

**SAFETY TEST REPORT  
FOR THE  
KENYON LABORATORIES LLC  
KS SERIES  
GYROSCOPE KITS**

**Prepared for:**

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**Submitted by:**

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**Kenyon Laboratories LLC**  
**CE Safety Testing**  
**At**  
**Green Mountain Electromagnetics, Inc.**

**Unit: KS-8 Gyroscope Kit**

**Received: 2/28/11**

**Tested: February 28 to March 9, 2011**

**Final Evaluation: April 7, 2011**

**I. Applicable Standards:**

The product described in this report was evaluated for compliance with International Standard IEC 61010-1, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements (2010)."

The following tests were performed: (1) input current in accordance with paragraph 5.1, (2) marking durability in accordance with paragraph 5.3, (3) protective bonding in accordance with paragraph 6.5, (4) enclosure rigidity in accordance with paragraph 8.2, (5) drop in accordance with paragraph 8.3, (6) thermal hazard in accordance with paragraph 10, (7) sound level in accordance with paragraph 12, (8) fault conditions in accordance with paragraph 4.4, and (9) voltage strength with humidity pre-conditioning in accordance with paragraph 6.8. No particular sequence is required, except the voltage test is last because it is potentially destructive.

A risk assessment was performed per paragraph 17, and inspections were made to determine compliance with applicable portions of IEC 61010-1:2010.

**II. Measurement Location:**

The GME product safety laboratory is located at 219 Blake Roy Road, Middlebury, VT. The laboratory operates in accordance with CE standards. GME is internationally accredited by the American Association for Laboratory Accreditation (A2LA) and meets the quality requirements in ISO/IEC 17025 (2005), "General Requirements for the Competence of Testing and Calibration Laboratories." For scope of accreditation, contact GME.



### **III. Unit Description:**

The Kenyon Laboratories LLC, KS-Series Gyroscope Kits provide mechanical stability control for video cameras and other non-residential devices. The KS-Series is intended for use by qualified personnel in commercial environments. The gyro requires AC power from an inverter. The inverter requires a battery and the kit includes a battery charger. The KS-Series consists of the gyro in a metal enclosure, the inverter electronics in a plastic enclosure, the battery in a case, and cables for power, charging and inverter output. The system was fully connected and operational. The KS-series compliance was based on type-tests of a single model (KS-8: largest size and current rating) representing all features of the product line. The table below describes the unit that was subjected to measurements determining compliance with applicable safety standards:

Model	Manufacturer	Serial Number
KS-8 Gyroscope	Kenyon Laboratories LLC	1102D43
KP-6 Inverter	Kenyon Laboratories LLC	1102L26

The following table describes the system physical and electrical properties:

Model	Volts	H/W/D in cm
KS-8 Gyroscope	115 VAC, 1 A, 400 Hz	10/8/15
KP-6 Inverter	12 VDC, 3 A	5/11/7

The following table lists the system critical components:

Component	Manufacturer	Model	Agency/Rating
Battery	Power Patrol	SEC1075	UL, RoHS
Thermal Fuse	Littlefuse	30R	UL, TUV
PCB	Advanced Circuits	KLKSG-1	ULE122342
Enclosure	Hammond	1594	UL
Connector	Amphenol	Z-Series	IEC 268-12 CSA 68598
Fuse	Littlefuse	MF528	UL, VDE
Capacitor	Panasonic	ECG Series	UL
AC Wire w/ Strain Relief	Autac	9907	UL E101739



Battery Charger	CELLCON	452240	UL, CE
Magnet Wire	Newport Magnetics	MW80C	NEMA
Varnish	Newport Magnetics	1446	UL

#### **IV. Summary of Test Results:**

The Kenyon Laboratories LLC, KS-8 Gyroscope Kit complies with the IEC 61010-1 safety tests and inspections: it uses <110% of the rated current and markings are sufficiently durable. The protective bonding circuit impedance is less than 0.1Ω. The enclosure is sufficiently rigid and the drop test does not affect unit operation. The unit does not generate unintentional heat or create sound levels above 80 dBA. Fault conditions do not create a safety hazard. The units, which were subjected to humidity pre-conditioning, do not fail when 1350 VAC and impulses are applied at the power input for 1 minute.

The system modifications for compliance with the safety inspection include:

1. The markings on the inverter should include the input in DC.
2. The markings on the gyroscope should include the input in AC amps.
3. The markings on the inverter should include the DC Symbol 1 of IEC 61010-1, Table 1.
4. The markings on the system should include the Caution Symbol 14 of IEC 61010-1, Table 1.
5. The markings on the system should include the Electrical Hazard Symbol 12 of IEC 61010-1, Table 1.
6. The markings on the system should include the On/Off Symbols of IEC 61010-1, Table 1.
7. The inverter output connector is changed to a touch-safe, liquid resistant type.
8. Internal quality procedures are developed to ensure safety in construction of parts that could produce hazardous live voltage: gyroscope assembly, inverter toroid.
9. The gyroscope input-power circuit is rewired to ensure the protective earth ground breaks last in case of strain-relief failure.
10. The capacitor is changed from a non-rated type to the Panasonic ECG, UL-rated series.
11. The cork insulation is replaced with non-hygroscopic material.
12. The tape on the battery is replaced with a proper strain relief and thermal-fuse mount.
13. The AC wire in the inverter is provided with supplementary insulation.
14. The documentation includes all required information in IEC 61010-1, including safe use and an explanation of the IEC symbols.



### Input Current Results

The test point is the power input conductor. >110% of rated current to fail.

Unit	Serial Number	Actual (Rated) Current
KS-8 System	1102L26/1102D43	2.2 (3A) @ 12VDC

### Marking Durability Results

No curling or working loose. No effect on labels.

Unit	Serial Number	Notes
KS-8 System	1102L26/1102D43	No Hazard

### Protective Bonding Test Results

The test circuit is between the protective earth conductor and the enclosure.  $>0.1\Omega$  (<25A) to fail.

Unit	Serial Number	Current (A)
KS-8 System	1102L26/1102D43	>25 A

### Enclosure Rigidity Results

No hazard to the user from static impact or horizontal/vertical dynamic impacts. No enclosure cracks or insulation exposed. No fire hazard.

Unit	Serial Number	Notes
KS-8 System	1102L26/1102D43	No Effect

### Drop Test Results

No hazard to the user from drop. No effect on electrical system or enclosure.

Unit	Serial Number	Notes
KS-8 System	1102L26/1102D43	No Hazard



Temperature Test Results

The test point is the enclosure top after one half-hour of operation. >80°C for coated metal enclosures to fail. No knobs/handles. Compliance is result plus 40°C.

Unit	Serial Number	Notes
KS-8 System	1102L26/1102D43	No Hazard, <25°C

Sound Test Results:

>80 dBA for hazard.

Unit	Serial Number	Sound Level
KS-8 System	1102L26/1102D43	70 dBA

Single-Fault Hazard Results

No hazard to the user from open circuit protective earth or supply reversal. No high temperature from continuous operation.

Model	Serial Number	Result
KS-8 System	1102L26/1102D43	No hazard

Voltage Test Results:

>10 mA or catastrophic event to fail.

Model	Serial Number	Current (mA)
KS-8 Gyroscope	1102D43	0.043
KP-6 Inverter	1102L26	0.02
KS-8 System	1102L26/1102D43	0.005



Testing was performed by Kyle R. Kowalczyk, president, Green Mountain Electromagnetics and requested by:

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Higganum, CT 96441  
USA



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Kyle R. Kowalczyk  
4/15/11

**V. Measuring Equipment:**

The table below describes the instrumentation used at Green Mountain Electromagnetics to perform this testing:

Unit	Manufacturer	Model	Serial #	Last Calibration	Next Cal
High-Voltage Potential Source	Quad-Tech	Sentry 30	7104009	3/3/10	4/3/11
Volt-Ohm-Amp, Temperature, & Continuity Meter	BK Precision	Test Bench Model 390	25205312	8/6/10	8/6/11
Sound Level Meter	Extech	407703A	9144841	4/8/10	4/8/11
Ammeter	MasTech Sinometer	MS2102	10060119050	1/27/11	1/27/12
Ground-Bond Tester	GME	GB-1	n/a	1/3/11	1/3/12
Steel Ball	Com-Power	500g 50mm	481005	n/a	n/a
Temperature-Humidity Probe	PTC	RHTemp101	N00532	11/5/10	11/5/11



## **VI. Measurement Procedures:**

### **1. Input Current Rating in accordance with IEC 61010-1 paragraph 5.1.**

Levels: 3 A at 12 VDC

- a. Place EUT and ammeter on non-conducting tabletop.
- b. Verify rms ammeter operation.
- c. Set up, power and operate EUT.
  - i. Connect EUT power cable directly to the ammeter.
- d. Record current draw and compare to 1.1 times the rating.
- e. Perform final evaluation of unit by noting EUT operation.

### **2. Marking Durability in accordance with IEC 61010-1 paragraph 5.3.**

- a. Set up EUT on laboratory table. Use manufacturer's solution b if available or  $\geq 70\%$  isopropyl alcohol solution.
- b. Rub markings by hand with solution-soaked cloth for 30 seconds.
- c. Verify that markings are clear and legible.
- d. Verify that adhesive labels have not worked loose or become curled.

### **3. Protective Bonding Circuit Continuity IEC 61010-1 paragraph 6.5.2.4.**

Levels: 25 A or twice rated current (twice only OK for dual fused EUT)

Impedance: 0.1  $\Omega$  (0.2 for non detachable cord)

- a. Place EUT and ground-bond tester on non-conducting tabletop.
- b. Verify ground-bond tester operation.
- c. Apply current for 1 m to PE circuit and determine voltage drop across EUT.
- d. Verify impedance between accessible conductive parts of the EUT and its ground connection.

### **4. Enclosure Rigidity in accordance with IEC 61010-1 paragraph 8.2.**

Static Force: 30 N

Impact Energy: 5 J

Static Test per 8.2.1:

- a. Hold EUT against firm support in position of normal use.
- b. Apply 30 N with 12 mm diameter rod to all easily touched surfaces of EUT.
- c. Verify unit is operational and no safety hazards arise.
- d. Repeat at elevated temperature if EUT would be affected.

Impact Test per 8.2.2 and Figure 10:

- a. After securing covers/bases, hold EUT against firm support in position of normal use.
  - i. Non-metallic enclosures cooled to min  $< 2^{\circ}\text{C}$  and tested in  $< 10$  min.
  - ii. Impacts applied to empty enclosures only if no different result.





- iii. Fixed equipment installed as per instructions.
- b. Apply a single 5 J impact by dropping 500g-/50mm-steel sphere from height X.
  - i. Height X determined from Table 15 is 1 meter.
  - ii. Repeat for horizontal.
  - iii. Damaged enclosure may be replaced between tests.
- c. Verify unit is operational and no safety hazards arise.
- d. Repeat at elevated temperature if EUT would be affected.

**5. Drop Test in accordance with IEC 61010-1 paragraph 8.3.**

Other than Handheld Test per 8.3.1:

- a. Place EUT on smooth rigid concrete or steel surface in position of normal use.
- b. Raise edge of unit to 100 mm and drop freely to surface.
  - i. Less severe of 25 mm height or 30° for EUT >20 kg and <100 kg.
  - ii. Limited to four edges.
  - iii. Attached units are treated as single unit.
- c. Verify unit fell only in desired direction, unit is operational, and no safety hazards arise.  
or

Handheld Test per 8.3.2:

- a. Hold EUT 1 meter in air in position providing most severe condition.
- b. Drop unit freely onto 50-mm thick hardwood surface having density >700 kg/m<sup>3</sup>.
- c. Verify unit is operational and no safety hazards arise.

**6. Temperature Tests in accordance with IEC 61010-1 paragraph 10.4.**

- a. Set up EUT and temperature meter in laboratory.
  - i. Place EUT on non-conducting tabletop. Connect thermocouple to meter.
- b. Determine EUT test points and attach thermocouple tip to EUT.
  - i. Follow manufacturer's instruction for cooling/ventilation.
- c. Apply power to EUT and operate unit for at least ½ hour.
- d. Verify that temperature is within 61010-1, Table 19 & 20 limits, as applicable.
- e. Repeat c. and d. for all test points.

**7. Sound Level in accordance with IEC 61010-1 paragraph 12.**

Limit: <80 dBA

- a. Set up instrumentation and EUT in laboratory.
  - i. Mount EUT on edge of table and connect accessories/support equipment.
  - ii. Alarms switched off.
- b. Verify meter operation and quiet ambient.
  - i. Discount any intentional noise unless EUT is for noise-sensitive area.
  - ii. Measurement distance is 1 meter over hard reflecting floor. Nearest object is 3m.



- c. Set up, power and operate EUT for loudest combination of load and operating conditions.
- d. Record level noted.

**8. Single Fault Hazards in accordance with IEC 61010-1 paragraph 4.4.**

- a. Set up EUT on laboratory table.
- b. Identify single fault hazards for unit.
  - i. Open protective earth.
  - ii. Reverse power polarity.
- c. Apply faults to EUT one at a time.
- d. Verify EUT does not create a fire or safety hazard.

**9. Voltage Tests in accordance with IEC 61010-1 paragraph 6.8 and Table 5.**

Levels: 115 VAC Working Voltage (1350 VAC test voltage from 500 VA sine source).

- a. Place EUT and high-voltage potential source on non-conducting tabletop.
- b. Verify high-voltage potential (hipot) source operation; perform model self-test.
- c. Set up, power and operate EUT.
  - i. Connect EUT power cable directly to the hipot. Disconnect parallel devices.
- d. Illuminate unit under test with high voltage.
  - i. Apply voltage between power circuit and accessible conductive parts.
  - ii. Apply voltage for duration of at least 1 minute with 5-second ramp.
  - iii. Apply 5 impulses with 1.2/50 us waveform and verify waveshape.
  - iv. Operate unit before and after application of test voltages.
- e. Perform final evaluation of unit by noting EUT operation. No breakdown or repeated flashover shall occur.



**VII. Photographs of EUT:**



**VII. Photographs of EUT Cont'd:**



**VIII. Risk Tables:**

**Table 1 - Hazard Identification**

This hazard identification of the KS-Series was based on specifications, design documents, and an inspection of the system.

	<b>Life-Cycle Phase</b>	<b>Tasks</b>	<b>Hazards</b>	<b>Situation</b>	<b>Event</b>
<b>a.</b>	Transport/ Assembly	Lifting, Loading & Packing	Crush	Working with heavy items	Injury from mishandling item
<b>b.</b>	Installation	Connecting Power	Shock	Working with electrical items	Injury from electrical supply
<b>c.</b>	Commissioning and Settings	Tests & Trials	Bodily Damage	Misuse of gyroscope system	Injury from operating incorrectly
<b>d.</b>	Training, Programming and Operation	Verify/Adjust Controls	Device Inoperative	Inactive control system	Inability to use device
<b>e.</b>	Cleaning/ Maintenance	Use of cleaning fluids	Burn	Personnel working with cleaner	Contact with cleaner
<b>f.</b>	Trouble-shooting	Locating Electrical Faults	Shock	Working with electrical items	Injury from electrical supply
<b>g.</b>	De- commissioning	Dismantling	Crush	Working with heavy items	Injury from mishandling item



**Table 2 - Risk Assessment**

This risk assessment of the KS-Series was based on specifications, design documents, and an inspection of the completed system.

	<b>Tasks</b>	<b>Hazard</b>	<b>Risk Severity/ Probability /Level</b>	<b>Reduction Method</b>	<b>Residual Risk Severity/ Prob./ Level</b>	<b>Status</b>
<b>a.</b>	Lifting, Loading, & Packing	Crush	Medium/ Feasible/ Medium	Instructions for safe transport and assembly to be provided	Low/ Medium/ Low	Ongoing
<b>b.</b>	Connecting Power	Shock	Serious/ Feasible/ Medium	Unit has reverse polarity protection, touch-safe inverter terminals added	Low/ Medium/ Low	Ongoing
<b>c.</b>	Tests/Trials	Bodily Damage	Medium/ Feasible/ Medium	Warnings and instructions for proper use provided	Low/ Medium/ Low	Ongoing
<b>d.</b>	Verify/Adjust Controls	Device Inoperative	Low/ Low/ Low	Instructions for commissioning provided	Low/ Low/ Low	Ongoing
<b>e.</b>	Use of Cleaning Fluids	Burn	Low/ Low/ Low	Simple to clean, no special fluids required	Low/ Low/ Low	Ongoing
<b>f.</b>	Dismantling	Crush	Medium/ Feasible/ Medium	Instructions for safe de-commissioning provided	Low/ Medium/ Low	Ongoing



<b>IEC 61010-1:2010</b>			
<b>Compliance Checklist March 7, 2011</b>		Tested or	
<b>Kenyon Laboratories KS-8</b>	Compliant	Inspected	Comments
<b>Clause 1.1 - Scope</b>			
EUT within scope of standard	Yes	Inspection	Electrical equipment for test/measurement and industrial process control
Exclusions under 60065, 60204, 60335, 60364, 60439, 60601, 60950, 61558, 61010-031 or 61243-3	N/A	N/A	No exclusions
Computing equipment exclusively for use with EUT	N/A	N/A	
<b>Clause 1.2 - Object</b>			
EUT hazards compared to object of standard	Yes	Inspection	Evaluated for shock/mechanical/fire/burn/fluid/radiation/gas/misuse hazards
Risk assessment included	Yes	Inspection	See Section VIII
No excluded aspects: Reliability, transport effectiveness, EMC, ATEX	Yes	Inspection	
<b>Clause 1.3 - Verification</b>			
Verification by inspection, routine/type-test and risk assessment	Yes	Inspection	
<b>Clause 1.4 - Environmental Conditions</b>			
Safe for indoor use and at altitude <2000 m	Yes	Inspection	
Safe at temperatures between 5°C and 40°C	Yes	Inspection	Within manufacturer rating



Safe at 80% humidity @ 31°C (linear to 50% at 40°C)	Yes	Inspection	Sealed unit
Safe at ±10% of main supply voltage	Yes	Inspection	
Safe from transient volts per over-voltage Cat. II	Yes	Inspection	
Safe from temporary mains over-voltage	Yes	Inspection	
Safe at applicable pollution degree	Yes	Inspection	Pollution degree 2
Safe at any extended ranges rated by manufacturer	Yes	Inspection	No extended ranges
<b>Clause 2 - Normative References</b>			
References applied as necessary	Yes	Inspection	
<b>Clause 3 - Terms and Definitions</b>			
Standard terminology for equipment states is applied	Yes	Inspection	Fixed equipment
Standard terminology for parts/accessories is applied	Yes	Inspection	Power terminal is battery input/AC power output signal terminals p/o power connector, no RF terminals, gyro enclosure is metal, circuits are protectively bonded
Standard terminology for quantities is applied	Yes	Inspection	See Section III for rated voltages, working voltage is 115 VAC
Standard terminology for tests is applied	Yes	Inspection	Type tests on single models
Standard terminology for safety is applied	Yes	Inspection	As required
Standard terminology for insulation is applied	Yes	Inspection	Basic insulation supplied and unit is designed for pollution degree 2, no supplementary or reinforced insulation, clearance and creepage as required





<b>Clause 4 - Tests</b>			
<b>Clause 4.1 - General</b>			
Type tests on sample for design and construction	Yes	Inspection	By GME
Routine tests by manufacturer on 100% as required	Yes	Inspection	Annex F supplied to Kenyon
Meet or exceed requirements and upper/lower limits	Yes	Inspection	
No repeat on approved subassemblies	Yes	Inspection	See critical components list
Type tests omitted if conclusively pass	Yes	Inspection	See Section I for tests performed
Type tests under reference and fault conditions	Yes	Inspection	
Inspections include measurement, marking, documentation, data sheets, and indicate further tests	Yes	Inspection	
Uncertainty on values; maximums set by test house and minimums by manufacturer	Yes	Inspection	
<b>Clause 4.2 - Test Sequence</b>			
Optional unless otherwise specified	Yes	Inspection	No sequence
Repeat tests if inspection indicates sequence reversal would affect outcome	N/A	N/A	
<b>Clause 4.3 - Test Reference Conditions</b>			
Test between 15°C and 35°C	Yes	Inspection	
Test at less than 75% relative humidity (RH<1.4.1d)	Yes	Inspection	
Test at air pressure between 75 kPa and 106 kPa	Yes	Inspection	
Test with no frost/dew/water/rain/solar	Yes	Inspection	
Test in normal use and unfavorable combinations	Yes	Inspection	
Sub-assembly test for large EUT as required	N/A	N/A	



Test in any ventilated position of normal use	Yes	Inspection	
Installed in recess or wall as per manufacturer	N/A	N/A	
Accessories connected or not	Yes	Inspection	Not connected
Covers and removable parts attached or not	Yes	Inspection	Covers installed, no removable parts
Main supply is 90%<>110% V, at rated frequency	Yes	Inspection	
Dual AC/DC units are connected to either	N/A	N/A	
Single phase AC normal and reversed	N/A	N/A	
If possible battery and DC are reversed	Yes	Test	See Procedure (8) and Results
I/O voltages are at rated values	Yes	Inspection	
Protective earth connected, functional earth connected or not	Yes	Inspection	
Controls in position of normal use, AC correctly set, no prohibited combinations	Yes	Inspection	
Connected as used in intended purpose or not	Yes	Inspection	
Motor loads are as used in intended purpose	Yes	Inspection	Gyro motor
Electrical outputs provide rated power	Yes	Inspection	No output
Load impedance is connected or not	N/A	N/A	No load
Duty cycles are longest with shortest recovery time	Yes	Inspection	
Duty cycles are also shortest with shortest recovery time for heat generating/dissipating equipment for short term or intermittent use	N/A	N/A	Continuous duty
Loading and filling per least favorable quantity, hazardous material may be replaced with substitute if test outcome is not affected	N/A	N/A	



<b>Clause 4.4 - Single Fault Test Conditions</b>			
Examine unit/circuits to determine fault conditions	Yes	Inspection	
Fault test unless demonstrate no hazard could arise	Yes	Inspection	
Least favorable reference conditions, different for each test and recorded	Yes	Inspection	
Apply faults sequentially, no multiple simultaneous faults and pass 4.4.4	Yes	Inspection	
Protective impedance combinations shorted/opened, insulation/limiting devices per 4.4.2.2 b) and single rated devices are exempt	N/A	N/A	No PI
Protective conductor opened	Yes	Test	See Procedure (8) and Results
Continually operate transient/short-term functions	N/A	N/A	No transient/ST functions
Motors are stopped/prevented from starting	Yes	Test	See Procedure (8) and Results
Motors capacitors are short-circuited	N/A	N/A	No motor capacitors
Transformer secondaries are shorted/overloaded	Yes	Test	See Procedure (8) and Results
Outputs are shorted sequentially	Yes	Test	See Procedure (8) and Results
Multiple supply inputs are connected simultaneously	N/A	N/A	No multiple input
Cooling is restricted, close airholes/stop fans/stop circulation/loss of fluid	N/A	N/A	No cooling
Heating unit timers/controllers run continuously	N/A	N/A	No heating elements
Circuit/part insulation bridged if less than basic insulation is used	N/A	N/A	No insulation below basic
Interlocks are shorted/opened if no tool needed for hazardous area access	N/A	N/A	No interlocks
Voltage selectors at each possible setting/supply	N/A	N/A	No select
Duration of tests until no change and <1 hour	Yes	Inspection	
Extend to 4 hr if hazard may eventually occur	N/A	N/A	
Current limiting with temp. control meas. per 4.4.3.2	Yes	Inspection	



Fuse operation <1s per 4.4.3.3	Yes	Inspection	
Conformity after fault application: no accessible hazardous live, voltage/transformer temperature tests on double/reinforced insulation	Yes	Inspection	No double/reinforced insulation
Conformity after fault application: temperature of easily touched parts	Yes	Inspection	
Conformity after fault application: spread of fire per 4.4.4.3	Yes	Inspection	Not a significant heat source
Conformity after fault application: other hazards per Sections 7 to 16	Yes	Inspection	
<b>Clause 5 - Marking and Documentation</b>			
<b>Clause 5.1 - Marking</b>			
Markings as specified, visible from exterior without aid of tool, unless internal	Yes	Inspection	
Markings not on removable parts, or use tool to remove part	Yes	Inspection	
Markings on rack-mounted visible after removal	Yes	Inspection	
Letter symbols per IEC 60027	Yes	Inspection	
Graphics symbols per Table 1	Yes	Inspection	Modified: See Summary
No color requirements	Yes	Inspection	
Graphics symbols explained in documentation	Yes	Inspection	
IEC/ISO symbols used if available	Yes	Inspection	Modified: See Summary
No markings on bottom of unit unless handheld/space	Yes	Inspection	
Manufacturer and model identification	Yes	Inspection	
Manufacturer location identification if multiple	N/A	N/A	
Mains supply - hertz or DC Symbol 1 of Table 1	Yes	Inspection	Modified: See Summary
Mains supply - AC Symbol 2 of Table 1	N/A	N/A	



Mains supply - AC/DC Symbol 3 of Table 1	N/A	N/A	
Mains supply -3ø power Symbol 4 of Table 1	N/A	N/A	
Mains supply - rated voltage or range	Yes	Inspection	
Mains supply - watts, volt-amps or amps	Yes	Inspection	Modified: See Summary
Mains supply - amp range with voltage unless <20%	Yes	Inspection	
Mains supply - marked amps $\geq 90\%$ of measured amp	Yes	Test	See Procedure (1) and Results
Operator settings are indicated/visible from exterior	Yes	Inspection	
Operator setting change updates indication	N/A	N/A	
Accessory sockets per 5.1.3 e)	N/A	N/A	No sockets
Fuse ratings - current and type for user replacement	Yes	Inspection	
Terminals marked per 5.1.5.1 and Table 1	Yes	Inspection	
Mains supply terminals are identifiable	N/A	N/A	
Functional earth terminals with Symbol 5 of Table 1	N/A	N/A	
Protective conductor terminals with Symbol 6 of Table 1 on or close to it, unless p/o inlet	Yes	Inspection	
Control circuit terminals with Symbol 7 of Table 1 as applicable for accessible conductive/no hazardous live connection	N/A	N/A	
Hazardous non-mains circuit terminals with Symbol 14 of Table 1 or ratings in volts/amps or energy	Yes	Inspection	Modified: See Summary
Switches and circuit breakers used as disconnect marked with "off" and preferably "on"	N/A	N/A	
Switches and circuit breakers used as disconnect marked with Symbols 9 & 10 of Table 1	Yes	Inspection	Modified: See Summary
No lamp alone used as indicator	Yes	Inspection	
Push-button switches used as disconnect marked with Symbols 9, 10, 15 & 16 of Table 1/close together	N/A	N/A	
Double/reinforced insulation marked with Symbol 11	N/A	N/A	



of Table 1, unless partially protected			
Field wiring boxes marked with Symbol 14 of Table 1 if >60°C per 5.1.8	N/A	N/A	
<b>Clause 5.2 - Warning Markings</b>			
Visible when ready for normal use	Yes	Inspection	Modified: See Summary
Placed on part that is applicable	Yes	Inspection	
Symbols at least 2.75 mm, text is 1.5 mm in contrast	Yes	Inspection	
Stamped/engraved symbols least 2.0 mm, depth is 0.5 mm unless in contrast	Yes	Inspection	
Refer user to instructions with Symbol 14 of Table 1 unless other symbols used	Yes	Inspection	Modified: See Summary
If operator access is permitted, include warning to disconnect/isolate mains power when accessing hazardous live parts	N/A	N/A	No operator access
<b>Clause 5.3 - Durability of Markings</b>			
Clear and legible under normal use/cleaning	Yes	Inspection	
Survive 30s isopropyl alcohol rub–no curl/loose	Yes	Test	See Procedure (2) and Results
<b>Clause 5.4 - Documentation</b>			
Documentation - intended use/technical specs.	Yes	Inspection	
Doc. - name/address for technical help	Yes	Inspection	
Doc. - risk mitigation based on assessment	Yes	Inspection	
Doc. - accessories for safe use	N/A	N/A	
Doc. - guidance on proper function when error causes electrical or other hazard	Yes	Inspection	



Doc. - lifting/carrying instructions	Yes	Inspection	
Doc. - explanation of symbols used	Yes	Inspection	Modified: See Summary
Doc. - explanation of Symbol 14 and statement to consult documentation for hazard identification	Yes	Inspection	Modified: See Summary
Doc. - markings/text equivalent to documentation	Yes	Inspection	
Doc. - corrosive substances as required	Yes	Inspection	
Doc. - electronic media	Yes	Inspection	
Doc. - any essential safety information delivered in paper with equipment	Yes	Inspection	
Doc. - consider responsible body reading ability	Yes	Inspection	
Doc. - electrical ratings/IO description/external circuit rating/environmental/IP/IK code if <5J impact	Yes	Inspection	
Doc. - installation/commissioning & related safety	Yes	Inspection	
Doc. - assembly/location & mounting	Yes	Inspection	
Doc. - protective earth and supply connections	Yes	Inspection	
Doc. - perm-conn. eq. supply wiring, switch/breaker overcurrent and location requirements	N/A	N/A	
Doc. - ventilation/special/sound level	N/A	N/A	
Doc. - equipment operation per 5.4.4/ID operating controls & use/instruct not to position to make difficult to operate disconnecting device/instruct for interconnection to accessories/spec. of limits for intermittent op./explanation of safety symbols/replace consumables/cleaning & decontamination	Yes	Inspection	
Doc. - equipment operation per 5.4.4/list poisonous & quantities/instruct risk reduction flammable/methods to reduce burns if exceed 10.1/additional precautions	N/A	N/A	
Doc. - statement of impairment if equip. not used in specified manner	Yes	Inspection	
Doc. - maintenance and service per 5.4.5	N/A	N/A	



Doc. - systems integration/special condition effects	Yes	Inspection	
<b>Clause 6 - Electric Shock Protection</b>			
<b>Clause 6.1 - General</b>			
Maintained in normal/single fault conditions	Yes	Inspection	Modified: See Summary
Accessible parts are not hazardous live	Yes	Inspection	Modified: See Summary
Accessible-to-earth or accessible-electrical connections <1.8m per 6.3.1 and 6.3.2	Yes	Inspection	
Exceptions/permissible live per 6.1.2	N/A	N/A	
<b>Clause 6.2 - Accessible Parts Determination</b>			
Obvious or test fingers/pins per Annex B	Yes	Inspection	Obvious - sealed unit
Accessible if touched or touchable through non-suitable insulation per 6.9.1	N/A	N/A	
Open covers/doors/controls, replace consumable and remove parts if normal use	N/A	N/A	
Rack mounted gear installed before accessing	N/A	N/A	
Jointed/rigid test finger examination per 6.2.2	N/A	N/A	
Test pin for openings above hazardous live per 6.2.3	N/A	N/A	
Test pin for openings for pre-set controls per 6.2.4	N/A	N/A	
<b>Clause 6.3 - Accessible Parts Limits</b>			
Voltage to earth <33Vrms/46.7Vpeak/70Vdc	Yes	Inspection	
Wet location volts <16Vrms/22.6Vpeak/35Vdc	N/A	N/A	
Use current/cap levels if volt levels are exceeded	N/A	N/A	





I <0.5mArms/0.7mApeak/2mAdc per 6.3.1.b.1 and Figures A1, A2 & A4 for wet locations	N/A	N/A	
I <70mArms at high frequency per figure A.3	N/A	N/A	
Cap <45uC for <15kV per fig 3/350mJ for >15kV	N/A	N/A	
Single fault volts <55Vrms/78Vpeak/140Vdc	Yes	Inspection	
Single fault wet volts <33Vrms/46.7Vpeak/70Vdc	N/A	N/A	
Figure 2 for short duration voltages	N/A	N/A	
I <3.5mArms/5mApeak/15mAdc per 6.3.2.b.1 and Figures A1, A2 & A4 for wet locations	N/A	N/A	
I <500mArms at high frequency per figure A.3	N/A	N/A	
Capacitance per figure 3 for single faults	Yes	Inspection	
<b>Clause 6.4 - Primary Protection Means</b>			
No hazardous live accessible parts using enclosures, basic insulation or impedance	Yes	Inspection	Enclosure and basic insulation
Enclosures and protective barriers per 6.4.2	Yes	Inspection	Enclosure limits access; is not insulating material
Basic insulation clearance/creepage per 6.4.3	Yes	Inspection	
Impedances per 6.4.4	N/A	N/A	
<b>Clause 6.5 - Additional Protection Means</b>			
Single fault - no accessible hazardous live	Yes	Inspection	
Primary means is supplemented by protective bonding, supplementary insulation, automatic disconnect current/voltage limiting device, reinforced insulation or protective impedance per Figure 4 and Annex D	Yes	Inspection	Enclosure is supplemented with protective bonding and fuse
Protective conductor terminal bonded to accessible conductive parts	Yes	Inspection	



Protective conductor terminal bonded to protective screen separating accessible conductive parts	N/A	N/A	
Protective bond integrity per 6.5.2.2	Yes	Inspection	Discrete conductors used, no operator removable parts, no moveable ground, no braid, protective conductor is passed through with low impedance, solder and screw connections are secured
Protective conductor term. per 6.5.2.3 and Figure 5	Yes	Inspection	Terminal is metal, no cord, same current capacity as mains
Plug-connected equipment impedance per 6.5.2.4	Yes	Test	See Procedure (3) and Results
Protection/SF - perm eq. bond impedance per 6.5.2.5	N/A	N/A	
Transformer protective bonding screen per 6.5.2.6	N/A	N/A	
Supplementary/reinforced insulation per 6.5.3	Yes	Inspection	Modified: See Summary
Protective impedance per 6.5.4	N/A	N/A	
Automatic supply disconnect per 6.5.5	N/A	N/A	
Current/voltage limiting devices per 6.5.6	Yes	Inspection	
<b>Clause 6.6 - External Circuits</b>			
Create no accessible hazardous live parts norm/SF	Yes	Inspection	Modified: See Summary
Separation is method unless no short hazards	Yes	Inspection	
Mark or doc. rated conditions/insulation ratings	Yes	Inspection	See Critical Components List
External terminals charged by capacitors per 6.6.2	N/A	N/A	
Hazardous live terminals per 6.6.3	Yes	Inspection	Modified: See Summary
Stranded conductor terminals per 6.6.4	N/A	N/A	



<b>Clause 6.7 - Insulation Requirements</b>			
Insulation consists of clearance, creepage and solid material	Yes	Inspection	
Insulation withstands stress when providing protection from hazards	Yes	Inspection	
Stresses from working voltage transient/short-term/long-term over-voltage considered	Yes	Inspection	
Requirements depend on insulation level, maximum over/working voltages, pollution degree and mains fault over-voltage	Yes	Inspection	
Clearance multiplication factor per Table 3	Yes	Inspection	Rated altitude <2000 m, MF = 1
Creepage distance per material group and Annex C	Yes	Inspection	Material Group IIIb
Solid insulation per 6.7.1.4	Yes	Inspection	
Insulation requirements by circuit type in 6.7.2/3 and Annex K	Yes	Inspection	Over-voltage Category II and supply <300 V per 6.7.2
Clearance/creepage for main circuit <300 V per 6.7.2.1 and Table 4	Yes	Inspection	Clearance is 1.5 mm, Creepage for PWB is 1.5 mm, 2.1 mm for other material
Solid insulation test voltages for main circuit <300 V per Table 5	Yes	Inspection	Basic Insulation: 1350 V/1min for AC unit
Molded/potted parts per 6.7.2.2.2	Yes	Inspection	
PWB inner insulating layers per 6.7.2.2.3	Yes	Inspection	
Thin-film insulation per 6.7.2.2.4	Yes	Inspection	
Secondary circuits separated from mains by transformer with reinforced/double insulation or screen connected to protective conductor terminal	N/A	N/A	No secondary circuits
Clearance and test voltages for secondary circuit <300 V per 6.7.3.2 and Table 6	N/A	N/A	
Creepage distances for secondary circuit per 6.7.3.3 and Table 7	N/A	N/A	
Solid insulation test voltages for secondary circuit per 6.7.3.4.1 and Table 6	N/A	N/A	



Molded/potted parts per 6.7.3.4.2 and Table 8	Yes	Inspection	
PWB inner insulating layers per 6.7.3.4.3	Yes	Inspection	
Thin-film insulation per 6.7.3.4.4 and Table 8	Yes	Inspection	
<b>Clause 6.8 - Voltage Test Procedures</b>			
Possibly destructive; verify suitability of sample for further use post-test	Yes	Inspection	Last test
Test equipment per IEC 61180-1/2	Yes	Inspection	
Accessible enclosure insulation covered in foil	N/A	N/A	
Foil distance to terminals per Table 9	N/A	N/A	
Accessible control insulation covered in foil	N/A	N/A	No controls
Foil attached to generator low and after humidity	N/A	N/A	
Equipment is not energized during test	Yes	Inspection	
Test voltages for <2000m or per Table 10	Yes	Inspection	<2000 m
Tests are for clearance and solid insulation	Yes	Inspection	
Test at subassembly level if necessary	N/A	N/A	
Humidity pre-conditioning per 6.8.2	Yes	Test	See Procedure (9) and Results
AC voltage test per 6.8.3.1	Yes	Test	See Procedure (9) and Results
DC voltage test per 6.8.3.2	N/A	N/A	
Impulse voltage test per 6.8.3.3	Yes	Test	See Procedure (9) and Results
<b>Clause 6.9 - Construction Requirements - Shock Protection</b>			
Wiring subject to mech. stress not depend on solder	Yes	Inspection	



Captive screws if affect creepage/clearance	N/A	N/A	
Accidental loosening of fasteners is no hazard	Yes	Inspection	Modified: See Summary
Accidental loosening of parts or wires does not affect creepage/clearance	Yes	Inspection	
Lock washers or other mechanical means to secure soldered parts	Yes	Inspection	Modified: See Summary
No easily damaged insulation material	Yes	Inspection	
No non-impregnated hygroscopic insul. material	Yes	Inspection	Modified: See Summary
Green/Yellow conductor insulation only used for protective earth/bonding, potential equalization or functional earth	Yes	Inspection	
<b>Clause 6.10 - Connection to Mains Supply</b>			
Mains supply cords per 6.10.1, IEC standards 60227/60245/60320/60799 as applicable and Figure 9	Yes	Inspection	
Mains supply cords and inlets certified/approved	Yes	Inspection	See Critical Components List
Non-detachable cord entry per 6.10.2.1	N/A	N/A	
Non-detachable cord anchorage per 6.10.2.2 and Table 11	N/A	N/A	
Non-detachable cords per 6.10.2 and Table 11	N/A	N/A	
Detachable plugs and connectors per 6.10.3	N/A	N/A	
<b>Clause 6.11 - Disconnection from Main Supply</b>			
Disconnection - all source current conductors	Yes	Inspection	
Disconnection - exceptions per 6.11.2	N/A	N/A	
Permanently connected and multi-phase per 6.11.3.1	N/A	N/A	
Single-phase cord-connected per 6.11.3.2	Yes	Inspection	



Disconnection - located near power entry	Yes	Inspection	
EMI filter can be on supply side of switch	Yes	Inspection	
Switches/circuit breakers per IEC 60947	Yes	Inspection	
Switches/circuit breakers marking per Symbols 9 & 10 of Table 1	Yes	Inspection	
Switches/circuit breakers not in cord	Yes	Inspection	
Switches/circuit breakers not allowed to interrupt PE	Yes	Inspection	
Appliance couplers/plugs make/break PE first/last	Yes	Inspection	Modified: See Summary
Appliance couplers/plugs - ID/easily reached (<3m)	Yes	Inspection	
<b>Clause 7 - Mechanical Hazard Protection</b>			
<b>Clause 7.1 - General</b>			
No hazard in normal or single fault condition	Yes	Inspection	
Hazards identified per 7.1 a) to e)	Yes	Inspection	See Risk Tables
<b>Clause 7.2 - Sharp Edges</b>			
Smooth and rounded, cause no injury in normal use	Yes	Inspection	
Unless obvious, cause no injury in single fault	Yes	Inspection	
Finger test if necessary per UL 1439 or similar	N/A	N/A	
<b>Clause 7.3 - Moving Parts</b>			
Moving parts hazard does not exceed a tolerable level	Yes	Inspection	Enclosed in gyro
Directly applied human/animal effort is not MP	Yes	Inspection	
Meet 7.3.4/5 or 7.3.3 and C17 risk assessment	Yes	Inspection	See Risk Tables



Moving parts exceptions for obvious intent per 7.3.2	N/A	N/A	
Risk assessment for hazard to body parts per 7.3.3 and Table 12	Yes	Inspection	See Risk Tables
Limitation of force and pressure per 7.3.4	Yes	Inspection	
Moving parts gap limits per 7.3.5 and Tables 13/14	Yes	Inspection	
<b>Clause 7.4 - Stability</b>			
Non-secured units are physically stable before use	Yes	Inspection	Secured
Stability measures are marked or automatic	N/A	N/A	
Castor/feet are 4x load or per 7.4 d) & e)	N/A	N/A	
Tested for overbalance if applicable	N/A	N/A	
Containers have least favorable substance amount	N/A	N/A	
Castors have least favorable position in normal use	N/A	N/A	
Doors/drawers closed unless exception	N/A	N/A	
All but hand-held survive 10° tilt	Yes	Test	See Procedure (5) and Results
Equipment >1meter tall and 25kg tested per 7.3 b)	N/A	N/A	
Floor-standing eq. survive 800N on all horizontal working surfaces or ledges <1m high	N/A	N/A	
Doors/drawers meant for use by operator have least favorable position in normal use	N/A	N/A	
Castor/feet are tested per 7.4 d) & e)	N/A	N/A	
<b>Clause 7.5 - Lifting and Carrying</b>			
Lifting and carrying - >18kg provided with means	N/A	N/A	
Lifting and carrying - >18kg provided with directions	N/A	N/A	



Handles and grips per 7.5.2	N/A	N/A	
Lifting devices and supporting parts per 7.5.3	N/A	N/A	
<b>Clause 7.6 - Wall-mounting</b>			
Wall/ceiling brackets can handle >4x weight	N/A	N/A	
<b>Clause 7.7 - Expelled Parts</b>			
Expelled parts device to limit energy if cause hazard	N/A	N/A	
Tool to defeat any expelled parts protection	N/A	N/A	
<b>Clause 8 - Resistance to Mechanical Stresses</b>			
<b>Clause 8.1 - General</b>			
No hazard from mechanical stresses encountered in normal use	Yes	Inspection	
Normal energy protection is 5J	Yes	Inspection	
Energy protection <5J but >1J per 8.1 a) to d)	Yes	Inspection	
Inspection and tests per 8.1 tests 1, 2 & 3	Yes	Inspection	
IK08 enclosures that meet 8.1 i-vii not tested	Yes	Inspection	
Parts that are not enclosure parts are not tested	Yes	Inspection	
Post-Test - visibly damaged windows/displays have no accessible hazardous live parts	Yes	Inspection	No damage
Post-Test - voltage test for insulation that could have been affected per 6.7/8 with no humidity	N/A	N/A	
Post-Test - no corrosive leaks	N/A	N/A	No fluids
Post-Test - no enclosure cracks	Yes	Inspection	





Post-Test - clearances not less than permitted values	Yes	Inspection	
Post-Test - internal wiring insulation is undamaged	Yes	Inspection	
Post-Test - protective barriers intact	Yes	Inspection	
Post-Test - no exposed moving parts	Yes	Inspection	
Post-Test - no fire hazards	Yes	Inspection	
<b>Clause 8.2 - Enclosure Rigidity Tests</b>			
Static 30N force test per 8.2.1	Yes	Test	See Procedure (4) and Results
Impact test at Table 15 levels per figure 10 for horizontal and vertical surfaces test per 8.2.2	Yes	Test	See Procedure (4) and Results
<b>Clause 8.3 - Drop Test</b>			
All equipment, except handheld and direct plug in, drop test per 8.3.1	Yes	Test	See Procedure (5) and Results
Handheld and direct plug in drop test per 8.3.2	N/A	N/A	
<b>Clause 9 - Fire Protection</b>			
<b>Clause 9.1 - General</b>			
No spread of fire outside the equipment in normal or single fault conditions	Yes	Inspection	
Verify conformity per Figure 11 flowchart	Yes	Inspection	Path is 9.1 b), 9.2 a) 2), no liquids/heat per 9.2 b) & c) and 9.6
Meet 9.6 if mains powered	Yes	Inspection	
Verify conformity per 9.1 a) b) or c)	Yes	Inspection	9.1 b)
Applied throughout or individually	Yes	Inspection	



<b>Clause 9.2 - Eliminate/Reduce Ignition Sources</b>			
Meet 9.2 a) b) and c)	Yes	Inspection	
Limited energy per 9.4, or basic insulation, or no ignition from bridging terminals	Yes	Inspection	Basic insulation
Flammable liquid hazard reduced to tolerable level per 9.5	Yes	Inspection	No liquids
No ignition in heat circuits in single fault condition	Yes	Inspection	No heating circuits
<b>Clause 9.3 - Containment of Fire</b>			
Hold-to-run or construction to reduce hazard	N/A	N/A	
Construction requirements per 9.3.2, Table 16 and Figs. 12&13	N/A	N/A	
<b>Clause 9.4 - Limited Energy Circuit</b>			
Voltage <30Vrms/42.4Vpeak or 60Vdc	N/A	N/A	
Current limited by Table 17 and Table 18	N/A	N/A	
<b>Clause 9.5 - Flammable Liquids</b>			
No spread of fire in normal/single fault condition	N/A	N/A	
Meet 9.5 a) or b) or c)	N/A	N/A	
Temperature is 25°C less than fire point	N/A	N/A	
Quantity is sufficiently small to be safe	N/A	N/A	
Ignited liquid cannot spread outside equipment	N/A	N/A	
Detailed instruction on risk reduction	N/A	N/A	



<b>Clause 9.6 - Overcurrent Protection</b>			
Overcurrent protection device provided for mains powered equipment in case of fault	Yes	Inspection	
Device is not for mains short; rating is for load	Yes	Inspection	
Basic insulation between supply-side polarized parts	Yes	Inspection	
Not fitted in protective conductor	Yes	Inspection	
Not fitted in neutral conductor of multi-phase eq.	N/A	N/A	
Devices in all supply conductors	Yes	Inspection	
Fuse holders mounted adjacent to each other	Yes	Inspection	
Fuses are same rating and characteristic	Yes	Inspection	
Devices on supply side of other mains parts/circuits	N/A	N/A	
EMI filter on supply side of overcurrent devices	N/A	N/A	
Conformity during voltage test	N/A	N/A	
EMI capacitors removed during voltage test	N/A	N/A	
Optional for built-in equipment; if none fitted, then instructions for required in installation	N/A	N/A	
Overcurrent devices must be within the equipment	Yes	Inspection	
<b>Clause 10 - Temperature Limits/Heat Resistance</b>			
<b>Clause 10.1 - Temperature Limits for Burns</b>			
Easily touched surfaces do not exceed Table 19 in normal condition at 40°C ambient	Yes	Test	See Procedure (6) and Results
Easily touched surfaces do not exceed 105°C in single fault condition	Yes	Test	See Procedure (6) and Results
Exceptions for exceeding Table 19/105°C because of ambient rating or heated surfaces per 10.1	N/A	N/A	



<b>Clause 10.2 - Winding Temperature Limits</b>			
Transformer winding temperatures per Table 20	N/A	N/A	
<b>Clause 10.3 - Other Temperature Limits</b>			
As necessary for terminal boxes, flammable liquids, non-metallic enclosures, supporting insulation or terminals per 10.3	N/A	N/A	
<b>Clause 10.4 - Conduct of Temperature Tests</b>			
Tested under reference conditions and normal use with mfr.'s instructions on cooling	Yes	Test	See Procedure (6) and Results
Cooling liquid at highest rated temperature	N/A	N/A	
Max temp is rise + 40°C or max rating	Yes	Inspection	
Windings measured by resistance or sensors	N/A	N/A	
Measurements made at steady state	Yes	Inspection	
Heating equipment per 10.4.2	N/A	N/A	
Wall/cabinet installed equipment per 10.4.3	N/A	N/A	
<b>Clause 10.5 - Resistance to Heat</b>			
Creepage/clearance meets 6.7 requirements (40°C or max rated)	Yes	Inspection	
Non-metallic enclosures per 10.5.2	Yes	Inspection	
Mains insulating material - rated or tested per 10.5.3 and Fig 14	N/A	N/A	Rated material



<b>Clause 11 - Fluid Hazard Protection</b>			
<b>Clause 11.1 - General</b>			
Operator protection in normal use	Yes	Inspection	
Consider continuous, occasional or accidental contact	Yes	Inspection	
Only specified fluids considered	Yes	Inspection	
Liquids and gases are considered fluids	Yes	Inspection	
<b>Clause 11.2 - Cleaning</b>			
Cleaning and decontamination cause no hazard from manufacturer specified process	Yes	Inspection	No process
No corrosion or mechanical weakening	Yes	Inspection	
<b>Clause 11.3 - Spillage</b>			
No hazard from liquid spilled into equipment	Yes	Inspection	
No electrical insulation wetting	Yes	Inspection	
No internal non-insulated parts wetting	Yes	Inspection	
No hazard from contact from aggressive substances	Yes	Inspection	
Analyze material required to be in contact with aggressive substances in normal use	N/A	N/A	
<b>Clause 11.4 - Overflow</b>			
No hazard from liquid spilled out of equipment	Yes	Inspection	No liquid container
No electrical insulation wetting	Yes	Inspection	
No internal non-insulated parts wetting	Yes	Inspection	



Container protected against liquid surging out	N/A	N/A	
<b>Clause 11.5 - Battery Electrolyte</b>			
Mounting protects against leakage	Yes	Inspection	Sealed Battery
<b>Clause 11.6 - Specially Protected Equipment</b>			
Resist water as marked per IP class of IEC 60529	N/A	N/A	Not rated
<b>Clause 11.7 - Fluid Pressure and Leakage</b>			
Maximum pressure per 11.7.1	N/A	N/A	No fluids
Leakage/rupture at high pressure per 11.7.2	N/A	N/A	
Low-pressure leakage per 11.7.3	N/A	N/A	
Overpressure safety devices per 11.7.4	N/A	N/A	
<b>Clause 12 - Radiation Protection</b>			
<b>Clause 12.1 - General</b>			
Protect against all radiation types; UV/Ionizing/Microwave/Laser/Sonic/Ultrasonic	Yes	Inspection	
<b>Clause 12.2 - Ionizing Radiation</b>			
Ionizing radiation per 12.2.1	N/A	N/A	
Intentional ionizing radiation per 12.2.1.2	N/A	N/A	
Unintentional ionizing radiation per 12.2.1.3	N/A	N/A	
Accelerated electron - access to >5kV requires tool	N/A	N/A	



<b>Clause 12.3 - Ultraviolet Radiation</b>			
No unintentional emissions that could create a hazard	N/A	N/A	
<b>Clause 12.4 - Microwave Radiation</b>			
Microwave power density <10W/m <sup>2</sup> 1-100GHz	N/A	N/A	
Limits not applicable at waveguide ports or other intentionally radiating parts	N/A	N/A	
<b>Clause 12.5 - Sonic and Ultrasonic Pressure</b>			
Sound levels per 12.5.1 >80 dBA is hazard	Yes	Test	See Procedure (7) and Results
Ultrasonic pressure <110dB//20uPa 20-100kHz	N/A	N/A	
<b>Clause 12.6 - Laser Sources</b>			
Lasers must comply with IEC 60825-1	N/A	N/A	
<b>Clause 13 - Liberated Gases/Substances</b>			
<b>Clause 13.1 - Poisonous/Injurious Gases</b>			
No liberation of dangerous amounts in normal use	N/A	N/A	
Documentation indicates quantities and types which can be liberated	N/A	N/A	
<b>Clause 13.2 - Explosion/Implosion</b>			
Components per 13.2.1	N/A	N/A	
Batteries and charging per 13.2.2	Yes	Inspection	See Critical Components List



Implosion/mechanical impact and intrinsic protection for CRTs >160 mm per 13.2.3 and IEC 60065	N/A	N/A	
Non-intrinsic protection with screens for CRT per 13.2.3 and IEC 60065	N/A	N/A	
Intrinsic protection indicates no additional protection required	N/A	N/A	
<b>Clause 14 - Components &amp; Subassemblies</b>			
<b>Clause 14.1 - General</b>			
Safety components used as rated	Yes	Inspection	See Critical Components List
Safety components exceptions made	N/A	N/A	
Compliance - Relevant IEC Standard per 14.1 a)	Yes	Inspection	
Compliance - Relevant IEC Standard & IEC 61010-1 per 14.1 b)	N/A	N/A	
Compliance - IEC 61010-1 per 14.1 c)	Yes	Inspection	
Compliance - Nationally Recognized Authority meeting/exceeding IEC per 14.1 d)	Yes	Inspection	
Figure 15 flowchart for determining compliance	Yes	Inspection	Paths b and d used
<b>Clause 14.2 - Motors</b>			
Motor temperature limits under fault and thermal protection per 14.2.1	Yes	Inspection	
Series excitation motors are direct drive	N/A	N/A	
<b>Clause 14.3 - Overtemp. Protection</b>			
Overtemperature protection devices per 14.3 a), b), c)	N/A	N/A	





<b>Clause 14.4 - Fuse Holders</b>			
No live voltage access during replacement	Yes	Inspection	
<b>Clause 14.5 - Mains Voltage Select Device</b>			
No accidental select possible and marked per 5.1.3d	N/A	N/A	
<b>Clause 14.6 - Mains Transformers Tested Outside Equipment</b>			
Same conditions for test as internal if could affect results	N/A	N/A	
<b>Clause 14.7 - Printed Circuit Boards</b>			
Comply with flammability classification of V-1 of IEC 60695-11-10 or better	Yes	Inspection	
Exceptions for limited energy circuits per 9.4	N/A	N/A	
<b>Clause 14.8 - Transient Overvoltage Circuits/Components</b>			
Rated or tested per 14.8 and Table 21	Yes	Test	Rated
<b>Clause 15 - Interlocks</b>			
<b>Clause 15.1 - General</b>			
Designed to remove hazd. before expos./meet 15.2/3	N/A	N/A	



<b>Clause 15.2 - Preventing Reactivating</b>			
Hazard cannot be re-established w/o tool until interlock action is reversed/cancelled	N/A	N/A	
<b>Clause 15.3 - Interlock Reliability</b>			
Interlock fault does not cause hazard	N/A	N/A	
<b>Clause 16 - Application Hazards</b>			
<b>Clause 16.1 - Reasonably Foreseeable Misuse</b>			
No hazard from adjustments, knobs, software, hardware, or controls that are set unintentionally	Yes	Inspection	See Risk Tables
Risk assessment for all other reasonable misuse	Yes	Inspection	
<b>Clause 16.2 - Ergonomic Aspects</b>			
Risk assessment includes; body dimension limitations, display/indicators, control accessibility/conventions and terminal arrangements	Yes	Inspection	
<b>Clause 17 - Risk Assessment</b>			
Risk assessment performed as necessary	Yes	Inspection	See Risk Tables
Risk assessment includes analysis, evaluation and reduction	Yes	Inspection	
Remaining risks are documented for responsible body	Yes	Inspection	
Incorporate principles: eliminate/reduce risk, employ protective measures and inform of residual risk	Yes	Inspection	
Utilize Annex J, ISO 14971, SEMI S10-1296, IEC 61508, ISO 14121-1, ANSI B11.TR3 or similar	Yes	Inspection	

