# SINGH ISOTECH

## SINCE-1996

ELECTRICAL CONSULTANTS X RISK ASSESSMENT X PANEL BUILDERS

www.singhisotech.com

ESEA

ENERGY IS LIFE
BEE
CONSERVE IT
BUREAU OF ENERGY EFFICIENCY

ISO
ISO 50001
ENERGY MANAGMENT

CERTIFIED
ISO
45001:2018
COMPANY

MOST TRUSTED BRANDS OF INDIA
2023

International Organization for Standardization
ISO
9001:2015

ENTREPRENEUR OF THE YEAR

MSME
MICRO, SMALL & MEDIUM ENTERPRISES
सूक्ष्म, लघु एवं मध्यम उद्यम
OUR STRENGTH • हमारी शक्ति
Ministry of MSME, Govt. of India

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# About Us

*A 26-year-old firm specializing in electrical consulting, energy auditing, and electrical & fire safety auditing. The firm is certified by BEE (Bureau of Energy Efficiency), ISO 50001, ISO 45001, and MSME NSIC, and has won multiple awards for its outstanding auditing services.*

# Directors

***R.V Singh (65 Years)***
***45+ Years of Experience in Electrical Projects.***

*Experience Prior to Business:-*

***8 Years*** *in ITDC (Indian Tourism Development Corporation) as Project Manager*
***2 years*** *at Garden Estate Gurgaon as Projects Head*
***9 Years*** *in DLF Ltd. Resigned as Chief Project Manager*
***Projects Executed:*** *Ashok Yatri Nivas, Hotel Ashoka (Delhi & Agra), Hotel Samrat, Developed DLF Ph-1,2,3,4,5, DLF Green Valley Farms, Dilshad Garden & many mor*

***Vishal Singh (32 Years)***

***Proud BNI Member (5 Years)***
***10+*** *Years of Experience in Electrical Consultancy*
*MBA from* ***S P Jain School of Global Business***
*Electrical Engineer from* ***BITS-Pilani***

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# Why Us?

PAN INDIA PRESENCE (28 STATES)

SHORT PROJECT TIMELINES

IN-HOUSE INDUSTRY EXPERTS & CONSULTANTS

QUALITY ASSURANCE

HI-END INSTRUMENTS & NABL LAB ACCREDITIONS

PROVEN TRACK RECORDS

500+ DELIGHTED CLIENTS

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# INDUSTRIAL FOOTPRINTS

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# ACHIEVEMENTS & HONORS



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# BUSINESS VERTICALS

Singh Isotech Pvt. Ltd. encompasses five major business divisions.


## SAFETY & RISK MANAGEMENT

01

- Electrical Safety & Gap Audits
- Energy Audits
- Fire Safety Audits
- Structural Audits
- Process Audits
- Sustainability Audits
- Root Cause Analysis Audits

## ELECTRICAL DESIGN & CONSULATNCY

02

- Electrical Design Consultancy
- Lightning Protection Designs
- Electrical & Fire Designs
- Arc Flash Design & Studies
- Fire & Gas Mapping Studies
- Ergonomics Studies
- Industrial Hygiene Studies

## ELECTRICAL TURNKEY PROJECTS

03

- Turnkey Projects- Elect. & Fire
- Risk Assessment & mitigation
- Cost Effective Execution
- Regulatory Approvals & Permits
- End to End Project Management

## HT-LT PANELS MANUFATURERS

04

- Main LT & Sub-Panels
- All Types- PLC, MCC, APFC, VFD, SOLAR, etc.
- High Quality Components
- Extended Warranties
- Minimal Delivery Time
- Onsite Installation Services

## ELECTRICAL GOODS TRADERS

05

- 45+ Brands Available
- Special Discounted Rates
- Extended warranties
- Brands: Polycab, Havells, Norisys, GM, Goldmedal, L&T, Wipro etc.

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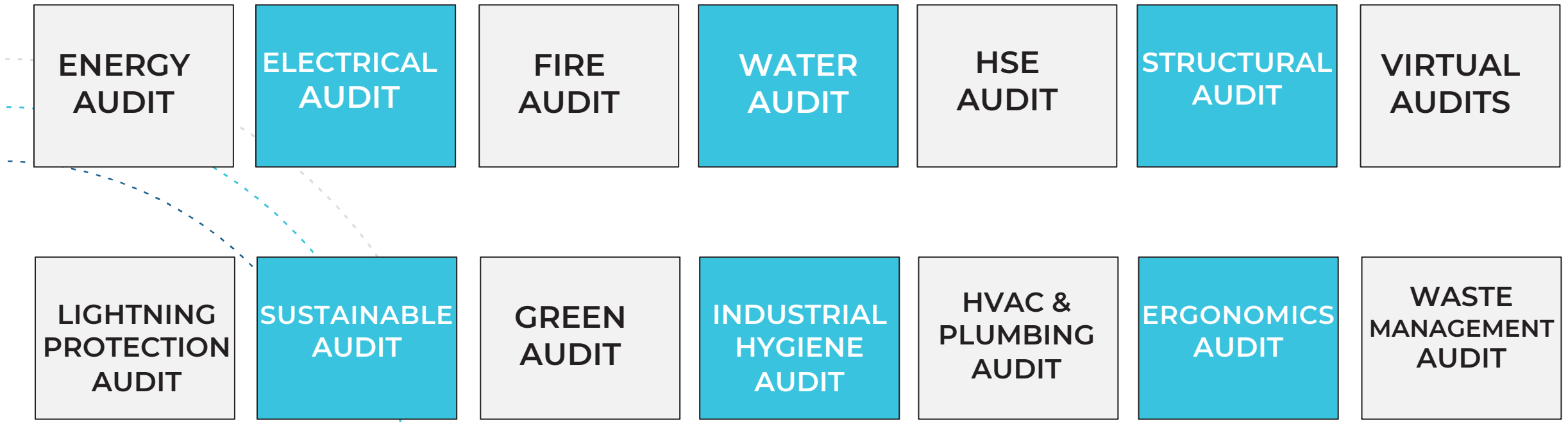
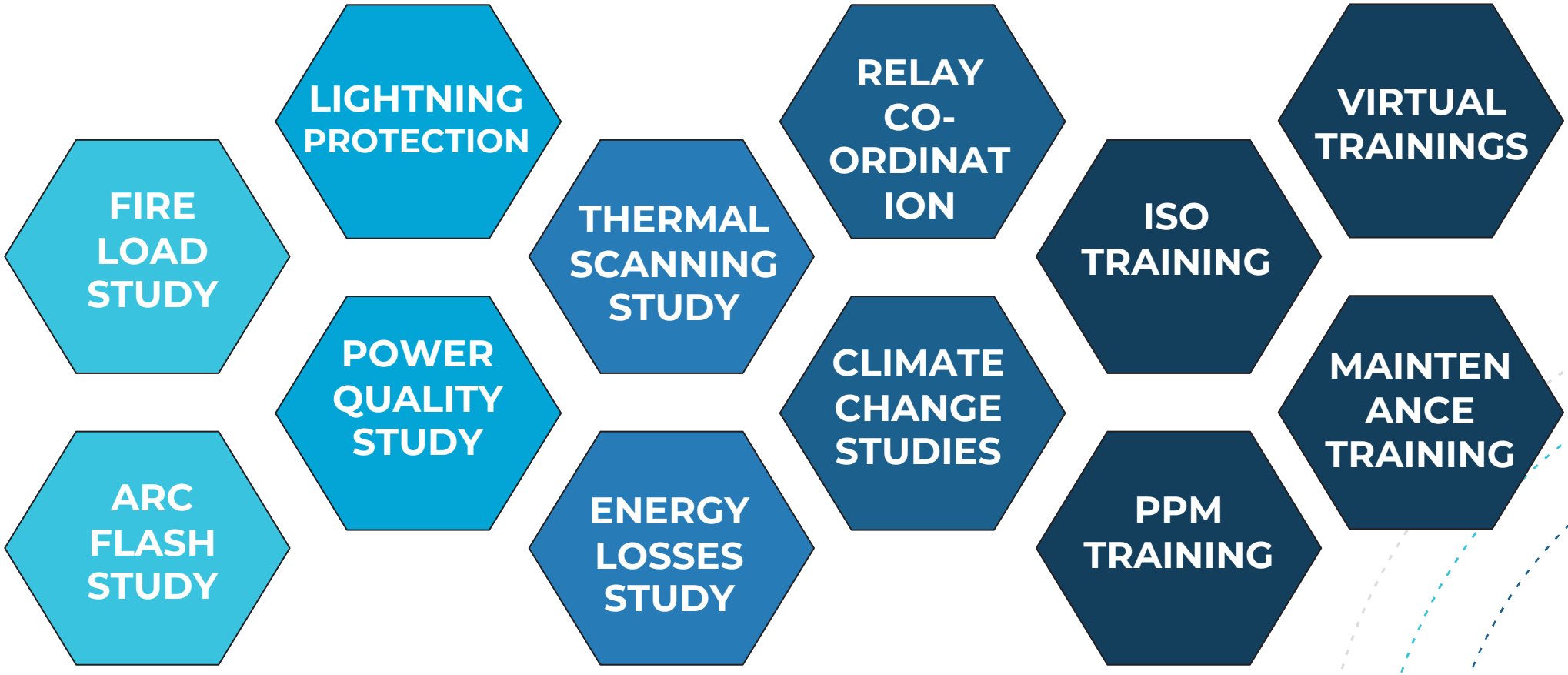
# SAFETY & RISK MANAGEMENT AUDITS




COMPLETE ENGINEERING SERVICES AUDITS

SINCE-1996

# RISK ASSESSMENT STUDIES/ TRAININGS




COMPLETE RANGE OF CUSTOMIZED STUDIES & TRAININGS

SINCE-1996

# HI PRECISION INSTRUMENTS & BEE CERTIFIED TEAM


# SAFETY TRAININGS

## GENERAL SCOPE OF WORK

•Hazard identification where construction site hazards are identified and standard practices for eliminating, preventing & controlling such hazards are introduced.

•Discussion with site staff for their role at the site, assigned responsibilities, anticipation of hazard and proactive approaches to reduce incidents at site.

•This audit shall comprehensively cover the activities of construction site & associated hazards such as

- ➢ Electrical Safety – Action of electricity, working with electrical equipment, hazards of electricity, preventive methods to control electrical hazards etc.
- ➢ Fall Protection – Need of fall protection, fall protection systems etc.
- ➢ Fire Safety – Nature & class of fire, source of fire, types of extinguishers & their usage.
- ➢ Work Execution Activities – Scaffolding, welding, cutting, excavation, heavy machinery etc.

# Actual Pictures of HSE Safety at DMRC Office, Connaught Place on 16th Apr, 2024

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# GOVERNMENT APPROVED & CERTIFIED AUDIT COMPANY

- Bureau of Energy Efficiency BEE ESCO
- National Safety Council Certified
- ISO 9001 | 14001 | 45001 | 50001
- Central Electricity Authority (CEA)
- On Panel Auditor- MSME Department Haryana
- NABL Laboratories Accredited
- Chartered Elect. Mech. Civil Engineers & A – Class Contractor License

# REPORTING STYLE
# REPORT SUMMARY

## 3.Summary of Electrical safety Audit

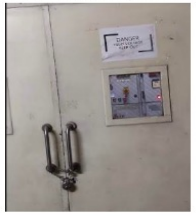
| Sr. N. | Observation | Location | Impact on system | Ref. Std. | Risk category | Recommendation |
|---|---|---|---|---|---|---|
| 1 | Double body earthing is not provided to various locations | a) Transformer yard net<br>b) Changeover switch<br>c) HT Meter<br>d) UPS<br>e) Motor | If a system does not have double body earthing, it can increase the risk of electric shock, electrical fires, and damage to equipment. | IS 3043/ CEA 2010 | HIGH | It is recommended to provide double body earthing because In the event of a fault, double body earthing provides a redundant path for electrical current to flow, which ensures that the fault current is safely dissipated and protects people and equipment from harm. |
| 2 | RCCB is not provided | All DBs | Without RCCB, Leakage current cannot be detectedwhich increase the riskof electric shock. | IS 3043/ CEA 2010 | HIGH | It is recommended to provide RCCBs for preventing someone from electric shock caused by leakage current. |
| 3 | Isolator is used at main incomer in each DB. | All DBs | Isolator is just an on/off switch. It will not provide protection to your appliances from overload and short circuits. | IS 1646 | HIGH | It is recommended to provide MCB of same rating. |
| 4 | Flameproof Enclosures are not provided. | All MCCB /MCB boxes installed in the premises. | In absence of enclosures, external factors such as moisture, dust, dirt, and other contaminants can enter into the DB causes heating and fire. | IS 2148 | HIGH | It is recommended to provide flameproof enclosure. |

| Sr. No. | Our Recommendations | Annual Saving (in KWh) | Annual Saving (in INR) | Payback Time |
|---|---|---|---|---|
| 1 | **Comparison of 1.5 ton, 5 star and 1 star air conditioner:**<br>One ton = 3,515 watts cooling capacity.<br>Average Power = cooling capacity ÷ EER<br>**For 1.5 ton 5 star unit:**<br>Power = 3515 × 1.5(ton) ÷ 3.3(EER) = 1598 Watts = 1.598 Units per Hour<br>**For 1.5 ton 1 star unit**<br>Power = 3515 × 1.5(ton) ÷ 2.5(EER) = 2109 Watts = 2.109 Units per Hour<br>Price difference of same type 1.5 ton, 5 star and 1 star A/C is taken as Rs 8000/-<br>Annual variable cost on account of interest, depreciation and maintenance taken as 20% of capital cost.<br>Annual variable charges for additional cost = 8000 × 20% = 1600/-<br>Energy charge average Rs 6.5 per unit.<br><br>**Case for Regular Running such as UPS rooms:**<br>Total usage hours per day = 20 Hrs<br>Annual utilization = 300 days (includes summer days & period between end monsoon and start winter)<br>Annual saving on energy bill = (2.109 – 1.598) × 20 Hrs × 300 days × 6.5 Rs/Unit = Rs 19,929 per year.<br><br>Annual Net Saving = 19929 – 1600 = Rs 18,329 per year.<br>Additional cost of Rs 8000 is recovered in than 6 months only. | 2345 Units | Rs. 19929.00 | 6 Months |
| 2 | **Changing normal type belt to V-Type Belt -**<br><br>Suppose 100 hp motor operate at 75% load and consume 525 K units annually. Suppose it is using V- Belt (93% efficient) is replace by synchronous belt (98% efficient), The saving is illustrated below:<br>Energy Saving = Annual energy used X $(1-\frac{\text{Effeciency of v belt}}{\text{Effeciency of Synchronous belt}})$<br>$= 525000 \text{ X } (1 - \frac{0.93}{0.98})$<br>= 26785.71 units<br><br>**Results** - Yearly saving in term of Rupee (Rs. 8.5/ unit) = Rs 227,672.50 | 26785.71 Units | Rs. 227,672.00 | 10 Months |
| 3 | **Savings In Compressor System**<br>Saving in term of cost considering hole diameter 3 mm which corresponds to a loss of 6.5 KW. Suppose a compressor operate for 24 hrs for 312 days so it will consume = 6.5 x 24 x 312 | 48672 Units | Rs. 413712.00 | I Year |

# REPORTING STYLE
# REPORT SUMMARY

## 17. Electrical Safety Observation & Recommendation

### 17.1 HT- Side Observation & Recommendation

| S: No | OBSERVATION | PICTURES | Risk | Suggestions / Recommendations | Post Audit observation/Recommendations |
|---|---|---|---|---|---|
| 1 | G.O pole earthing pit value is not good. (13.0Ω Measured) G.O pole earthing pits are full buried. |   | High | It is recommended to provide new electrical earthing as IS 3043. As per the IS earthing pits should be easily accessible. | Complied. The issue has been resolved through the installation of RMU. |
| 2 | The Danger Sign board was not pasted in front of the HT meter area. HT meter net fencing body earthing is not provided. |   | Medium | As per CEA regulations, every installation of voltage exceeding 250V shall affix permanently in a conspicuous position a danger notices in Hindi or English and the local language of the district, with a sign of skull and bones of a design as per IS -2551. Net fencing electrical body earthing required. | Non-compliance persists as the issue remains unresolved.  |
| 3 | VCB Room danger sign board was not pasted in front of the door. |  | Medium | As per CEA regulations, every installation of voltage exceeding 250V shall affix permanently in a conspicuous position a danger notices in Hindi or English and the local language of the district, with a sign of skull and bones of a design as per IS -2551. | Not Complied as the Problem is not yet rectified.  |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | Utilizing energy from heat pump exhaust air to optimize the air conditioning load | 89711 | 10.2 | 5 | 5.8 | High |
| 9 | Improving & maintaining the performance of VRV Air Conditioners at optimal level | 4578.5 | 0.52 | 0.25 | 5.74 | Immediate |
| **HIGH COST ECMs** | | | | | | |
| 10 | Energy Efficient EC fans | 545702 | 62.2 | 41.8 | 8 | Medium |
| **Total** | | **1307335** | **165.1** | **58.45** | **4.24** | |

**The Annual electrical energy savings (in kWh)** are calculated and mentioned in the below table:

*Table 4: Energy Conservation Measures Summary*

| | |
|---|---|
| Total annual energy savings (kWh) | 1307335 |
| Annual energy consumption (kWh) | 8214080 |
| Expected energy consumption (kWh) | 6906745 |
| **Energy savings %** | **15.91** |

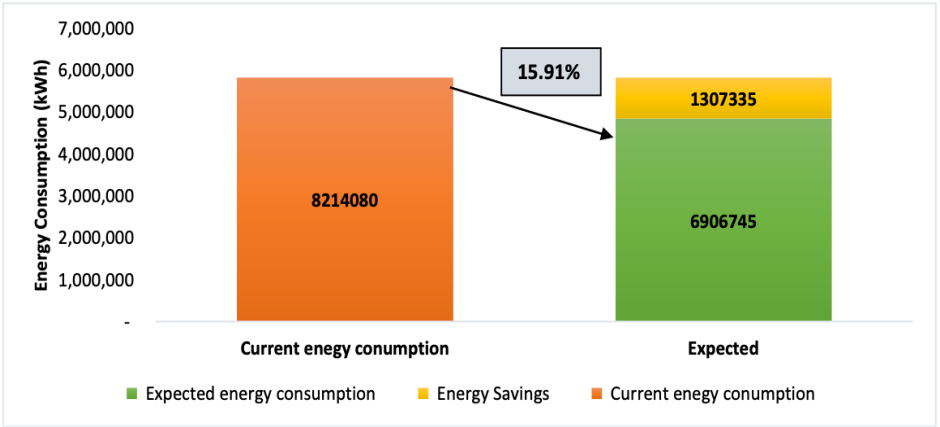
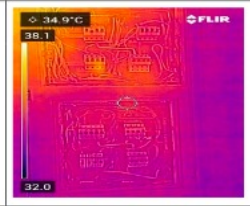



*Figure 1: Annual Energy Savings*

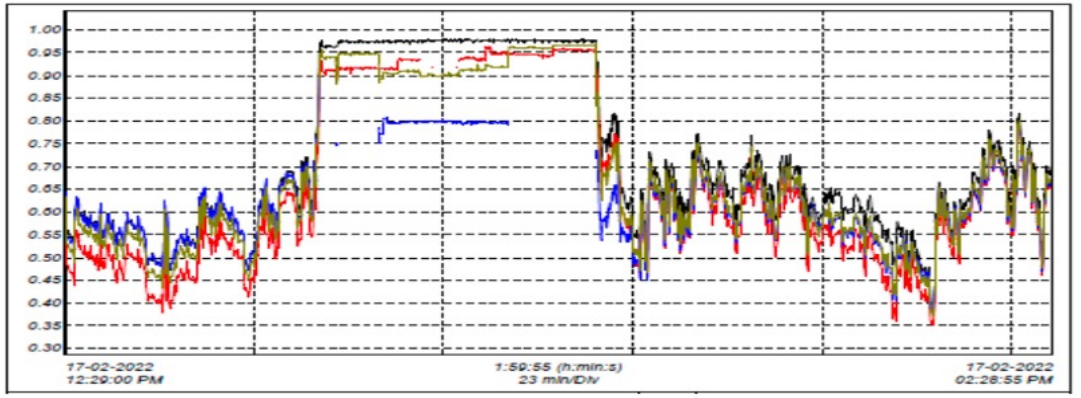
# REPORTING STYLE
# HIGH, MEDIUM, LOW PRIORITY

| Sr. N. | Real Image | Thermal Image | Risk category | Observation/recommendation |
|---|---|---|---|---|
| 13. |  |  | MEDIUM | **Identification: F13 MCB**<br>Heating is found Throughout the cable and installation. Heating may be due to loose connection.<br>It is recommended to retighten the connection. |
| 14. |  |  | HIGH | **Identification: Fist floor DB (Right side)**<br>Heating is found at input cable termination of main incomer. Heating may be either due to poor lug crimping or loose connection.<br>It is recommended to retighten the connection. |
| 15. |  |  | NA | **Identification: First Floor DB (Left Hand)**<br>No heating found in the DB. |
| 16 |  |  | LOW | **Identification: AC cable**<br>Minor heating is found in the AC cable. It may be either due to insulation degradation of cable or poor housekeeping.<br>It is recommended to change the insulation/ provide regular housekeeping to DB. |
| 17. |  |  | HIGH | **Identification: First Floor DB (right side)**<br>Heating is found throughout the Y phase cable. Heating may be due to insulation degradation of cable.<br>It is recommended to change the cable. |

***Powe r Factor***

| Name | Date | Time | AVG | MIN | MAX | Duration | Units |
|---|---|---|---|---|---|---|---|
| PF1 | 17-02-2022 | 12:29:00 PM | 0.71 | 0.38 | 0.97 | 2:00:00 | (h:min:s) |
| PF2 | 17-02-2022 | 12:29:00 PM | 0.65 | 0.35 | 0.96 | 2:00:00 | (h:min:s) |
| PF3 | 17-02-2022 | 12:29:00 PM | 0.62 | 0.37 | 0.89 | 2:00:00 | (h:min:s) |
| PFT | 17-02-2022 | 12:29:00 PM | 0.68 | 0.37 | 0.96 | 2:00:00 | (h:min:s) |

*Source – Recorded through Krykard ALM31*




*As per Indian Electric Rule 1956, National Electric Code 2011, Section 6.3.02, IS 12360, IEC 61000, power factor must be maintain close to unity or in-between a tolerance value of 0.85 and 1*

*Observation* –

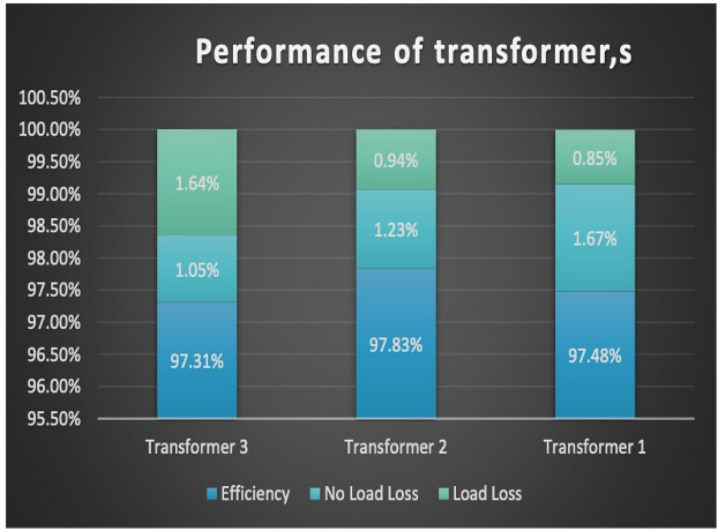
**Due to nonlinear load in the system, the power factor gets distorted; it should be maintained to 0.99. While maintaining power factor, will helps in voltage stabilization and load balancing, which will increase energy efficiency and power saving. Here power factor gets distorted due to frequent induction of Harmonics distortion.**

**APFC panel will be required to be installed of size 140KVAr.**

# CASE STUDY-1
# TRANSFORMER SWITCHING

## 1.1 Executive Summary of Energy Audit

### A) Summary of performance of transformer




**Observation –** During testing of the transformer, it was discovered that there were power losses and no-load issues. The no-load losses for TF-1, TF-2, and TF-3 were measured at **4.38 kW, 5.02 kW, and 6.75 kW,** respectively. **These measurements exceeded the permissible limit of no-load losses set by IEC-60076, which is 2.2 kW**.

The high no-load loss in dry-type transformers is typically due to the core loss or the iron loss. Core loss occurs due to the alternating magnetic field in the transformer core, which results in eddy currents and hysteresis losses.

able 3: Energy Conservation Measures Summary

| | |
|---|---|
| Total annual energy savings (kWh) | 678342.26 |
| Annual energy consumption (kWh) | 6290840 |
| Expected energy consumption (kWh) | 5612497.74 |
| **Energy savings %** | **10.78%** |

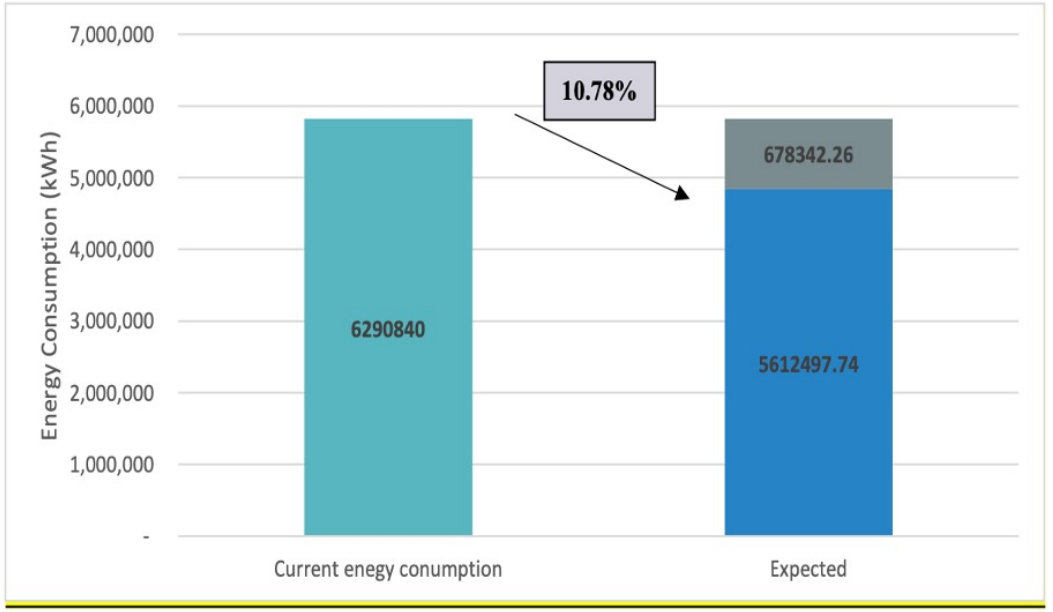



Figure 1: Annual Energy Savings

# CASE STUDY-2
# TIME OF DAY TARIFF

| Month/TOD | Time | Rate |
|---|---|---|
| Jan-20 | | |
| TOD -1 | 05:00 11:00 | 6.035 |
| TOD -2 | 11:00-17:00 | 7.1 |
| TOD -3 | 17:00-23:00 | 8.165 |
| TOD -4 | 23:00-05:00 | 7.1 |
| Feb-20 | | |
| TOD -1 | 05:00-11:00 | 6.035 |
| TOD -2 | 11:00-17:00 | 7.1 |
| TOD -3 | 17:00-23:00 | 8.165 |
| TOD -4 | 23:00-05:00 | 7.1 |
| | | |
| Apr-20 | | |
| TOD -1 | 05:00-11:00 | 6.035 |
| TOD -2 | 11:00-17:00 | 7.1 |
| TOD -3 | 17:00-23:00 | 8.165 |
| TOD -4 | 23:00-05:00 | 7.1 |
| May-20 | | |
| TOD -1 | 05:00-11:00 | 6.035 |
| TOD -2 | 11:00-17:00 | 7.1 |
| TOD -3 | 17:00-23:00 | 8.165 |
| TOD -4 | 23:00-05:00 | 7.1 |

Detailed Electrical Safety Audit Report

**Observation:**

- **Suppose if we change the morning shift by an hour and add it on TOD (5:00 – 11:00) then daily we can save 320 units i.e Rs 2240/day during winter and 600 units during summer which corresponds to Rs 441000 / annum during winter and 1050000/annum during summer.**
- **And also if we do man power work for an hour during TOD (17:00 -23:00) then we can save 120 units/ day which corresponds to Rs 960/day.**

**Summary of Electricity Bill:**

| Sr. No. | Parameters | Six months Consumption |
|---|---|---|
| 1 | KWH | 40192 |
| 2 | KVAH | 47363 |
| 3 | PF | 0.746047 |
| 4 | Electricity Cost* | Rs666178 |
| 5 | Average Billing Rate* | Rs14.06/KVAh |
| 6 | Recorded highest Demand | 12440KVAh |

# CASE STUDY-3
# COOLING TOWERS

**10.1 ECM: Installation of Variable Frequency Drives and Automation of Cooling Tower Fans by Enthalpy based control system.**

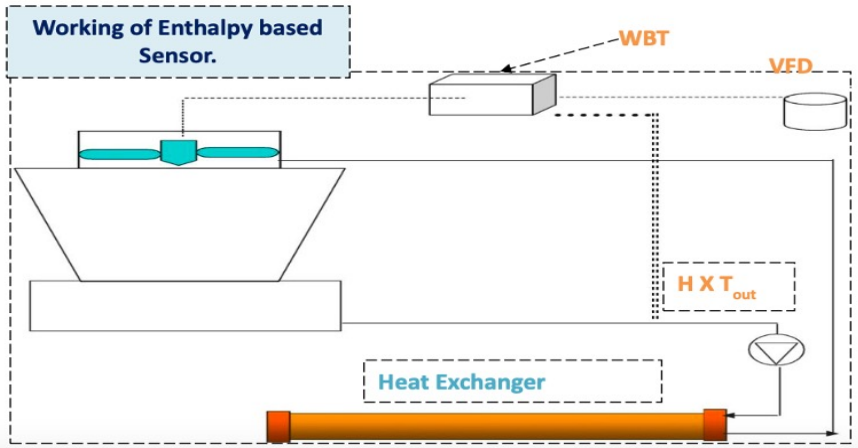
**Recommendations**

- ✓ Opting for variable frequency drive would enable operational team to maintain L/G ratio precisely w.r.t ambient conditions.
- ✓ L/G Ratio is not systematically maintained, PLC based Automatic Controllers shall also be made use to adjust L/G i.e., Air Flow ratio through real monitoring of Wet Bulb and Supply Water Temperature
- ✓ Optimizing the air flow would result in Energy Savings and reduce the drift losses as well.
- ✓ VFDs shall be installed with PLC based feedback speed modulation

Table 9: Power Consumption of fans of cooling towers:

| *No* | *Equipment* | *CT Fan Power Consumption kW* | *No's CT Fan Operated* |
|---|---|---|---|
| 1 | CT 1 | 3.34 | 1 |
| 2 | CT 2 | 3.50 | 1 |
| 3 | CT 3 | 3.42 | 1 |
| 4 | CT 4 | 3.19 | 1 |
| **Total** | | **13.45** | |

*Fig 3: The proposed scheme of CT operation with the VFD and PLC based Auto L/G controller is: -*




**10.2 ECM: Installation of FRP (Fibre Reinforced Plastic) Blade: system**

**Advantages**

a. CT fans metallic blades should be replaced with the FRP blades to reduce the power consumption up to 25-30% as FRP blades are lighter in weight as compared to metallic blades.

b. Fibre reinforced plastic has greater flexural strength than timber and pound-for-pound is often stronger than steel and aluminium in the lengthwise direction. Ultimate flexural strength is LW-30,000 psi and CW-10,000 psi. Compression strength is LW-30,000 psi and CW-15,000 psi.

**Energy consumption & saving Economics.**

| Parameters | Magnitude |
|---|---|
| Present Power consumption | 13.45 KW |
| Anticipated power consumption | 10.08 KW |
| Energy Savings / Year | 3.37KW x 365 h/y<br>**1230 KWH / y** |
| Cost savings/ Year | 1230/ y x Rs 6.8/kwh<br>**Rs 8364/ y** |
| Investment | 0.45 lakhs |
| Simple Payback Period | 64 months |

# ROI WITH PAYBACK PERIOD

### 10.4 By Providing Harmonic Filter

Harmonic currents and voltage are created by non-linear loads connected to the power system. All power electronic converters used in different types of electronic system increase the harmonic disturbance by injecting harmonic current directly into the supply network. Common non-linear loads include variable frequency speed drives (A.C and D.C as well), induction furnace, LED, CFL, UPS etc

These harmonic current and voltage creates the power loss in the system. Therefore, it is recommended to install the harmonic filter.

| As per IEEE 519, Limit of current harmonics is 8% and voltage harmonics is 5%. | | |
|---|---|---|
| **S.No** | **Parameter** | |
| **1** | Existing Current harmonics(%f) (Max) | 17.4 |
| **2** | RMS current (KA) | 1.007 |
| **3** | Fundamental current (KA) | 0.974 |
| **4** | Harmonic current (KA) | 0.169 |
| **5** | Permissible Harmonic current as per IEEE 519 (0.08*F) | 0.078 |
| **6** | Existing Voltage harmonics(%F) (Max) | 4.2 |
| **7** | RMS Voltage (Volt) | 428.5 |
| **8** | Fundamental Voltage (Volt) | 414.81 |
| **9** | Harmonic Voltage (KA) | 20.75 |
| **10** | Harmonic Voltage as per IEEE 519 (0.05*F) | 20.74 |
| **11** | Distortion power factor | 0.99 |
| **12** | Power loss due to harmonics (Kw) | 2.93 |
| **13** | Annual energy saving after harmonic filter installations (Kwh) | 25628.35 |
| **14** | Required filter size | 92Amp |
| **15** | Annual cost saving @6.65Rs | 170428Rs |
| **16** | Cost of Harmonic filter | 500000 |
| **15** | Payback period (Months) | 35.20 |

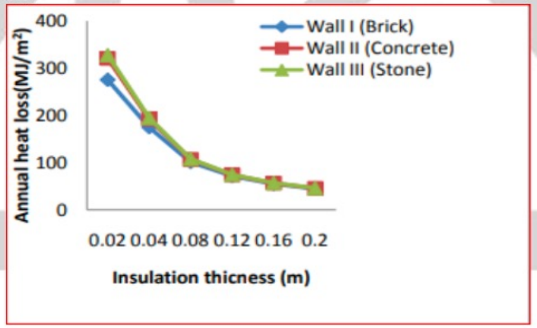
Hence Pay back will come around 8.31 months.

Most of the energy savings in new air-conditioned buildings come from reductions in space cooling energy usage due to thermal insulation and high-efficiency air conditioning equipment (seasonal energy efficiency ratio. The optimal combination of R-values is 1.4 m2 ¨ K/W for roofs and 1 m2 ¨ K/W for walls. Investing in better energy efficiency through insulation is a significant economic effort. This is why it is important to explore the various options available to achieve an optimal use of thermal insulation for residential buildings.

Energy saving for different type of walls construction in India

| Wall Type | Energy Saving (Rs/m$^2$) | |
|---|---|---|
| | XPS | EPS |
| Wall I (Brick) | 2560.099 | 2947.976 |
| Wall II (Concrete) | 4627.48 | 5046.47 |
| Wall III (Stone) | 5084.03 | 5510.55 |

The above data is per annum.




Now installing insulation on wall ** will save 5046.47/12 = 420.5 units/ months.

Hence unit consumption will reduce to (1944 - 420.5) = 1523.5 units / months

Energy cost of 1523.5 unit = Rs 12950

Which is a saving of Rs (16524-12950) =Rs 3574/ month.

# TRANSPARENT DATA COLLECTION

## Detailed Electrical Safety Audit Report

ESEA

**One Wire Size Up Means Big Savings**

Installing wire only one size larger than has been required by the National Electrical Code increases energy efficiency with dramatic paybacks. This simple technique can yield quick paybacks while increasing the flexibility of the installation. By increasing the wire size, reduced power losses offset the cost of the wire and produce savings on energy costs.

**Example 1:** A three-phase circuit feeding a 125 H.P. 460 V motor, operating at 75% load, 75 Mtr. from the load center, running 8,000 hours per year. Draw is assumed to be 75% of 156 full-load amps.

| | 4 Sqmm | 6 Sqmm |
|---|---|---|
| Conduit Size | 32 mm | 32 mm |
| Estimated Loss (at 75% load and 44°C and 40°C, respective conductor temps.) | 708 W | 554 W |
| Wire Cost | Rs. 14250 | Rs. 16125 |
| Conduit Cost | Rs. 4125 | Rs. 4125 |
| Upgrading Cost | | Rs. 3500 |
| Energy Savings: at 75% load | | 1,237 kWh/year |
| Savings: at Rs. 7.15 per kWh Payback | | Rs. 8845/year, 2 years, 4 months |
| Savings: at Rs. 8.50 per kWh Payback | | Rs. 10514/year, 2 year, 2 months |
| **In this example, the payback is under 2 years 6 months, and the savings continue indefinitely into the future.** | | |

**Example 2.**The same $I^2R$ savings and short paybacks apply to single-phase systems also. Take the case of a single-phase, 15 amp lighting load operating continuously. To simplify, assume the load is concentrated 30 Mtr from the panel.

| | 4 Sqmm | 6 Sqmm |
|---|---|---|
| Conduit Size | 25 mm | 25 mm |
| Estimated Loss (at 15 amp load and 40°C, and 37°C, respective conductor temps.) | 77 W | 48 W |
| Wire Cost | Rs. 1650 | Rs. 1950 |
| Conduit Cost | Rs. 600 | Rs. 600 |
| Incremental Cost | | Rs. 150 |
| Energy Savings | | 354 kWh/year |
| Savings: at Rs. 7.15 per kWh Payback | | Rs. 2531/year, 14 months |
| Savings: at Rs. 8.50 per kWh Payback | | Rs. 3000/year, 10 months |
| **Dramatic, short term paybacks in a single-phase run, with flexibility for future load changes.** | | |

**Performance evaluation of pump -1**

| Pump Identification | Unit | Pump-1 |
|---|---|---|
| Rated flow | $m^3$/hr. | 93.6 |
| Rated head | M | 25 |
| Motor Rating (A) | kW | 9.3 |
| Rated motor efficiency(B) | % | 84.5 |
| Rated pump set efficiency | % | 63 |
| Rated specific consumption(A*100/B) | Kw/m3 | 0.12 |
| **Parameters measured** | | |
| Measured Flow | $m^3$/hr. | 67 |
| Measured pressure (B) | Kg/$cm^2$ | 1.7 |
| **Performance Evaluation** | | |
| Total head (D=C*10) | M | 17.00 |
| Voltage | Volt | 414.00 |
| Current | Amp | 15.80 |
| Power factor | Unit less | 0.82 |
| Average Kw (D) | kW | 9.3 |
| Hydraulic power(E) | kW | 3.20 |
| Motor efficiency | % | 84.5 |
| Calculated pump efficiency | % | 40.72% |
| Calculated overall (Pump set) efficiency | % | 34.41% |
| Specific energy consumption (D/E) | kW/$m^3$ | 0.14 |

**Observation** – Efficiency of first pump is less because of low flow as compared to rated flow. Hydraulic power is less due to low flow. Also, specific energy consumption of this pump is more as compared to other pumps that means pumps is consuming more power corresponding to flow.

Probable reasons for reduced flow

1. Clogs or blockages in the pump or the piping: Debris, sediment, or other materials can build up and obstruct the flow of water or fluid.

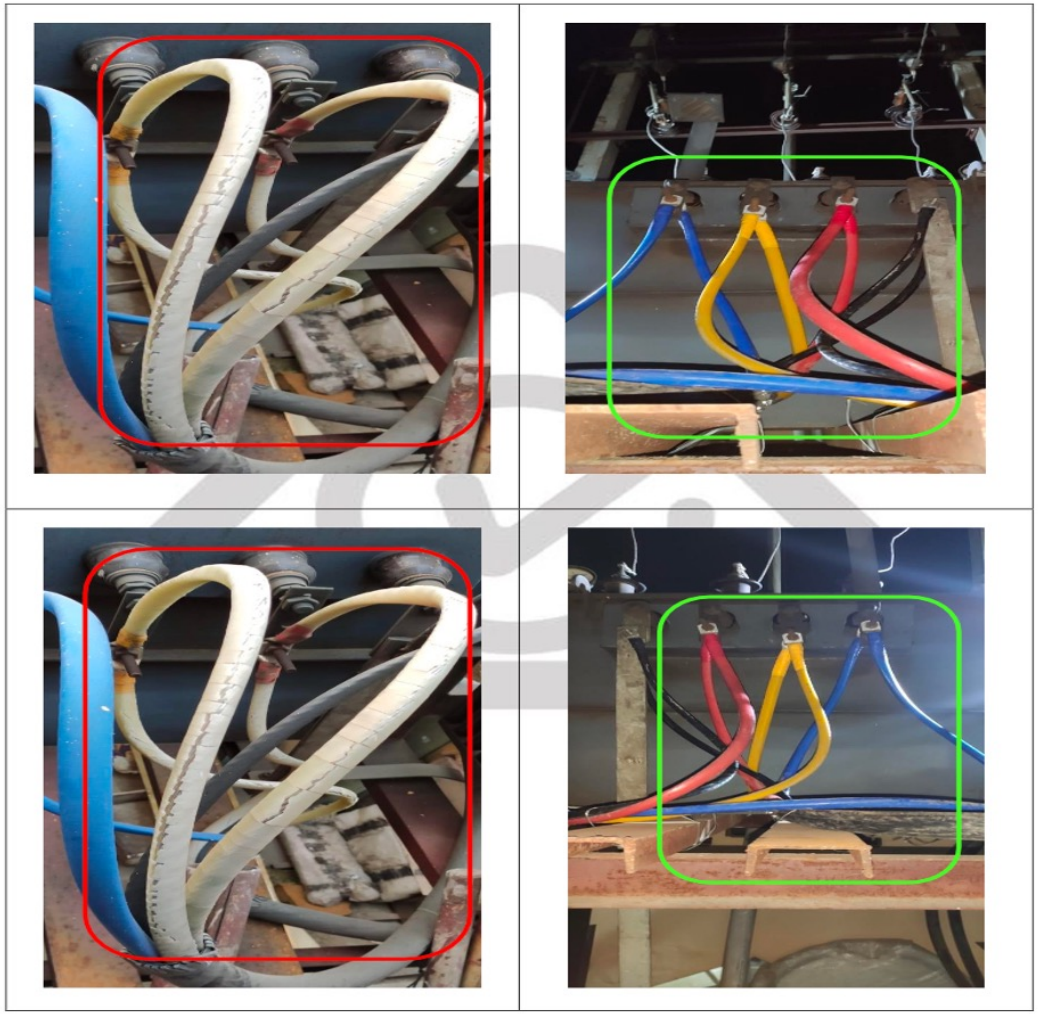
2. Impeller problems: The impeller is a rotating part of the pump that creates the flow of water or fluid. If the impeller is damaged or worn out, it can reduce the pump's ability to move water or fluid.

**Recommendation** – It is recommended to either get the maintenance done of pump or replace the energy inefficient pump by new pump.

**Performance of DG Pump: -**

# WE TAKE SAFETY VERY SERIOUSLY

**Some Before and After Observations**

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★ RECOMMENDED ★

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- Ensure your premises are 100% electrically safe by evaluating and maintaining the existing electrical design & systems.

## ENERGY AUDIT

- Optimize energy usage, reduce bills by up to 40%, and enhance equipment efficiency through an energy audit.

## FIRE AUDIT

- Ensure comprehensive fire safety, detection, and firefighting systems through a thorough fire audit.

## TRANSFORMER/ VCB/ PANELS SERVICING/ TESTING

- Efficient servicing for transformers (Dehydration, Filtration), VCBs, panels, and various electrical items to maintain top-notch performance.

## TRAIN YOUR MAINTENANCE TEAM

- Empower your maintenance team with a comprehensive 1-day on-site training and monthly maintenance checklist.

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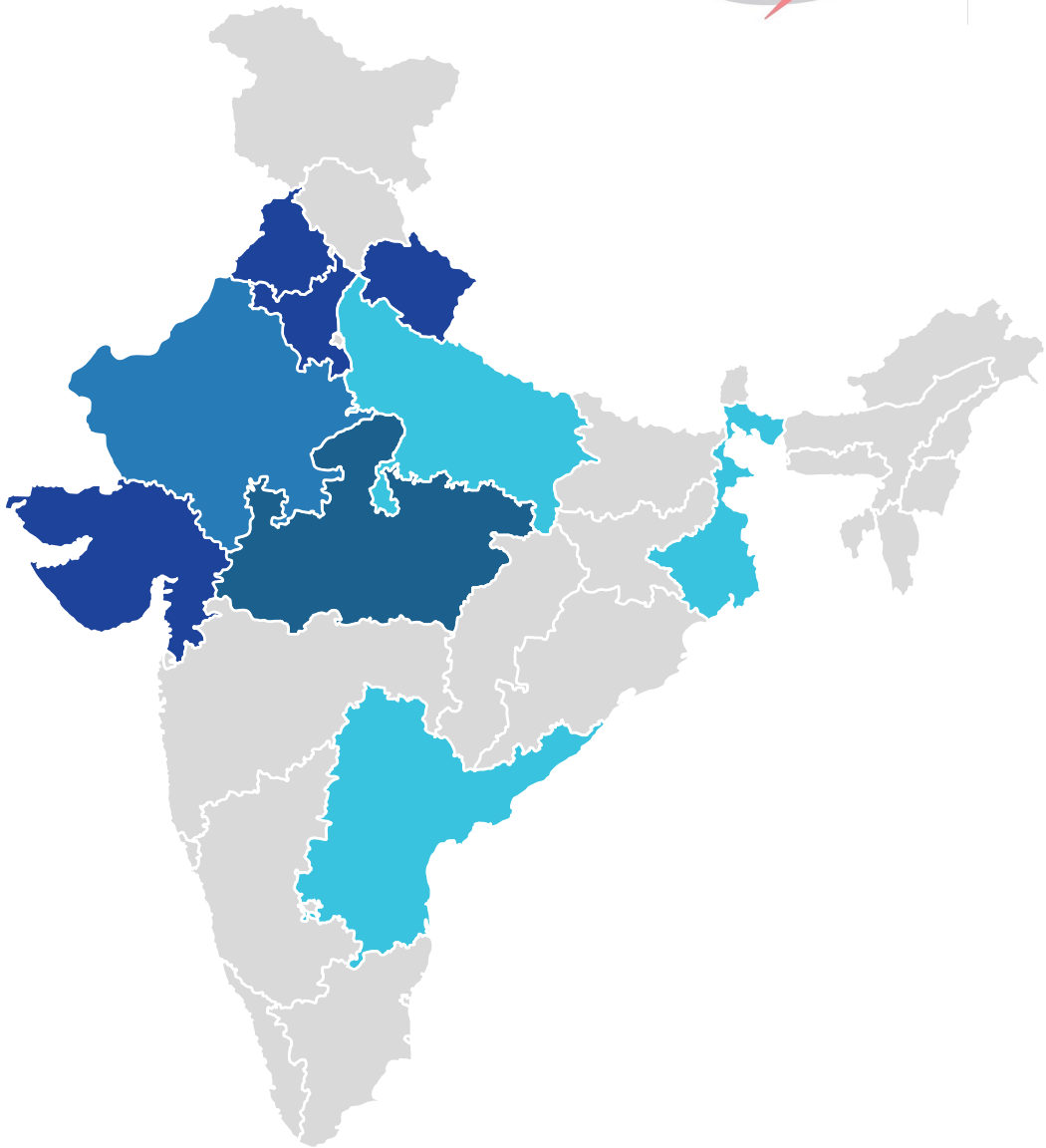
- Jammu



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# Contact Detail

SINGH ISOTECH PVT. LTD.

ELECTRICAL CONSULTANTS X RISK ASSESSMENT X PANEL BUILDERS

## PHONE

Phone : +91 9999 888 902

Phone : +91 9871 659 963

## ADDRESS

HQ: GURUGRAM

A-335A Sushant Lok-1

A Block, Gurugram, Haryana

## EMAIL

mail@singhisotech.com

sales@singhisotech.com

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