ANALYTICAL SUPPORT : BUILDING MATERIALS

CORE COMPETENCE:
- Quality Evaluation of Raw Materials & Finished Products
- Mix Designs for Concrete Structures
- Durability Studies for Concrete
- Performance Studies on Precast Concrete Members
- Independent/Third Party Agency for Quality Control
- Consultancy for obtaining NABL Accreditation and ISO Certification
- Imparting Training/Awareness Programmes (National/International)

TYPICAL PRODUCTS EVALUATED / STUDIED:
Cement, Concrete (Cubes, Beams, Cylinders), Sand (Fine & Coarse), Aggregates, Bricks (Masonry, Fly Ash, Sewer, Refractory), Tiles (Terrazo, Ceramic, Concrete), Stones (Granite, Sandstone, Marble), Lime, Pipes (RCC, SW, MS, CI, DI), Fly Ash, Blocks (AAC, CLC, Concrete), Gypsum (Plaster, Board), POP, Asbestos, Pavers, Water Proofing Compound, Coating Materials, Admixtures, Microsilica, Bentonite, Sanitary Wares, Water, Steel, Wood, Soil, Resin, Grout, Filter Media etc.

STUDIES UNDERTAKEN:
- Chemical & Physical analysis of Cement (OPC, PPC, PSC, WPC, SRC, HAC) as per ISS & ASTM standards including Heat of Hydration, Degree of Whiteness
- Chemical & Physical analysis of White Cement as per European Standards
- Concrete Mix Designing (M-10 to M-80 for CC & RCC with and without Admixture, Fly Ash, Steel fibers, Microsilica, Fume Silica & other emerging additives)
- Designing of Self Compacting Concrete, High Performance Concrete, Roller Compacted Concrete, Dry Lean Concrete, Pavement Quality Concrete
- Durability Studies of Concrete (Permeability, RCPT, ISAT, Drying Shrinkage)
- Coarse & Fine Aggregates for Physico-Chemical Properties including Alkali Aggregate Reactivity by Chemical and Mortar Bar Method, Alkali Silica Reactivity, Alkali Carbonate Reactivity, Petrography, Sand Equivalent Value
- Building Bricks & Other Type of Bricks for Physico-Mechanical Properties
- Refractory Material for Physico-Mechanical and Chemical Properties including Pyrometric Cone Equivalent, Linear Change, Density, Compressive Strength
- Stones for Physico-Mechanical & Chemical Properties including Freezing & Thawing, Strength, Abrasion, Hardness, Water Absorption, Density & Durability
- Tiles for Physico-Mechanical Properties including Surface Abrasion, PIE Rating, Resistance to Wear, Strength, Hardness, Water Absorption
- Pozzolanic Materials for various Physico-Chemical Properties including Lime Reactivity, Soundness, Compressive Strength, Fineness
- Sanitary wares for Physico-Chemical Properties including Performance, Endurance, Resistance to Different Materials, Identification of polymer
- Blocks, Pavers, Kerbs, Channels for Strength, Drying Shrinkage, Density
- Concrete Cubes, Cylinders, Beams for Compressive Strength, Permeability, Moisture Movement, Thermal Conductivity, Accelerated Aged Studies
- Precast Concrete Members (Manhole Covers, Drain Covers & other Building Components) for Load Test
- Pipes for Hydrostatic Pressure, Water Absorption & other Physico-Mechanical Properties

...continued
- Admixtures/Accelerators for Physico-Chemical Parameters including Uniformity Tests, Strength, Shrinkage, Air Content, Slump as per ISS & ASTM
- Gypsum Plaster / POP/ Asbestos for Physico-Chemical Properties including Transverse Strength, Setting Time, Expansion, on Setting Soundness, Frost Resistance
- Construction Chemicals (WPC, Sealant, Curing Compounds, Epoxy, Grouts, Resin, Protective Coatings) for Physico-Chemical Properties including Bond Strength, Working Time, Strength, Permeability, Corrosion Resistance
- Drilling Mud for Marsh Cone Viscosity, Density, pH
- Filter Media Sand for Uniformity Coefficient & Chemical Analysis

**MAJOR INSTRUMENTS:**
- Compressive Strength Machines Upto 3000kN
- Flexural Strength Machine
- Rapid Chloride Permeability Test Unit
- Tile Flexural, Impact & Abrasion Units
- PIE Rating Unit for Ceramic Tiles
- Pyrometric Cone Equivalent Unit
- Thermal Conductivity Unit
- Moh’s Hardness Kit
- Self Compacting Concrete Designing
- Vee-Bee Consistometer
- Vibration Machines
- Needle Vibrators & Slump Cones
- Autoclaves-Soundness Test
- Accelerated Curing Water Bath

- Curing Baths with Temperature Control
- Heat of Hydration Unit
- Humidity Cabinets
- Freezing & Thawing Unit
- Jolting Apparatus Paddle Mixer
- Le-chattier Apparatus
- Vicat Apparatus
- Aggregate Impact, Crushing & Abrasion Value Units
- Elongation & Flakiness Gauges
- Air Content Unit
- Ball Mills, Jaw Crushers & Pulverizer
- Hydrostatic Pressure Test Equipments for Pipes

**STANDARDS/ SPECIFICATIONS:**
- Indian Standard Specifications (ISS)
- British Standard Specifications (BS)
- American Society for Testing & Materials (ASTM)
- European Standards (EN)
- German Standards (DIN)
- Japanese Standards (JIS)
- Canadian Standards (CSA)
- International Organisation for Standardization (ISO)
- Saudi Arabian Standards (SASO)
- Indian Road Congress (IRC)
- CPWD Specifications
- MOST/MORTH Specifications
- Defence Specifications (DRDO)
**ANALYTICAL SUPPORT: PETROLEUM & FUEL**

**CORE COMPETENCE:**
- Quality Evaluation of Liquid & Solid Fuels
- Study of Insulating Oils for their Suitability in Electrical Equipment
- Suitability Studies with Proposed Remedies for Transformer Oils
- Assessment of Fuel Additives for their Performance & Optimizing Doses
- Adulteration in Petroleum Oils
- Studies on used Engine Oil from Aircraft
- Imparting Training for Fuel Analysis

**TYPICAL MATERIALS EVALUATED / STUDIED:**

- **Liquid Fuels:** Diesel (HSD & LDO), Bio Diesel, Petrol, Kerosene, Transformer Oil, Furnace Oil, Engine Oil, Turbine Oil, Hydraulic Oil, Quenching Oil, Cutting Oil, ATF, RPO, Antifreeze Coolant, FRHF
- **Solid Fuels:** Coal, Coke, Bagasse, Rice Husk, Paddy Husk, Saw Dust
- **Lubricants:** Lube Oil, Grease, Wax, Jellies, Polishes
- **Bitumen & Related Materials:** Bitumen, CRMB, PMB, Anti-Stripping Agent, Charcoal, Activated Carbon, Carbon Black
- **Miscellaneous Products:** Transformer Oils, Grease, Wax, Jellies, Polishes

**MAJOR PARAMETERS:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity &amp; Viscosity Index</td>
<td>Air Release Value</td>
</tr>
<tr>
<td>Pour Point</td>
<td>Cloud Point</td>
</tr>
<tr>
<td>Aniline Point</td>
<td>Congealing Point</td>
</tr>
<tr>
<td>Flash &amp; Fire Point</td>
<td>Sediments</td>
</tr>
<tr>
<td>ASTM Color</td>
<td>Interfacial Tension</td>
</tr>
<tr>
<td>Foaming Tendency / Stability</td>
<td>Flash Point (PMCC, ABEL, COC)</td>
</tr>
<tr>
<td>Ash Fusion Temperature</td>
<td>Weld Load &amp; Scar Diameter</td>
</tr>
<tr>
<td>Dissolved Gas Analysis (DGA)</td>
<td>FURAN Compounds</td>
</tr>
<tr>
<td>Conradson Carbon Residue</td>
<td>Ramsbottom Carbon Residue</td>
</tr>
<tr>
<td>Reid Vapour Pressure</td>
<td>Calculated Cetane Index</td>
</tr>
<tr>
<td>Rust Preventive Characteristics</td>
<td>Emulsion Characteristics</td>
</tr>
<tr>
<td>Frothing Characteristics</td>
<td>Cold Filter Plugging Point</td>
</tr>
<tr>
<td>Oxidation Stability</td>
<td>Particle Charge</td>
</tr>
<tr>
<td>Copper Strip Corrosion</td>
<td>Silver Strip Corrosion</td>
</tr>
<tr>
<td>Distillation Range</td>
<td>Trace/Wear/Additive Metals</td>
</tr>
<tr>
<td>Total Base Number</td>
<td>Total Acid Number</td>
</tr>
<tr>
<td>Softening Point</td>
<td>Penetration</td>
</tr>
<tr>
<td>Frass Breaking Point</td>
<td>Ductility</td>
</tr>
<tr>
<td>Equilibrated Moisture</td>
<td>Water/Moisture Content</td>
</tr>
<tr>
<td>Electric Strength (BDV)</td>
<td>Dielectric Dissipation Factor</td>
</tr>
<tr>
<td>Hard Groove Grindability Index</td>
<td>Specific Resistance</td>
</tr>
<tr>
<td>Proximate Analysis</td>
<td>Ultimate Analysis</td>
</tr>
<tr>
<td>Volatile Matter</td>
<td>Swelling Number</td>
</tr>
<tr>
<td>Gross Calorific Value</td>
<td>Net Calorific Value</td>
</tr>
<tr>
<td>Caking Index</td>
<td>Useful Heat Value</td>
</tr>
<tr>
<td>Burning Quality</td>
<td>Smoke Point</td>
</tr>
</tbody>
</table>

...continued
INSTRUMENTS:
- Automatic Distillation Unit
- Automatic Bomb Calorimeter
- Automatic CHNS-O Analyzer
- Cold Filter Plugging Point (CFPP)
- Automatic Softening Point
- Coal ASTM Air Flow Oven
- Coal ASTM Vertical Tube Furnace
- GC, GC-MS/MS & LC-MS
- TGA & DTA
- GC with TOGA for DGA in Transformer Oils
- IR Spectrophotometer
- Atomic Absorption Spectrophotometer
- Four Ball Test Equipment
- Air Release Value Unit
- Silver Strip Corrosion Unit
- Frass Breaking Point
- Emulsion Stability Unit (for 1000 hours)
- Rust Preventive Characteristics Unit
- COC Flash Point Unit
- Breakdown Voltage Unit
- Ductilometer
- Density Meter
- Reid Vapour Pressure
- Hard Groove Grindability Unit
- Ramsbottom Carbon Residue
- Automatic Flash Point Tester
- Automatic Interfacial Tensiometer
- Ash Fusion Temperature Unit
- Coulometric Karl Fischer
- Automatic Penetrometer
- Coal ASTM Volatile Matter Furnace
- ASTM Colour Unit
- HPLC
- ICP-OES/ICP MS
- Refractometer
- Flame Photometer
- Brookfield Viscometer
- Oxidation Stability of Oils & Greases
- Foaming Stability Unit
- Copper Strip Corrosion Unit
- Tar Viscometer
- Dean & Stark Unit
- Ford Cup Viscometer
- Pour Point Unit
- Tan Delta Resistivity Unit
- Kinematic Viscosity Unit
- Corrosion Properties Unit
- Existent Gum in Gasoline
- Melting Point of Wax
- Conradson Carbon Residue

SPECIALIZED STUDIES:
- Ash Fusion Temperature in Coal
- Four Ball Test for Lubricants
- Cold Filter Plugging Point (CFPP) in Diesel Oils.
- SOAP Analysis in Fresh & Used Engine Oils for Various Airlines.
- Study on the Engine Flush Products & Radiator Flush Products for their Performance and Efficiency
- Studies on the Efficacy of Radiator Coolant
- Studies on Various Solid Fuels to Ascertain their Fuel Efficiency
- Emulsion Stability of Fire Resistant Hydraulic Fluids for 1000 hours at 27±2°C
- Performance Studies of Automotive Fuel Additives

STANDARDS / SPECIFICATIONS:
- Indian Standard Specification (ISS)
- British Standard Specification (BS)
- American Society for Testing & Materials (ASTM)
- European Standard (EN)
- German Standard (DIN)
- International Organisation for Standardization (ISO)
- Institute of Petroleum (IP)
- Japanese Standard (JIS)
ANALYTICAL SUPPORT: ROADWORKS

CORE COMPETENCE:

• Assessment of Flexible Pavements
• Job Mix Formula for Flexible Pavements
• Traffic Density Survey
• Road Failure Studies
• Designing of Roads
• Post Construction Assessment of Roads
• Consultancy for Obtaining Accreditation for NABL/ISO Certification for Laboratories
• Imparting Training/Awareness Programs (National and International)

TYPICAL PRODUCTS EVALUATED / STUDIES:


Finished Products: Bituminous Mix (BM), SDBC, Mastic Asphalt, Premix Carpet, BUSG.

Survey Studies: Topography, Benkelman Beam Deflection, Roughness Survey, Levels by Total Station & Auto Level, Traffic Survey, Distometer, GPS.

Site Testing: Core Cutting for Binder, Density & Thickness of individual Layers.

MAJOR PARAMETERS:

• All Physico-Chemical Parameters as per MORTH/IRC/ISS for: Aggregates, Sub Grade, Stone Dust, Bitumen, Emulsion, WBM, WMM, GSB
• Job Mix Formula Preparation for GSB, WMM, BM & BC
• Stone Polishing Value for Aggregates
• Petrography for Aggregates
• Hardness Number of Mastic Asphalt
• Marshal Stability of Bituminous Materials
• Retained Tensile Strength

INSTRUMENTS:

• Bump Integrator
• Benkelman Beam Unit
• Total Station
• Automatic Compactors
• Automatic Mixer
• Buoyancy Balance
• Skid Resistance Tester
• Stone Polishing Value Unit
• Marshal Unit
• Hardness Number Unit
• Automatic Asphalt Furnaces
• Bitumen Extractor
• Automatic Softening Point Unit
• Automatic Penetrometer
• Ductility Unit
• TFOT Air Oven
• Kinematic Viscosity Unit
• Absolute Viscosity Unit
• Flash Point Unit
• Loss Angeles Abrasion Machine
• Aggregate Impact Value Machine
• Compressive Strength Machine

STANDARDS/ SPECIFICATIONS:

• Indian Standard Specification (ISS)
• British Standard Specification (BS)
• American Society for Testing & Materials (ASTM)
• AASHTO
• European Standard (EN)
• German Standard (DIN)
• International Organisation for Standardization (ISO)
• Indian Road Congress (IRC)
• CPWD Specifications
• MOST/MORTH Specifications
ANALYTICAL SUPPORT: CONCRETE NON DESTRUCTIVE EVALUATION (NDE)

Non Destructive Evaluation (NDE) enables one to assess the condition and quality of the concrete structures without damaging their future usefulness.

CORE COMPETENCE:
- Assessment of Quality of in-situ Concrete through NDT
- Assessment of Structural Soundness
- Investigation for Restoration & Rehabilitation of Structures
- Assessment of Structures Damaged by Fire or other Calamities
- Evaluation of TG Decks in Thermal Power Stations
- Evaluation of Bridges for Strength & Discontinuities
- Assessment of Quality of Concrete used for Railway Sleepers
- Establishing Correlation between NDT & Semi NDT Techniques for Assessment of Concrete Grade

NON DESTRUCTIVE EVALUATION STUDIES:
Assessment of Concrete Structure for:
- Compressive Strength after Core Extraction (dia 50 to 150 mm)
- Surface Strength of Concrete Structure using Rebound Hammer
- Ultrasound Pulse Velocity Measurement through Concrete Structure for Checking the Compaction, Discontinuities, Homogeneities and Health of Concrete
- Extent of Corrosion in the Rebars through Half Cell Potential Meter
- Rebar Scanning of Structure for Number, Dia and Spacing of Bars using Ferro Scanning System
- Cover Depth through Elcometer
- Extent of Carbonation in Cover Concrete
- Detection of Reinforcement during Core Extraction

INSTRUMENTS:
- Rebound Hammer (PROCEQ: Silver Schmidt “N” Digital, PROCEQ N-34, PROCEQ N-10, CNS Farnell)
- Ultrasonic Pulse Velocity Units (PROCEQ TICO, PUNIDIT PLUS, CONTROLS)
- Ferro Scanning System (HILTI PS 200)
- Ferro Detectors (HILTI)
- Half Cell Potential (ELCOMETER)
- Cover Meter (HILTI PS 35)
- Core Cutting Systems (HILTI: DD 120, DD 160, DD 200)
- Core Cutting Systems (Rothenberger: Eurodema, F 202)
- Core Cutting Systems (Hakken SPJ SAX – C)

STANDARDS/SPECIFICATIONS:
- Indian Standard Specifications (ISS)
- British Standard Specifications (BS)
- American Society for Testing & Materials (ASTM)
- International Organisation for Standardization (ISO)
- Indian Road Congress (IRC)
- CPWD Specifications
- MOST/MORTH Specifications
**ANALYTICAL SUPPORT : WOOD & WOODEN PRODUCTS**

**CORE COMPETENCE:**
- Physico-Mechanical Properties of Wood & Wooden Products
- Identification of Declared Wood
- Study of Bamboo Match Sticks for Physico-Mechanical Properties & Performance
- Performance & Workmanship Evaluation of Wooden Door & Window Frame vis-a-vis Concrete Door & Window Frames

**TYPICAL MATERIALS EVALUATED / STUDIED :**

<table>
<thead>
<tr>
<th>Wood</th>
<th>Plywood</th>
<th>Boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>Screw Withdrawal</td>
<td>Glue Shear Strength</td>
</tr>
<tr>
<td>Nail Holding</td>
<td>Knife Test</td>
<td>Adhesion of Plies</td>
</tr>
<tr>
<td>Screw Withdrawal</td>
<td>Glue Adhesion</td>
<td>Water Resistance</td>
</tr>
<tr>
<td>Dimensions</td>
<td>End Immersion</td>
<td>Mycological Test</td>
</tr>
<tr>
<td>Squareness</td>
<td>Dimensions</td>
<td>Screw Withdrawal</td>
</tr>
<tr>
<td>Modulus of Rupture</td>
<td>Impact Indentation</td>
<td>Moisture Content</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>Flexure Test</td>
<td>Tensile Strength (Along &amp; Across the Grain)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>Edge Loading</td>
<td>Modulus of Rupture</td>
</tr>
<tr>
<td>Identification of Declared Wood</td>
<td>Shock Resistance</td>
<td>Preservative Treatment (Cu, Cr, B &amp; Total Retention)</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>Buckling Test</td>
<td>Dimensions</td>
</tr>
<tr>
<td>Compression</td>
<td>Slamming Test</td>
<td>Squareness</td>
</tr>
<tr>
<td>Shear Strength</td>
<td>Misuse Test</td>
<td>Fire Retardancy</td>
</tr>
<tr>
<td>Hardness</td>
<td>Varying Humidity Test</td>
<td>Resistance to Water</td>
</tr>
</tbody>
</table>

**INSTRUMENTS :**

| Ultimate Tensile Strength Machines (UTM) | Stout Table          |
| Wood Identification Kit                  | Abrasion Resistance Unit |
| Atomic Absorption Spectrophotometer (AAS) | ICP-OES/MS          |
| Straight Edge                            | Right Angle          |
| Controlled Temperature Water Bath        | Boiling Water Bath    |
| Micrometers & Screw Gauge                | Vernier Callipers    |
| Compressometer                           | Varying Humidity Chamber |
| Air Ovens                                 | Fire Retardant Apparatus |
| Wood Shutter Door Assembly                | Different Type of Fixtures |

**STANDARDS/ SPECIFICATIONS:**
- Indian Standard Specifications (ISS)
- British Standard Specifications (BS)
- American Society for Testing & Materials (ASTM)
- CPWD Specifications
- Field Books for Identification of Wood
ANALYTICAL SUPPORT: FERTILIZERS & RAW MATERIALS

CORE COMPETENCE:
- Quality Evaluation of Fertilizers
- Raw Materials Evaluation

Evaluation of Fertilizers
Various fertilizers are evaluated for their macro & micro nutrients using conventional volumetric, gravimetric as well as sophisticated instrumental techniques mainly Inductively Coupled Plasma or Atomic Absorption Spectrophotometer for their chemical properties. Other physical properties are checked by using suitable related equipment.

TYPICAL MATERIALS EVALUATED / STUDIED:
- Straight Nitrogenous Fertilizers
- Straight Phosphatic Fertilizers
- Straight Potassic Fertilizers
- Straight Sulphur Fertilizers
- Complex Fertilizers
- Fortified Fertilizers
- Micro Nutrients
- Water Soluble Complex Fertilizers

PARAMETERS:
- Purity of Chemicals
- Impurity Profile for Chemicals
- Micronutrients
- Macronutrients
- Moisture Content
- Total Nitrogen

INSTRUMENTS:
- Atomic Absorption Spectrophotometer (AAS)
- UV-visible Spectrophotometer (UV-vis)
- Flame Photometer
- Inductively Coupled Plasma-OES
- Air Circulating Ovens
- Selective Ion Analyzer
- pH Meter
- Conductivity Meter
- Turbidity Meter
- Muffle Furnaces

STANDARDS/SPECIFICATIONS:
- Indian Standard Specifications (ISS)
- American Society for Testing & Materials (ASTM)
- International Organistaion for Standardization (ISO)
- Fertilizer Control Order (FCO)

Raw Materials Evaluation
Raw materials used in the manufacture of fertilizers e.g. rock phosphate, ammonia, gypsum, sulphuric acid, phosphoric acid etc. are being analyzed at SRI for their purity and impurity profile along with their physical characteristics, e.g. grain size, specific gravity, solubility, density, hydrosopicity etc. Based on this data, manufacturers can use the raw material in proper quantities and ratios for the production of fertilizers.

- Total Phosphate
- Total Potash
- Citric Acid Soluble Phosphate
- Neutral ACS Phosphate
- Water Soluble Phosphate
- Water Soluble Potash
- Free Phosphoric Acid
- Ammonical Nitrogen
- Urea Nitrogen
- Nitrate Nitrogen
- Calcium Nitrate
- Free Acidity
- Particle Size
- Sulphur
- Biuret
- Acid Soluble Matter
- Heavy Metal
ANALYTICAL SUPPORT: INORGANIC CHEMICALS, MINERALS & ORES

CORE COMPETENCE:
- Chemical Composition of Mineral & Ores
- Chemical Analysis of all type of Cements
- Chemical Analysis of Building Materials
- Mineralogical Composition of Materials
- Physico-chemical properties of Thermal Insulation Materials
- Physico-chemical Properties of Refractories
- Chemical Composition of Glass & Ceramics
- Physico-chemical Properties of Activated Alumina
- Physico-chemical Properties of Activated Carbon
- Chemical Composition of Rock Phosphate & Sulphur
- Chemical Composition of Scale Deposits
- Analysis of Raw Materials of Cement for Quarry Selection
- Method Development for New Products
- Training Programs for Testing & Awareness System

MAJOR PARAMETERS:
- Loss on Ignition
- Iron Oxide
- Calcium Oxide
- Sodium Oxide
- Potassium Oxide
- Barium Oxide
- Boron
- Cobalt
- Arsenic
- Mercury
- Nitrogen
- Total Moisture
- Free Moisture
- Combined Water
- Solid Content
- Free Lime
- Dead Burnt Lime
- Whiteness
- Oil Absorption
- Acidity
- Adsorption Capacity
- Silica
- Magnesia
- Chlorides
- Phosphates
- Manganese
- Lead
- Zirconium
- Fluorine
- Selenium
- Heavy Metals
- Acid Solubles
- Acid Insolubles
- Water solubles
- Sieve analysis
- Free Silica
- Bulk Density
- Apparent Porosity
- Alkalinity
- Attrition Loss
- Swelling Power
- Boil Test
- Dimensions
- Thermal Shock
- Alumina
- Titania
- Sulphates
- Copper
- Chromium
- Zinc
- Nickel
- Molybdenum
- Tellurium
- Carbon
- Water Insolubles
- pH Value
- Volatile Matter
- Moh's Hardness
- Available Lime
- Carbonates
- Specific Gravity
- Ash Content
- Oil Content
- Friability
- Gel Formation
- Fragmentation
- Defects in Glass
- Thermal Conductivity

TYPICAL PRODUCTS EVALUATED / STUDIED
Ores & Minerals: Limestone, Dolomite, Bauxite, Chromite, Fluorspar, Iron Ore, Manganese Ore, Magnesium Ore, Nickel Ore, Titanium Ore, Zirconium Ore, Lead Ore, Zinc Ore, Copper Ore, Molybdenum Ore, Quartz, Gypsum, Barite, Biotite, Feldspar, Graphite, China Clay, Soapstone, Rock Phosphate, Asbestos, Lime, Coal, Mica, Bentonite, Asbestos, Emery Grains

Building Materials: Cement, Aggregates, Sand, Admixture, Water Proofing Compound, Clay, Soil, Concrete, Stones

Glass & Ceramics: Glass Sheets, Glass Bottles, Glass Powder, Ceramics

Thermal Insulations: Mineral Wool, Glass Wool, Insulation Blanket

Refractories: Fire Bricks, Calcium Silicate, Zircon, Castable.

Other Materials: Silica Gel, Activated Alumina, Sulphur, Scale Deposits

INSTRUMENTATION FACILITY FOR MINERAL ORES:
- AAS with VGA & GTA
- ICP- OES, ICP-MS
- UV-visible Spectrophotometer
- Selective Ion Analyzer
- Flame Photometer
- Thermogravimetric Analyzer
- Lazer Particle Analyzer
- CHNS-O Analyzer
- IR-Spectrophotometer
- Lovibond Refractometer
- Thermal Conductivity
- Electro Analyzer
- Dean & Stark
- Turbidity Meter
- Karl Fischer
- Conductivity Meter
- Adsorption Capacity
- Moh's Hardness Kit
- Strohelin Unit and CO2 Assembly
- Soxhlet Apparatus
- Nitrogen Assembly

STANDARDS/ SPECIFICATIONS:
- Indian Standard Specifications (ISS)
- American Society for Testing & Materials (ASTM)
- British Standard Specifications (BS)
- International Organisation for Standardization (ISO)

Shriram Institute for Industrial Research
(A Unit of Shriram Scientific and Industrial Research Foundation)

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www.shriraminstitute.org
ANALYTICAL SUPPORT: METAL AND ALLOYS

The Metal Alloy Laboratory in Shriram Institute for Industrial Research undertakes analytical studies listed below on copper alloys, ferrous alloys, aluminum alloys, aluminum-magnesium alloys, nickel alloys, solder alloys, tin alloys as per National, International and product specific standards.


**Metallographic Studies** - Phase Analysis, Grain Size, Inclusion Rating, Case Depth, Decarb Depth and Graphite Type.

**Spectrochemical and Wet Analysis** - The Laboratory is well equipped to carry out Spectrochemical and Wet Testing of Metal Alloys using AAS (VGA & GTA), ICP-OES.

**Non Destructive Analysis** - The laboratory carries out Non-Destructive Analysis on Metal, Alloys and Welded Metal Joints using Ultrasonic, Radiography, MPI, DPI for Identifying Cast & Process Induced Internal Defects and Welding Defects in Above-Mentioned Metal Alloys.

**Analysis of Coatings** - Chemical Composition, Thickness, Adhesive Strength on Galvanized, Anodized, Nickel, Silver, Gold, Electroless Nickel, Copper, Ceramic, Palladium, Rhodium, Platinum and Powder Coatings on Metal and Non-Metal Surfaces.

**Specialized Studies** - Structure-Property Correlations, Consultancy Research Projects, Failure Analysis, Corrosion, Tribology.

**Corrosion** - The Lab has Facility for carrying out Corrosion Studies (Corrosion Penetration Rate, Identifying Type of Corrosion), on Metal Alloys and Coatings.
ANALYTICAL SUPPORT: HOME APPLIANCES AND BATTERIES

SRI Electrical Section is equipped with the State-of-the-Art Facilities to Undertake Assignments of Various Electrical Studies (Safety and Performance) for Electric Home Appliances & Batteries and Has Qualified & Trained Scientists for its Operations Including Calculation of Measurement Uncertainty (MU) and Imparting Training to Various Organizations.

Prompt, Precise and Accurate Analytical Services, in the field of Electrical Studies are offered to the Satisfaction of Wide Spectrum of National and International Agencies for the Following Products:

**ELECTRIC HOME APPLIANCES:**
- Electric Ceiling Type Fan- IS: 374
- Electric Table Type Fan- IS: 555
- Electric Pedestal Type Fan- IS: 1169
- Propeller Type AC Ventilating Fan- IS: 2312
- Railway Carriage Fan- IS: 6680
- Mineral Filled Sheathed Heating Element- IS: 4159
- Electric Immersion Water Heater- IS: 368
- Stationary Storage Type Electric Water Heater- IS: 2082
- Electric Instantaneous Water Heater- IS: 8978
- Domestic Electric Food Mixer- IS: 4250
- Domestic Electric Clothes Washing Machine for Household Use- IS: 14155
- Ingress Protection

**BATTERIES:**
- Lead Acid Storage Batteries for Motor Vehicles- IS: 7372
- Lead Acid Storage Batteries for Motor Vehicles with Light Weight & High Cranking Performance- IS: 14257
- Lead Acid Batteries Electric Road Vehicles- IS: 13514
- Stationary Lead Acid Batteries (with Tubular Positive Plates) in Mono-Block Container- IS: 13369
- Stationary Cells & Batteries Lead Acid Type (with Tubular Positive Plates)- IS: 1651
- Stationary Valve Regulated Lead Acid Batteries- IS: 15549
- Lead Acid Starter Batteries- IEC: 60095-1
ANALYTICAL SUPPORT: ELECTRICAL INSTALLATIONS

SRI offers Prompt, Precise and Accurate Analytical Services, in the Field of Electrical Installations, to the Satisfaction of Wide Spectrum of National and International Agencies in the Following Fields of Electrical Installations.

Electrical Section is Equipped with the State-of-the-Art Facilities to Undertake Assignments for Testing/Studies of Various Electrical Installations Including Fittings by Qualified and Trained Personnel. The Services Include Calculation of Measurement Uncertainty (MU) and Imparting Training to Various Organizations.

Aluminium Conductors for Overhead Transmission Purpose
- Aluminium Stranded Conductors- IS: 398 (Part 1)
- Aluminium Conductors, Galvanized Steel-Reinforced- IS: 398 (Part 2)
- Aluminium Conductors, Aluminized Steel-Reinforced- IS: 398 (Part 3)
- Aluminium Alloy Stranded Conductors [AL-Magnesium-Silicon Type]- IS: 398 (Part 4)
- Aluminium Conductors - Galvanized Steel-Reinforced for Extra High Voltage (400 kV and above)- IS: 398 (Part 5)

Cables & Accessories
- PVC Insulated Cable upto 1100 V- IS: 694
- PVC Insulated (Heavy Duty) Cables upto 1100 V- IS: 1554 (Part 1)
- PVC Insulated (Heavy Duty) Cables from 3.3 kV to 11 kV- IS: 1554 (Part 2)
- XLPE Insulated PVC Sheathed Cables upto 1100 V- IS: 7098 (Part 1)
- XLPE Insulated PVC Sheathed Cables from 3.3 kV to 33 kV- IS: 7098 (Part 2)
- XLPE Insulated Thermoplastic Sheathed Cables from 66 kV to 220 kV- IS: 7098 (Part 3)
- Elastomer Insulated Cable upto 1100 V- IS: 9968 (Part 1)
- Elastomer Insulated Cable from 3.3 kV to 33 kV- IS: 9968 (Part 2)
- Cables for Motor Vehicles- IS: 2465, JASO D 611, DIN 72551 (Part 5), JIS C 3406 & ISO 6722
- Welding Cables- IS: 9857
- Arial Bunched Cable for Working Voltage upto 1100 V- IS: 14255
- Cables Required to Maintain Circuit Integrity under Fire Conditions- BS: 6387
- Cables for Rated Voltages of 1 kV- IEC: 60502-1
- Cables for Rated Voltages from 6 kV- IEC: 60502-2

Lamps, Luminaries and Accessories
- Self Ballasted Lamps for General Lighting Services- IS: 15111 (Part 1)
- Self Ballasted Lamps for General Lighting Services- IS: 15111 (Part 2)
- High Pressure Sodium Vapour Lamp- IS: 9974
- Luminaires for Road & Street Lighting- IS: 10322 (Part 5/Sec. 3)
- Ingress Protection as per Various Specifications

Wiring Accessories
- Conduit for Electrical Installation of Insulating Material- IS: 9537 (Part 3)
- Metallic Conduit for Electrical Installation- IS: 9537 (Part 2)
- Plug & Socket Outlet of Rated Voltage upto & Including 250 V & Rated Current upto & including 16 A- IS: 1293
- Switches for Domestic & Similar Purposes- IS: 3854

Insulating Materials
- Pressure Sensitive Adhesive Insulating Tapes for Electrical Purposes- IS: 7809 (Part 3/Sec.1)
- Pressure Sensitive Adhesive Insulating Tapes for Electrical Purposes- IS: 7809 (Part 1)
- Electrical Insulating Mat- IEC: 61111
- Insulating Mat for Electrical Purposes- IS: 15652

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ANALYTICAL SUPPORT: CALIBRATION SERVICES

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SRI Calibration Laboratory is Equipped with the State-of-the-Art Facility to Undertake Calibration Assignments of Various Parameters by Well Qualified and Trained Scientists for its Operations Including Calculation of Measurement Uncertainty (MU) and Imparting/Providing Training to Various Organisations.

MECHANICAL:
Mass:
- Weights: 1 mg to 20 kg
- Balances: upto 50 kg

Volume:
- Pipette, Burette, Cylinder, Flask, Micropipette, Syringe, etc.: 10 μl to 1000 ml
- Butyrometer: upto 100 %

Density (Hydrometer, Lactometer, Alcoholmeter):
0.650 to 1.800 g/cm³

Acoustic (Sound Level Meter):
94, 104 & 114 dB

Speed (Non Contact):
Tachometer & Centrifuge Machine: 1100 to 15000 RPM

Torque Wrench [(Type I, Class B, C) & (Type II, Class A, B)]: upto 100 Nm

Pressure:
- Pressure Gauge (Pneumatic): Upto 20 kg/cm²
- Pressure Gauge (Hydraulic): 3.2 to 700 kg/cm²
- Vacuum Gauge: (-)0.87 to 0 kg/cm²

THERMAL (RANGE: -70 °C to 1000 °C):
- Thermometer
- RTD and PRT
- Thermocouple
- Temperature Indicator / Controller/Recorder/Pyrometer Along with Sensors

ELECTRO-TECHNICAL:
- Source (Voltmeter, Ammeter, Multimeter, Resistance Meter, Frequency Meter)
- DC Voltage: 1 mV to 1000 V
- DC Current: 10 μA to 19 A
- DC Resistance: 100 μΩ, 500 μΩ, 1000 μΩ, 1900 μΩ, 10 mΩ, 100 mΩ, 1 Ω; 1 Ω to 100 MΩ; 200 MΩ & 2 GΩ
- AC Voltage: • At 50 Hz to 100 kHz: 10 mV to 100 V
- • At 10 kHz: 100 V to 1000 V
- AC Current: • At 50 Hz to 5 kHz: 100 μA to 10 A
- • At 1 kHz: 10 A to 19 A
- Frequency: 50 Hz to 10 MHZ
- Temperature Simulation (Temperature indicator/controller): • RTD/PRT: -80 °C to 650 °C
  • Thermocouple (Types B, E, J, K, N, R, S, T & C): 0 °C to 1200 °C

...continued
**DIMENSION:**
- Vernier Caliper: up to 600 mm
- Micrometer: up to 150 mm
- Thickness Gauge: up to 100 mm
- Slip Gauges: 0.5 to 100 mm
- Glass Scale: up to 100 mm
- Test Sieves: up to 125 mm
- Length Bar: up to 600 mm
- Dial Test Indicator: up to 25 mm
- Feeler Gauge: up to 2 mm
- Plain Plug Gauge: up to 75 mm
- Snap Gauge: up to 100 mm
- Height Gauge: up to 600 mm
- Measuring Pin: up to 25 mm
- Thread Pitch Gauge: up to 2 mm
- Radius Gauge: up to 25 mm

**FLUID FLOW:**
- **Reverse flow viscometer:** 0.001 to 1 mm²/s²
- **Direct flow viscometer:** 0.001 to 18 mm²/s²

**CALIBRATION AT SITE:**
- **Thermal:** Temperature Controller/Indicator with Sensor as fitted in any Thermal Equipment for the Range –70 °C to 1000 °C
- **Mass:** Balances up to 50 kg
- **Length:** Profile Projector - Linear: 25 mm, Magnification: up to 50X
- **Speed:** 1100 to 15000 RPM
- **Pressure:** (-) 0.87 kg/cm² to 20 kg/cm²

**Parameters/Equipments Other Than Those Mentioned Above**

- **Force & Pressure Devices**
  - Compound Gauge, Manometer, Proving Ring, Tensile Testing Machine, Dead Weight Tester
- **Viscometer**
  - Saybolt (Universal & Furol), Brookfield
- **Humidity Measurements**
  - Hair Hygrometer (Dial Type), Hygrometer (Dry & Wet Bulb Type)
- **Time**
  - Stop Watch & Timer
- **Electro–Technical**
  - Tong Tester/Clamp Meter
- **Textile Equipments**
  - Tear Tester, UTM, Abrasion Tester, Perspiration Tester, Crockmeter, Laundrometer
- **Rubber/Plastic/Paint Equipments**
  - Shore Hardness, Melt Flow Index, Pour Point Apparatus
- **Analytical Equipments/Apparatus**
  - Spectrophotometer, Refractometer, Moisture Meter, Turbidity Meter, Conductivity Meter, Flash Point Apparatus, Bomb Calorimeter, Autoclave, Conditioning Chamber, Neutral Density Filters.

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