

Report

On

Insulation Tester

(Transistorised)

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Insulation Tester (Transistorised)

I. Need of Insulation Resistance Test

Insulation starts to age as soon as it's made. As it ages, its insulating performance deteriorates. Insulating material properties generally get degraded as it is subjected to stresses like electrical, thermal, mechanical, environment and combined. This degradation can reduce the electrical resistivity of the insulating materials, thus increasing leakage currents that lead to incidents which may be serious in terms of both safety and the costs of production stoppages. Thus it's important to identify this deterioration quickly so that corrective steps can be taken. In addition to the measurements carried out on new and reconditioned equipment during commissioning, regular insulation testing on installations and equipment helps to avoid such incidents through preventive maintenance. These tests detect ageing and premature deterioration of the insulating properties before they reach a

Insulation testers are basically used in quality control measurements, in which measurement of insulation resistance, faults, and amongst others are crucial. Insulation testers are widely used in industries such as automotive, electronic manufacturing, construction, medical, and amongst others. The results obtained from IR Test give information on the quality of the bulk material used as the insulation. Wire and cable manufacturers use the insulation resistance test to track their insulation manufacturing processes, and spot developing problems before process variables drift outside of allowed limit.

Stresses on Insulation

1. Electrical Stressing Factors

- ❖ Voltage variation beyond the permissible limits long periods.
- ❖ Switching and impulse voltages e.g. frequent start / stop duty. These are generally 3-4 times the normal stress levels.

$$\text{LIFE of Insulation} = 1/E^n$$

Where, E = Stress Voltage Level

N = A Constant whose value varies from 5-20.

Thus, there is logarithmic fall in life with increase in electrical stress.

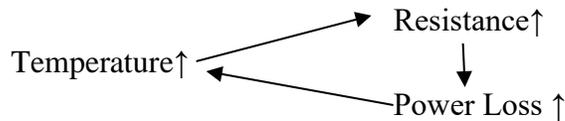
2. Thermal Stressing Factors

Temperature variation beyond the permissible limits for longer periods.

Mechanism:

Resistance at temperature 't' is, $R_t = R_0(1 + \alpha_0 t)$

Since, Copper Loss $P = I^2 R$



This implies that as temp increases the power loss increases.

3. Mechanical Stressing Factors

- ❖ Permanent Stresses - As in case of rotating machines.
- ❖ Occasional Stresses - As a result of sudden load-changes
- Basically involves physical wear and tear of the insulating material leading to its deterioration.

4. Environmental Stressing Factors

- Humidity –Humidity affects badly the life of insulating material
- Pollution – Air pollution also affects the life
- Radiation –Results in deterioration.

5. Combined Stressing Factors

- ❖ Normally multiple stressing factors are present simultaneously and this lead to accelerated deterioration of the insulating material.

Few Symptoms of Poor Insulation - Condition

- Excessive temperature rise
- Reduction in insulation resistance (IR)
- Increase in dielectric loss ($\tan \delta$)
- Change in dielectric absorption

II. Insulation Tester Market Segmentation

The global Insulation Tester market can be segmented on the basis of modularity, product type, end-user and end-use.

On the basis of Product Type, the global Insulation Tester market can be segmented as:

- Low Voltage Insulation Testers
- High Voltage Insulation Testers
- Multifunctional Insulation Testers

On the basis of Modularity Type, the global Insulation Tester market can be segmented as:

- Handheld
- Portable
- Fixed

On the basis of Technology Type, the global Insulation Tester market can be segmented as:

- Analog
- Digital

On the basis of Application, the global Insulation Tester market can be segmented as:

- Cabling
- Electrical Installation
- Transformer
- Motors
- Others

On the basis of End-Use Industry, the global Insulation Tester market can be segmented as:

- Construction
- Industrial
- Commercial
- Automotive
- Electronic Manufacturing
- Power Generation
- Others

III. Commercial Details

HSN code of the product: Insulation Tester mainly comes under **HS Code 90303390 & 90303900**. Beside this there are other codes like 90318000, 90303350, 90308990 etc. depending upon the type, specifications, features etc.

NIC code of the product: **27900** (Manufacture of other electrical equipment)

Code NIC 2008 - 2790 Manufacture of other electrical equipment

-
- [NIC 2008](#)
 - [C - MANUFACTURING](#)
 - [27 - Manufacture of electrical equipment](#)
 - [279 - Manufacture of other electrical equipment](#)

- 2790 - Manufacture of other electrical equipment

This class includes the manufacture of miscellaneous electrical equipment other than motors, generators and transformers, batteries and accumulators, wires and wiring devices, lighting equipment or domestic appliances

NIC CODE	INDIAN INDUSTRIES
27900	<u>Manufacture of other electrical equipment</u>

Clusters already existing on the product, if any: As such, there is no cluster on the product as per the data available on the website of M/o MSME & MIETY

Possibility to establish clusters on the product: Yes

Probable areas or district where products are being manufactured or project can be established: Ambala District (Haryana), Nashik (Maharashtra), Mumbai (Maharashtra) and Ahmedabad (Gujarat)

Number of Industries registered as MSME in the manufacturing of the product:

Enterprises Registered under Udyam in NIC Code - 27900					
Code	Description	Micro	Small	Medium	Total
27900	Manufacture of other electrical equipment	13147	2075	335	15557

Number of industries available in large scale industries:

As such there are no Large Scale Industries involved in manufacturing of Insulation Tester in India.

However, some of the manufacturers of Insulation Testers in India are:

M/s Meco Instruments Pvt. Ltd., Mumbai

M/s Rishabh Instruments Pvt. Ltd., Nashik

M/s Motwane Mfg. Co. Pvt. Ltd., Nashik

M/s Sivananda Electronics, Nashik

M/s Scope T & M Pvt. Ltd., Pune

M/s Quadrant Measurements Pvt. Ltd., Nashik

M/s Prestige Electronics, Mumbai

M/s Scientific Instruments, Ambala, Haryana

M/s RA Instruments, Ambala, Haryana

M/s International Instruments Industries, Khadia, Ahmedabad

M/s Infinity Enterprise Pvt. Ltd., Ahmedabad

Import Data of Transition Insulator:

Values in Crores

MSME_SL	Item Description	2017 -18	2018 -19	2019 -20
308	Insulation Testers (Transistorised)	4747.5627	3186.2576	2737.9468

Export Data of Transition Insulator:

Values in Crores

MSME_SL	Item Description	2017 -18	2018 -19	2019 -20
308	Insulation Testers (Transistorised)	185.7698	193.9091	299.0864

Demand in the domestic & global (export) market:

Expanding electrical industries such as motors, cables, transformers etc. are boosting the growth of the insulation tester market. There are various application of insulation tester in electric manufacturing for maintenance, repair, and verification. Growing construction industry is fueling the growth of insulation tester market. As consequences of increasing population and industrialization across the globe, the demand of insulation tester has increased significantly. The industrial, commercial, residential construction, demand the use of insulation tester for preventative maintenance.

Various insulation testers are available in the market with a different modularity such as portable, handheld, and fixed. The market of insulation tester is fragmented as many players are present. Some of the prominent market players identified across the value chain of global Insulation Tester Market are:

- HIOKI E.E. CORPORATION, Japan
- Megger, Dover, United Kingdom
- Kyoritsu Electrical Instruments Works Ltd., Japan
- Amprobe, Everett
- FLIR Systems, Oregon, USA
- Yokogawa Test & Measurement Corporation, Japan

- Metrel d.d., Slovenia
- Fluke Corporation, USA
- B&K Precision Corporation, California, USA
- Amprobe, Everett
- Italia S.r.L, Italy
- TES Electrical Electronic Corp., Taiwan
- Meco Instruments Pvt. Ltd., Mumbai, India

As consequences of high presence of leading players, North America and East Asian Countries such as Japan, China and Taiwan have a significant market share of Insulation Tester in terms of manufacturing, which is about half of the market share of global insulation tester market. Moreover, Europe have moderate market share of insulation tester. The Asia Pacific countries such as Japan, China and Taiwan have large market share of the market in terms of manufacturing due to the presence of global and local players Such as HIOKI E.E. CORPORATION, Yokogawa Corporation, Kyoritsu Electrical Instruments Works Ltd., TES Electrical Corp. etc.

The strong sales of insulation tester have been forecasted in South Asia, **especially in India due to high presence of distributors**. Therefore, South Asia and MEA has been forecasted as an emerging region for the insulation testers market because of expanding electrical and construction industries.

The **import of this item in India is quite high** from Japan, USA, UK etc. **because of advanced automated features, specifications, quality, safety standards etc.**, where as Import from Taiwan, China etc. is because of low cost of the product. In India there are few companies manufacturing the product but not to their standards/ Specifications. Here, most of them are distributor or suppliers who import the product and customize it as per the need. Now few Indian Companies have started collaboration with Foreign Ventures, so that the product can be partially manufactured / assembled in India

IV. Technical Details

Sector in which the product is falling: Electrical Sector (Testing)

End users of the products / sectors: Insulation Tester is used in electric manufacturing for maintenance, repair, and verification. The insulation tester plays important role at manufacturing site for maintenance. Growing construction industry is fueling the growth of insulation tester market. The industrial, commercial, residential construction, demand the use of insulation tester for preventative maintenance.

Governing Indian Specification:

Indian Standard for Compliance of Insulation Resistance Tester (Electronic Type): **BIS IS 10656 : 1983**

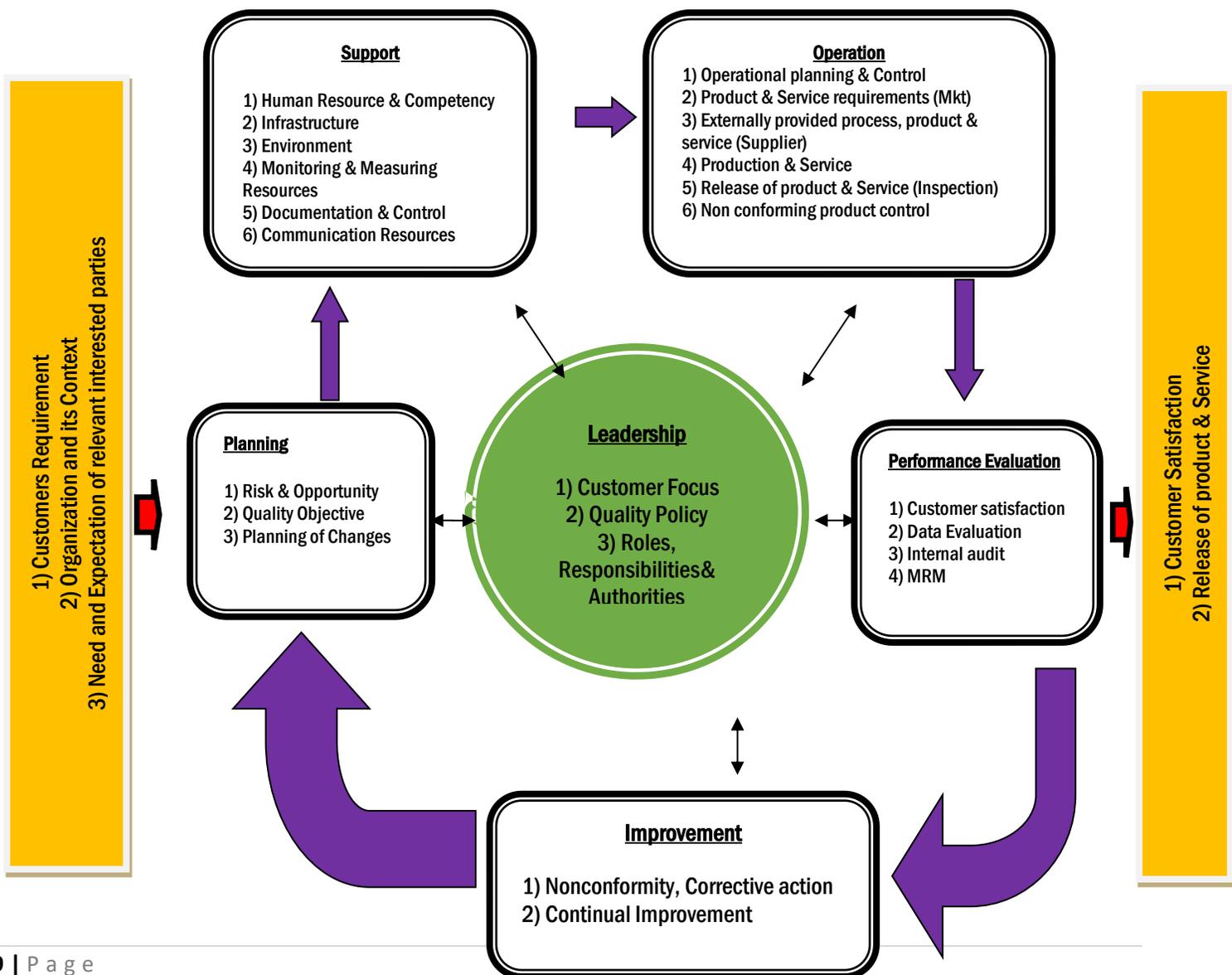
Specification for Insulation Resistance Testers Hand Operated (Magneto Generator Type): **IS 2992: 1987**. This standard covers direct-reading portable insulation resistance testers (hand-operated), enclosing in the same case, a generator having a rated voltage up to 5 k

Mains-operated and motor-driven insulation resistance testers may have to comply with additional requirements which do not form part of this specification. A requirement for mains-operated portable testers are covered by **IS 11994-1986**. Portable insulation resistance tester (mains- operated).

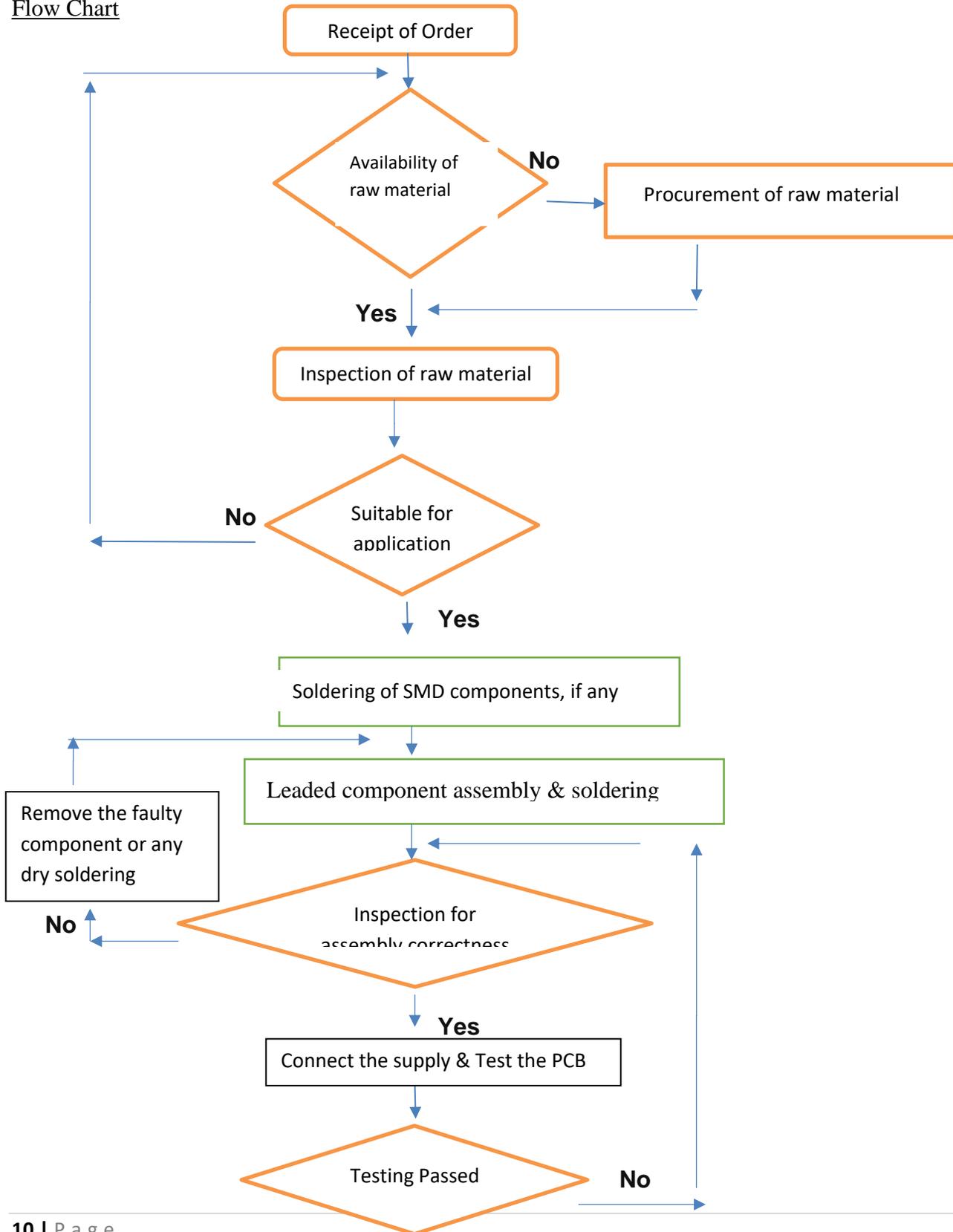
Governing International Specifications:

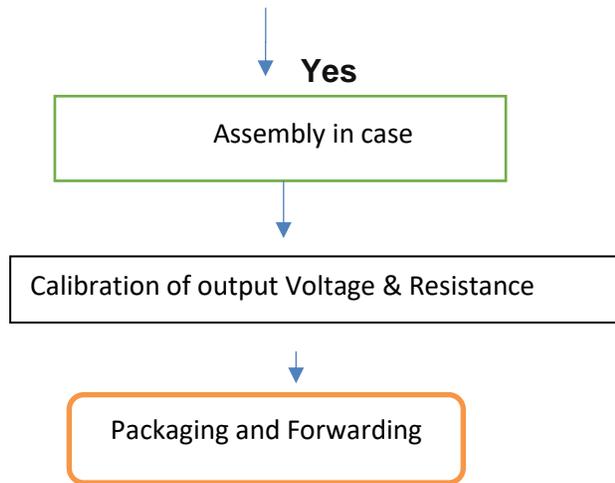
Applicable Standards: IEC61010-1 CAT IV 600V, EN 61326-1, IEC61557-1, IEC61557-2, IEC61557-4, IEC61557- 10 etc.

Flow process chart:



Flow Chart





PROCESS FLOW CHART OF MANUFACTURING

- 1) Component Inspection
- 2) Soldering of SMD component, if any on PCB
- 3) Leaded component assembly & soldering
- 5) Assembly in-case
- 6) Calibration of Output Voltage and Resistance
- 7) Packing and Dispatch

Inspection Steps for Insulation Tester

	Activity	Test Method
1.1	Mechanical component (e.g. Enclosure, footrest, etc)	Visual Inspection
		Cut out Verification
		Test Certificate Verification

1.2	Transformer	Visual Inspection, Terminator
		Test Certificate Verification of rating plate
1.3	Printed Circuit Boards (PCB)	Visual Inspection
1.4	Electrical & Electromechanical Components (e.g. Switch, DPM, Diode, Resistors, Capacitor etc)	Visual Inspection
		Operation Check
2.1	GA verification	Visual Inspection
2.2	Component verification	
2.3	Polarity	
3.1	Routing of Wires	Visual Inspection / Correctness of Routing
3.2	Crimping, Cable size	
3.3	Tightness	
4.1	Insulation Testing (before HV Test)	DMM/HV Tester, IR Tester, Standard High Value Resistors, Decade MegOhm Box
4.2	Voltage Calibration	
4.3	Resistance Calibration	
4.4	Protection Testing if applicable	
4.5	Functional Testing & systems details	
4.6	Special Test (As per specification)	
5.1	Wiring, Mechanical fitting	GCT/DMM/HV Tester
5.2	Ground Continuity, IR & HV Test of I/P side with mains cord.	
5.3	Resistance Range	
5.4	Protections	
5.5	Accuracy	
5.6	Heat Run for 3 hrs	
5.7	Visual check for Paint Shade, Name Plate, Output Test Probes, BOM	

6.0	Final Documents	
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Qualitative parameters of the product: Accuracy and Specification as per IS: 10656-1983

Anything that's qualitative has to do with the characteristics or features of something, rather than its quantity. ... Qualitative shows up in scientific writing to clarify that the quality of something is being assessed, not its size or quantity.

Qualitative parameters may be features and specifications.

Specifications

- Measurement range: **0. 10 MΩ to 10 GΩ**
- Nominal Test voltage: **50 V, 100 V, 250 V, 500 V, 1000 V**
- Terminal voltage: **20%**
- TRMS & DC Voltage measurement
- Continuity testing at **200 mA or 20 mA**
- Pass/Fail limit alarms
- Leakage current :10%

Features

- Adjustable insulation test voltages
- Dual digital display readout
- Live circuit Indicator
- Polarization Index (PI) & Dielectric Absorption Ratio (DAR) Test

Details of the product Licenses/ registration to be obtained:

MSME Registration Process

MSME registration is to be done in the government portal of **udyamregistration.gov.in**. New entrepreneurs need to click the button “For New Entrepreneurs who are not Registered yet as MSME” shown on the home page for registering MSME. New registration of MSME is done by entering the Aadhaar card number with or without PAN Card.

Registration with PAN Card:

When clicked on the “For New Entrepreneurs who are not registered yet as MSME” button on the homepage of the government portal, it opens the page for registration and asks to enter the Aadhaar number and the name of the entrepreneur. After entering these details, “Validate and Generate OTP Button” is to be clicked. Once, this button is clicked and OTP is received and entered, the PAN Verification page opens. If the entrepreneur has a PAN Card, the portal gets the PAN details from the government databases and automatically fills details on the page. The ITR details are to be filled by the entrepreneur.

Once PAN details are entered, a message appears as “Udyam Registration has already been done through this PAN” and the entrepreneur needs to click the “Validate PAN” button.

After verification of PAN, the Udyam Registration box will appear and the entrepreneurs need to fill the personal details and details of the plant or industry.

Registration without PAN Card: The procedure may be followed as available on the website.

EQUIPMENT / ACCESSORIES REQUIRED FOR MANUFACTURE OF THE PRODUCT

- 1) Standard High Value Resistance Box / Decade Megohm Box
- 2) Digital Multimeter
- 3) HV Tester
- 4) Soldering Iron
- 5) De-soldering Pump
- 6) Magnifying Glass with light
- 7) Smoke hood
- 8) SMD Machine, if SMD components are used.
- 9) LCR Meter
- 10) Oscilloscope
- 11) Power Supply

The technology existing in the manufacturing of the product:

Source: [Megger | Working Principle Types History Uses of Megger | Electrical4U](#)

October 27, 2020 by Electrical4U

History of Megger

Megger invented insulation testing before the beginning of the 20th century and has continued to lead the market in innovation and technological advancement. Improvements in respect of design, specification and quality of tester were an ongoing practice of the firm to meet the various standards like IEEE standards.

Need of Insulation Resistance Test

Insulation Resistance (IR) starts to age as soon as it's made. As it ages, its insulating performance deteriorates. Any harsh installation environments, especially those with temperature extremes and/or chemical contamination, accelerate this process. This wear and tear can reduce the electrical resistivity of the insulating materials, thus increasing leakage currents that lead to incidents which may be serious in terms of both safety (people and property) and the costs of production stoppages. Thus it's important to identify this deterioration quickly so that corrective steps can be taken.

Types of Megger

They are mainly of two types:-

1. Electronic Type (Battery Operated)
2. Manual Type (Hand Operated)

Besides the above, there is another type of **megger** which is motor operated and does not use battery to produce voltage .

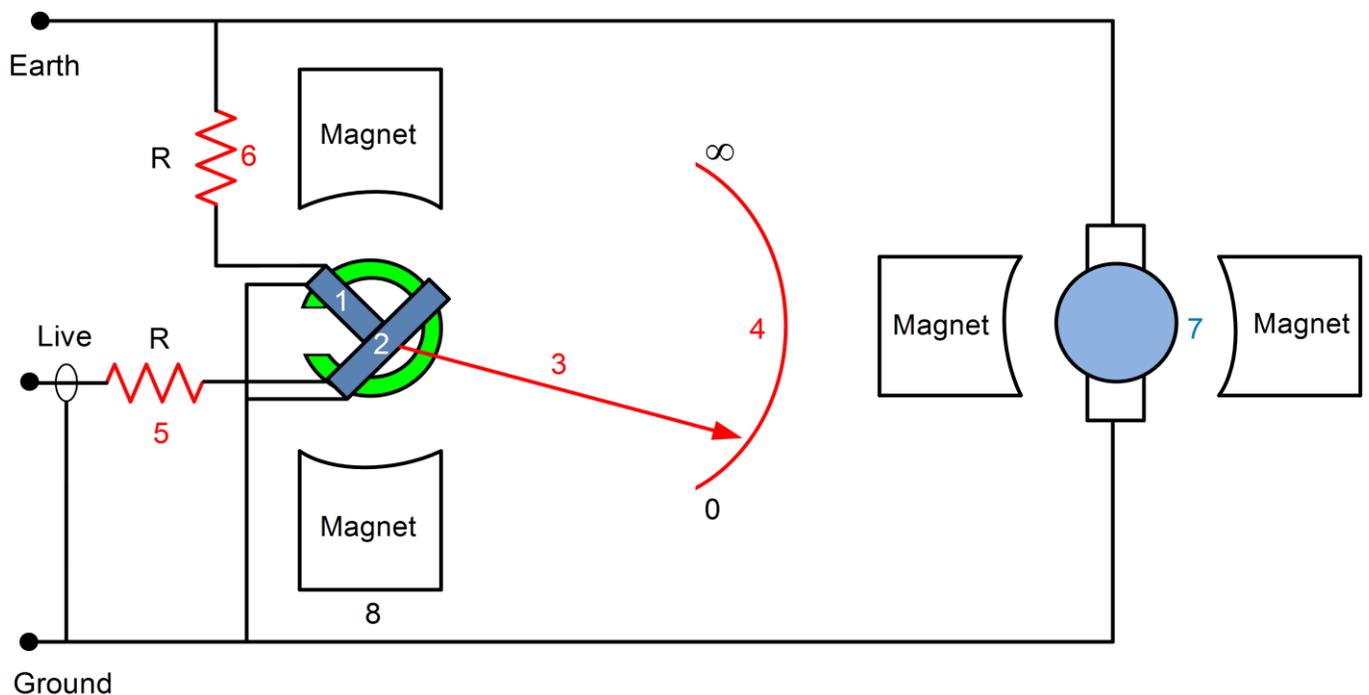
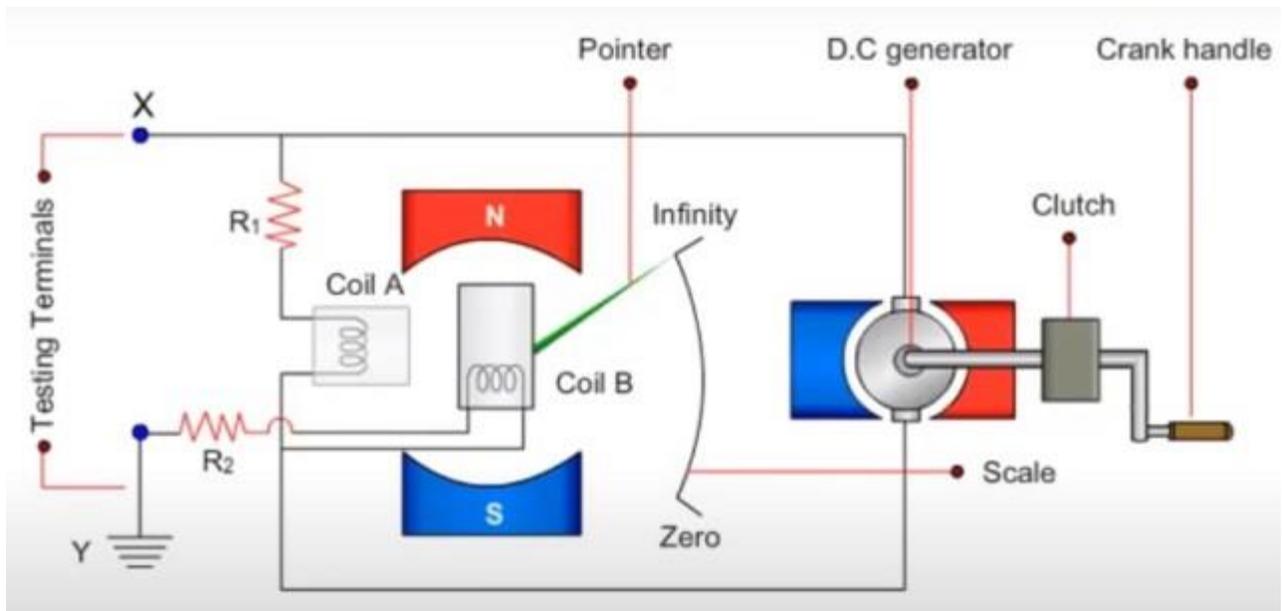


Fig.: Megohmmeter (Megger) Circuit Diagram

Components of Megohmmeter

- 1) Deflecting and Control coil: Connected parallel to the generator, mounted at right angle to each other and maintain polarities in such a way to produced torque in opposite direction.
- 2) Permanent Magnets: Permanent magnets generate a magnetizing effect in order to deflect the pointer.

- 3) Pointer: One end of the pointer connected with coil another end deflects on scale from infinity to zero.
- 4) Scale: A scale is provided in front-top of the megger from range 'zero' to 'infinity'; enable us to read the value.
- 5) D.C generator or Battery connection: Testing voltage is produced by hand operated DC generator for manual operated Megger. Battery / electronic voltage charger is provided for automatic type Megger for same purpose.
- 6) Pressure Coil Resistance and Current Coil Resistance: Protect instrument from any damage because of low external electrical resistance under test.

Working Principle of Megger

- In manually operated megger, a DC generator (rotation of armature of the generator by the hand driven crank lever) provides test voltage while in digital type megger, this is done by battery or voltage charger.
- The control coil also known as pressure coil is connected across the circuit.
- Deflecting coil or current coil is connected in series and allows the flow of the electric current taken by the circuit being tested.
- Current limiting [resistor](#) (CCR and PCR) connected in series with control and deflecting coil to protect damage in case of very low resistance in external circuit.
- As the voltage increases in external circuit the deflection of pointer increases and deflection of pointer decreases with an increase of current.
- Hence, resultant torque is directly proportional to voltage and inversely proportional to current.
- When electrical circuit being tested is open, torque due to voltage coil will be maximum and pointer shows 'infinity' means no shorting throughout the circuit and has maximum resistance within the circuit under test.
- If there is short circuit pointer shows 'zero', which means 'NO' resistance within circuit being tested.

The principal of megger is based on the moving coil in the instrument. When current is flowing in a conductor which is placed in magnetic field it will experience a torque.

A torque is developed due to the interaction of the current flowing through the pressure coil and current coil. Flux is produced by the permanent magnet. The deflection of these coils is proportional to the resistance to be measured.

The torque of the megger varies in a ratio with V/I , (Ohm's Law:- $V = IR$ or $R = V/I$). Electrical resistance to be measured is connected across the generator and in series with deflecting coil. Produced torque shall be in opposite direction if current supplied to the coil.

1. High Resistance = No Current: - No current shall flow through deflecting coil, if resistance is very high i.e. infinity position of pointer.
2. Small Resistance = High Current:- If circuit measures small resistance allows a high electric current to pass through deflecting coil, i.e. produced torque make the pointer to set at 'ZERO'.
3. Intermediate Resistance = Varied Current: - If measured resistance is intermediate, produced torque align or set the pointer between the range of 'ZERO to INFINITY' proportional to the resistance to be measured.

Electronic Type Megger

The DC voltage source is already present in the electronic megger. It consists of different parts:

- a) Digital Display: - A digital display to show Insulation Resistance (IR) value in digital form.
- b) Wire Leads: - Two numbers of wire leads for connecting **megger** with electrical external system to be tested.
- c) Selection Switches: - Switches use to select electrical parameters ranges.
- d) Indicators: - To indicate various parameters status. For Example Power, hold, Warning, etc.

Note: – Above construction is not similar for every megger, it differs from manufacture to manufacture but basic construction and operation is almost same.

Advantages of Electronic Type Megger

- a) Level of accuracy is very high.
- b) IR value is digital type, easy to read.
- c) One person can operate very easily.
- d) Works perfectly even at very congested space.
- e) Very handy and safe to use.

Disadvantages of Electronic Type Megger

- a) Require an external source of energy to energies i.e. Dry cell.
- b) Costlier in market.

Suggested modern technology for implementation or available in market:

Modern megohmmeters (IR) makes use of both digital and analog scale of display for resistance measurement

LCD display results in saving of time and cost. Digital measurement also could be extremely precise, down to a percent or two in quality instruments, and required no interpretation. But the pointer travel cherished by the veteran techs is lost.

Then technology came to the rescue once more! Combination displays are available in quality instruments, with an electronic pointer and digital result when it rests. Logarithmic arc is expanded for better resolution on the all-important low end of the scale. A mere curved bar graph doesn't behave like a genuine analog. The Insulation Test voltage was increased by few firms from 5KV to 10 kV to meet the new testing recommendations outlined by the IEEE Standards. Various features were added like automatically perform Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Test, Auto ranging voltage measurements, live circuit warning, exceptional measurement range in Giga ohms, greater safety when testing at higher voltage levels etc.

Raw material required:

- 1) Resistance
- 2) Capacitors
- 3) Diode, Zener diode
- 4) Transistors
- 5) Integrated Circuit
- 6) Transformer
- 7) Battery
- 8) Printed Circuit Board (PCB)
- 9) Rotary switch
- 10) Preset (for adjusting Resistance)
- 11) PCB case
- 12) Display (analog meter)

V. Project Report

Bankable Project Report

Financial Aspects

Fixed Capital

Rent

Built up Area - 200 Sq. Metres Office, Stores etc. - 75 Sq. Metres Working Area - 125 Sq. Metres	Rent - Rs 20,000
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Machinery

S.No.	Description	Qty	Unit Price	Total Price (Rs.)
(A)				
1	Digital Storage Oscilloscope (100 Mhz Bandwidth)	1	48,000	48,000
2	Computer with Printer	3	40,000	1,20,000
3	Regulated DC Source	1	20,000	20,000
4	Wave Soldering Machine	1	2,80,000	2,80,000
5	LCR Meter	1	24,000	24,000
6	Soldering Iron Station	4	7,000	28,000
7	De-Soldering Pump	4	1,200	4,800
8	Standard Resistance Box	1	7,500	7,500
9	Digital Mutimeter	2	4,500	9,000
10	Magnifying glass with light	1	3,000	3,000
			Total	5,44,300
(B)	Electrification and Installation charges at the rate 10% of Machinery & Equipment			54,430
(C)	Cost of Office Chair, Working Table, Almariah etc.			2,50,000
(D)	Pre- Operative Expenses			25,000
			Total	8,73,730

Working Capital (Per Month)

(A) <u>Wages</u>				
S.No.	Personnel Designation	No.	Salary	Total Salary (Rs.)
1	Manager	1	35,000	35,000
2	Purchase Officer	1	20,000	20,000
3	Store Officer	1	16,000	16,000
4	Skilled Technician @ Rs.13500 per month	3	13,500	40,500
5	Two Testing Engineers (Diploma Holders)	2	20,000	40,000
6	Quality Control Officer	1	16,000	16,000

7	Accounts Officer	1	16,000	16,000
8	unskilled / Peon	2	10,000	20,000
9	Sales Executive	2	20,000	40000
			Total	2,43,500
	Perquisites @ 10%			24350
			Total	2,67,850

(B) **Raw Material Per Month**

S.No.	Description	Cost
1	Raw material including PCB, Outercase etc. for Basic model @ Rs.4000/- per piece for 250 pieces per month	10,00,000
	Total	10,00,000

Total value of raw material required / month is = 10,00,000

(C) **Utilities Per Month**

S.No.	Description	Amount in (Rs.)
1	Power	10,000
2	Water	1,000
	Total	11,000

(D) **Other Contigent Expenses**

S.No.	Description	Amount in (Rs.)
1	Rent	20,000
2	Postage & Stationary	2,500
3	Consumable Stores	5,000
4	Repairs / Maintenance	7,500
5	Transport Charges	18,000
6	Insurance	24,000
7	Misc.	5,000
	Total	82,000

Total Recurring Expenditure / Month 13,60,850

Working Capital	40,82,550
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Total Capital Investment

1	Fixed Capital	8,73,730
2	Working Capital	40,82,550
	Total	49,56,280

Total Cost of Production Per year

1	Total recurring expenditure / annum	1,63,30,200
2	Depreciation @ 10% of Machinery	54,430
4	Depreciation of Furniture @ 10%	25,000
5	Interest on Investment @ 12%	5,94,754
	Total	1,70,04,384

Turn Over

S.No.	Description	Total S.Price (Rs.)
1	By sale of 250*12 =3000 pieces annually @ Rs. 6500 per piece	1,95,00,000

Parameters

1	Net Profit per Annum (Before Tax) in Rs.	24,95,616.40
2	Net Profit Sales Ratio	12.79803282
3	Rate of Return	50.35261123

Details of test facilities available in India: Test facilities are available at Electronics Regional Test Lab (ERTL), Testing & Calibration facilities at State / District level like in the state of Tamilnadu the test facilities are available at O/o Electrical Inspector. Besides this a good number of Electrical firms (owned by private players) having these facilities.

Details of raw material suppliers:

Other raw materials are easily available, however for making Printed Circuit Board (PCB) as per the design of the circuit, few suppliers are mentioned below:

- 1) M/s AT &S India Pvt. Ltd., Nanjangud, Karnataka
- 2) M/s Genus Electrotech Ltd., Gandhidham, Gujarat
- 3) M/s Shogini Technoarts Pvt. Ltd., Khed –Shivapur, Pune
- 4) M/s Ascent Circuits Pvt. Ltd., Hosur, Tamilnadu

- 5) M/s Circuit Systems India Ltd., Gandhinagar, Gujarat
- 6) M/s Vintek Circuits (India) Pvt. Ltd., Manesar, Haryana
- 7) M/s Precision Electronics, Noida, Uttar Pradesh

Details of the Machine Supplier:

Wave Soldering Machine Manufacturers

- i. **M/s ESTOVIR TECHNOLOGIES**
Address: Plot No. 375, Sector 7, IMT Manesar, Gurugram, Haryana- 122050
Phone: [0124 401 3575](tel:01244013575)
<https://www.pcb soldering.in/lead-free-wave-soldering-machine-1018329.html>
- ii. **M/s Sharang Corporation**
Address: Laxmi Plaza, 106, opp. Alfa Laval, Dapodi, Pune, Maharashtra 411012
Phone: [096078 77449](tel:09607877449)
<https://www.sharang.co.in/>
- iii. **M/s TMPL Machines**
Address: C 27, KSSIDC, Veerasandra Industrial Area, Hosur Rd, Electronic City, Bengaluru, Karnataka 560100
- iv. **M/s Control Signals**
Address: N-91, Sector -1 DSIDC - Bawana Industrial Complex, Delhi 110039
Phone: [098102 52584](tel:09810252584)

Soldering /Disordering Machine Manufacturers

- i. **M/s Suprabhat Enterprises**
Address : Sr.no.58,lane no.4,Gokul Nagar, Near Shankar Temple, “Krishnakunj”, Pune -411048.
Ph.No.- 8600986060,9850279330.
Email : spe.suprabhat@gmail.com
- ii. **M/s BRIGHT TECHNOLOGIES**
Plot No: 15/EP, Shakthi Sai Nagar, IDA Mallapur, Hyderabad-500076
(P): +91 40 64540825, 7801005920 | (M): 9949243757
(E): sales@brighttechnologies.in | hari@brighttechnologies.in
(W): www.brighttechnologies.in | ISO 9001:2015 CERTIFIED COMPANY
- iii. **M/s KPH Technologies Private Limited**
No. 38/43, West Punjabi Bagh
New Delhi - 110026, India
- iv. **M/s Vineet Electric Company (siron)**

19/4, Oberoi Compound, Industrial Area, Opposite Dilshad Garden Metro Station, Dilshad Garden, New Delhi - 110095, India

<https://www.siron.in>

- v. **M/s Global Statclean Systems**
Ashok Gupta
KH 375, H Block, Gali No. 5
GT Karnal Road, Swaroop Nagar
New Delhi - 110042, India

Oscilloscopes Suppliers:

- i. M/s Tektronis Inc, Sarjapur, Outer Ring Road, Bangalore
- ii. M/s Scientech Technologies Pvt. Ltd., Perdesipura, Indore.

Multimeter Suppliers:

- i. M/s Tektronis Inc, Sarjapur, Outer Ring Road, Bangalore
- ii. M/s Fluke India
<https://www.flukeindia.com>

Casing Manufacturers:

Detail list is available at: <https://www.exportersindia.com/indian-suppliers/instruments-case.htm>

VI. Schemes and Consultancy Services

Existing Schemes available and their details

Under Cluster Development Scheme (CDP) of Ministry of M.S.M.E & MEITY with slight amendment i.e. even 10 No. of existing units may be allowed to form a Special Purpose Vehicle (SPV) as these units are scattered and getting good number of manufacturing industries within a particular radius is difficult.

Details of agencies that can provide guidance

- **CSIR** - Central Electronics Engineering Research Institute, Pilani (Rajasthan)
- Society for Applied Microwave Electronics Engineering & Research (**SAMEER**), Mumbai, Chennai, Kolkata.
- Indian Institute of Science, Bangalore.