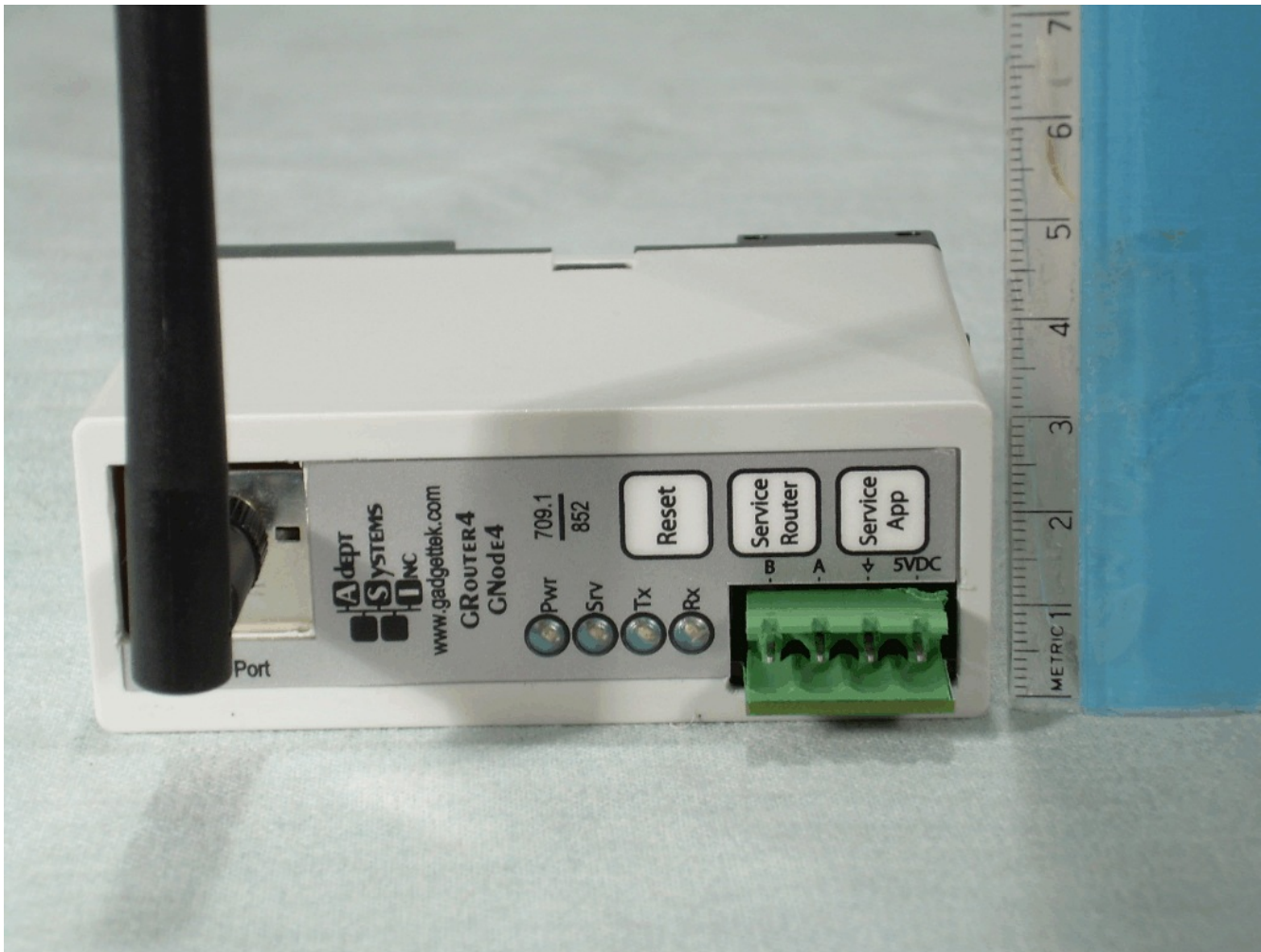
Photograph 3: GRouter4 GR4-E top view PCB



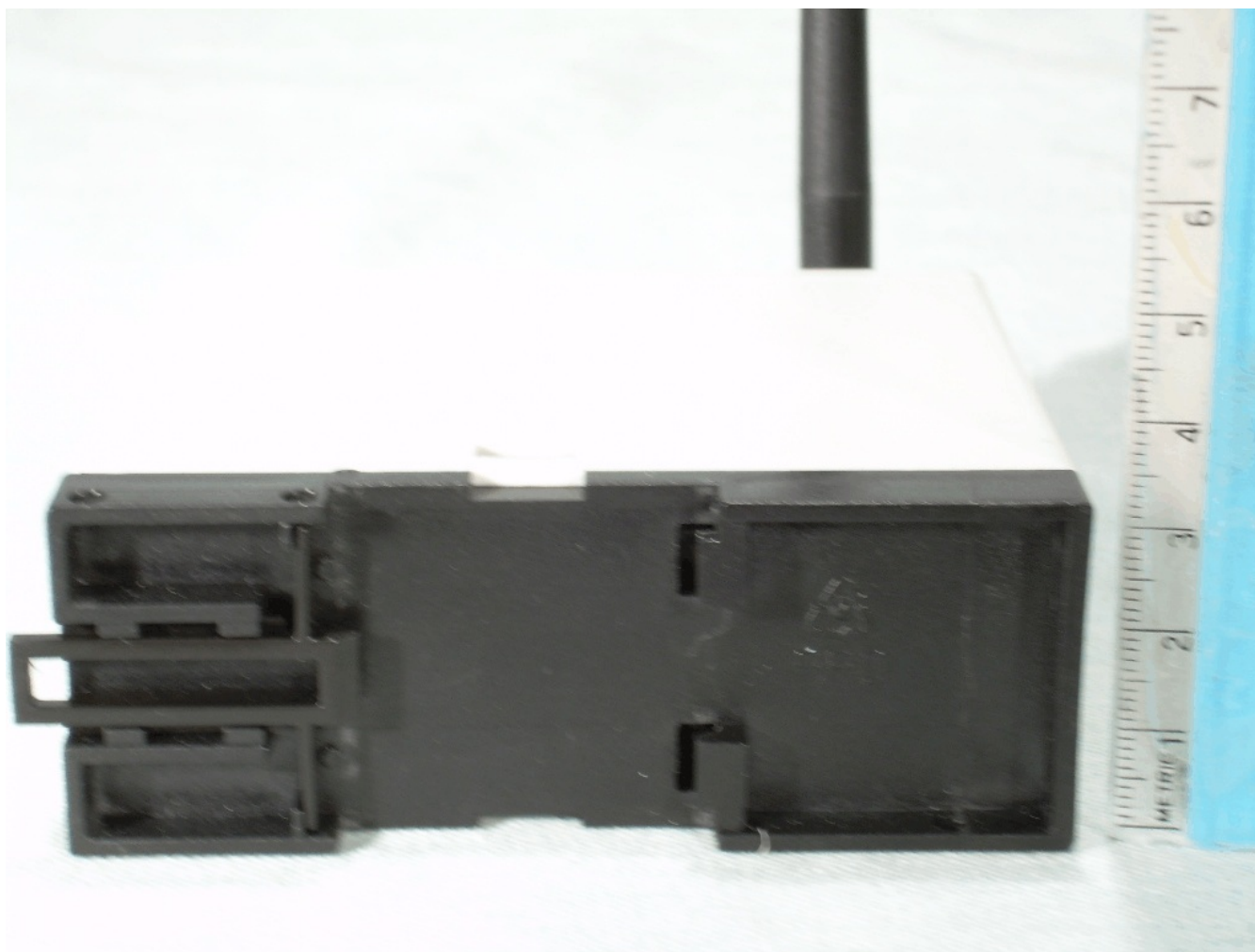
Photograph 4: GRouter4 GR4-E bottom view PCB



Photograph 5: GRouter4 GR4-W connector view



Photograph 6: GRouter4 GR4-W back view



Photograph 7: GRouter4 GR4-W top view PCB



Photograph 8: GRouter4 GR4-W bottom view PCB

