

PRODUCT PROFILE



INDIAN ENGINEERING
GLOBAL ENTERPRISE

ENGINEERING SUSTAINABLE SOLUTIONS

ABOUT US

With a golden legacy of 50 illustrious years on its side, BHEL is one of the largest engineering and manufacturing companies of its kind in India, engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products, services and systems for core sectors of the economy, viz. Power Generation, Transmission, Industry, Transportation, Renewable Energy, Oil & Gas, Water, Defence & Aerospace, and e-Mobility & Energy Storage Solutions with over 180 product offerings to meet the needs of these sectors. The establishment of BHEL in 1964 was with a mandate to achieve self-sufficiency in indigenous manufacture of heavy electrical equipment which has been duly accomplished.

BHEL, as a part of Pt. Jawaharlal Nehru's vision, was bestowed with the onus to make the country self-reliant in manufacture of heavy electrical equipment. This dream has been more than realised and the company's contribution to nation building endeavour is going to continue likewise. BHEL's mammoth size of operations is evident from its widespread network of 17 Manufacturing Units, 2 Repair Units, 4 Regional Offices, 8 Service Centres, 1 Subsidiary, 3 Overseas Offices, 5 Joint Ventures, 15 Regional Marketing Centres and more than 150 project sites across India and abroad. The total installed capacity base of BHEL-supplied equipment of 180 GW globally, speaks volumes about the contribution made by BHEL in the power sector.

BHEL has been adept at transforming itself in line with market requirements throughout its illustrious journey. Right from its incorporation in a protected market, to facing the pressures of a liberalized economy, including periods of slowdown in the economic environment, BHEL has evolved by transforming its strategies from product manufacturing to market orientation, achieving business excellence through portfolio restructuring and the current focus on sustaining growth through diversification.

Diversification in transportation, transmission, defence, water, renewables and e-mobility & energy storage solutions is the strategy adopted to maintain a balanced portfolio of offerings. This strategy of diversifying and capitalizing on new business opportunities stems from the commitment to innovation-led growth which is an indispensable part of BHEL's business model. The diverse R&D focus of the organization ranges from Advanced Ultra Supercritical thermal power plants to superconducting applications for electrical equipment. BHEL is one of the highest spenders on R&D in the Indian engineering field and has been consistently spending more than 2.5% of its turnover on R&D and innovation.

BHEL also has a widespread overseas footprint in over 82 countries with the cumulative overseas installed capacity of BHEL manufactured power plants at over 10,000 MW in Belarus, Bhutan, Egypt, Ethiopia, Indonesia, Kazakhstan, Libya, Malaysia, Nepal, New Caledonia, Oman, Rwanda, Sudan, Tajikistan, UAE and Vietnam.

The high level of quality & reliability of BHEL products and systems is an outcome of strict adherence to international standards through acquiring and adapting some of the best technologies from the world's leading OEM companies together with technologies developed in its own R&D centres. While all the manufacturing units and other entities of the company have been accredited to Quality Management Systems (ISO9001), major manufacturing units have also been accredited to Environmental Management Systems (ISO 14001) and Occupational Health & Safety Management Systems (OHSAS 18001).

PRODUCT PROFILE

THERMAL POWER PLANTS

- Capability for manufacture and supply of Steam Generators, Steam Turbines, Turbo Generators along with regenerative feed cycle up to 1000 MW capacities for fossil-fuel and combined-cycle applications.
- Air and water cooled Condensers, Condensate Extraction Pumps, Boiler Feed Pumps, Duplex Heaters, Valves and Heat Exchangers meeting above requirement of TG Sets up to 1000 MW.
- Energy Efficient Renovation and Modernisation (EE R&M) and Life Extension (LE) of old thermal power plants and Residual Life Assessment (RLA) studies.

NUCLEAR POWER PLANTS

- Engineering, manufacturing and supply of Reactor side components like Steam generator, Reactor header, End shield, special purpose Heat Exchangers, Pressure Vessels, Motors etc. for PHWR based Nuclear Power plants upto 700 MWe capacity.
- BHEL also provides complete solution to Secondary Side of Nuclear Power Projects and has capability to supply Turbines, Turbo Generators and Condensers, etc. for Nuclear Power Plants upto 700 MWe capacity.
- BHEL has the capability to design, manufacture and supply various components of both Reactor side and Secondary side for Nuclear Power Plant Projects upto 500MWe rating Fast Breeder Reactors (FBR)

GAS-BASED POWER PLANTS

- Gas turbines and matching generators ranging from 25 MW to 299 MW (ISO) rating tailored to meet specific needs with regard to plant layout, type of fuels, emission and noise requirements. The features of these machines include
- Capability to burn a variety of fuels, both gaseous and liquids.
- Mixed firing of many of these combinations of gases and liquids.
- Low exhaust emission levels upto 15ppm of NOx with Dry Low NOx (DLN) combustors.
- Gas turbine-based co-generation and combined-cycle systems for industry and utility applications.

HYDRO POWER PLANTS

- Custom-built conventional hydro turbines of Kaplan, Francis and Pelton types with matching generators, pump turbines with matching motor-generators upto 300 MW.
- Bulb turbine with matching generators up to 10 MW
- High capacity pumps along with matching motors for Lift Irrigation Schemes (up to 150 MW)

- Small hydro power plants 10- 25 MW unit rating capacity
- Electro Hydraulic Microprocessor based Digital Governor for conventional turbines
- Microprocessor based Digital Controller for lift irrigation schemes
- Static excitation systems for Hydro generators & motors
- Brushless exciter for Hydro generators & motors
- Renovation, Modernization and uprating of Hydro power plants
- Spherical (rotary) valves, butterfly valves and auxiliaries for hydro stations

SOLAR POWER PLANTS

- EPC solutions from Concept to Commissioning of Solar PV Power Plants:
- Grid Interactive systems with & without BESS (Battery Energy Storage System)
- Standalone systems
- Roof Top systems
- Hybrid systems
- Canal Top Systems
- Floating Solar power plants
- Solar based water pumping systems

DG POWER PLANTS

- HSD, LDO, FO, LSHS, natural gas based diesel generator power plants, unit rating of up to 20 MW and voltage up to 11 kV, for emergency, peaking as well as base load operations on turnkey basis.

DESALINATION AND WATER TREATMENT PLANTS

Complete Water Management Solutions for Power Plants, Industrial applications and Municipal Applications with different treatment technologies include: -

- Pre Treatment Plants (PT)
- Sea Water Reverse Osmosis (SWRO) Plants
- Demineralization (DM) Plants
- Membrane Based treatment for industrial applications
- Effluent Treatment Plants (ETP)
- Sewage Treatment Plants (STP) for Municipal applications
- Zero Liquid Discharge (ZLD) System

SYSTEMS AND SERVICES

- Power Generation Systems
 - Turnkey power stations/ EPC contracts.
 - Combined-cycle power plants.
 - Cogeneration systems.



- Captive power plants.
- Concept to Commissioning solutions for Solar Photovoltaic systems
- Modernization and renovation of power stations and RLA studies.
- Software packages including simulators for utilities.
- Erection, commissioning, support services, spares management and consultancy services for all the above systems.

INDUSTRIAL SYSTEMS

- Complete Coal Handling Plant and Ash Handling Plant including Civil & Structural, Mechanical, Electrical works and Automation systems
- Complete Mine Winder Systems
- Complete Electrics, Drives, Controls & Automation Systems for Processing & Compacting of Raw Materials, Iron Making, Primary & Secondary Steel Making, Casters & steel Finishing like Mills & process Lines for both long products & flat products
- Complete Raw Material Handling System including Civil & Structural, Mechanical, Electrical and Automation systems for Steel and other industries
- Complete Electrics & Automation Systems for High Current Rectifiers for Aluminium Smelters and Processing Mills for Aluminium Plants
- Automated Storage & Retrieval Systems (ASRS)
- Balance of Plant (BOP) for Hydro power plants

BOILERS

- Steam generators for utilities, ranging from 30 to 800 MW capacity, using coal, lignite, oil, natural gas or a combination of these fuels; capability to manufacture boilers with supercritical parameters up to 1000 MW unit size.
- Fuel Flexible boilers capable of all combination of blending / co-firing diverse qualities of imported/ indigenised coals, blending of lignite, petcoke, etc.
- Steam generators for industrial applications of the following types ranging from 40 to 450 T/Hour capacity, using coal, natural gas, industrial gases, biomass, lignite, oil, Bagasse or a combination thereof.
 - Pulverized coal / lignite fired boilers
 - Stoker fired boilers
 - Bubbling fluidized bed combustion (BFBC) boilers.
 - Circulating fluidized bed combustion (CFBC) boilers.
 - Heat-recovery steam generators (HRSG).
 - Chemical recovery boilers for paper industry, ranging from capacity of 100 to 1000 T/Day of dry solids.

BOILER AUXILIARIES

- Fans
 - Axial reaction fans of single stage and double stage for clean air application and dust laden hot gases applications up to 200°C, with capacity ranging from 40 to 1300m³/s and pressure ranging from 400 to 1,500 mmwc.
 - Axial impulse fans for both clean air and flue gas applications up to 200°C, with capacity ranging from 25 to 600m³/s and pressure up 300 to 700 mmwc
 - Single and double-suction radial fans (plate aerofoil bladed) for clean air and dust-laden hot gases applications up to 400°C, with capacity ranging from 4 to 660m³/s and pressure ranging from 200 to 3000 mmwc
- Air-Preheaters
 - Tubular Air Preheaters for industrial, utility boilers and CFBC boilers
 - Rotary regenerative Air-Preheaters for boilers of different types like BiSector, TriSector and QuadSector.
 - Large rotary regenerative Air-Preheaters for utilities of capacity up to 800 MW.
 - Air PreHeater for boilers with Selective Catalytic Reduction (SCR) for DeNox.
- Pulverizers
 - Bowl mills of slow and medium speed for coal fired thermal stations with capacity from 10 T / Hour to 120 T/ Hour catering to 60 MW to 1000 MW thermal power stations
 - Ball Tube mills for pulverizing low-grade coal with high ash content from 30 T/ Hour to 110 T/ Hour catering to 110 MW to 500 MW thermal power stations
 - Apart from strong presence in the Indian market for utility thermal power stations, BHEL also caters to the requirement of:
 - Steel Plants for Pulverised Coal Injection to Blast furnace
 - Cement Plants for coal pulverising
 - Fertilizers Plants for their captive power generation
- Electrostatic Precipitators (ESP)
 - Electrostatic precipitators of any capacity with outlet emission as low as 17 mg/Nm³ (efficiency up to 99.97%) for coal fired utility and industrial applications including Bio mass fired boilers, cement plants, steel plants, soda recovery boilers etc.
 - Bag Filters for Utility and Industrial applications.
 - Mechanical Dust Collector for SCR application
- Guillotine Gates & Dampers



- Guillotine gates with electric / pneumatic actuator. 100% leak proof with seal air.
- Bi-plane dampers with electric / pneumatic actuator. 100% leak proof with seal air.
- Louver dampers (Open close / Regulating) with electric / pneumatic actuator.
- Control dampers (Regulating) with electric / pneumatic actuator
- Flue gas desulphurization (FGD) systems
 - Flue gas desulphurization (FGD) systems with sea water/ limestone slurry scrubber.
 - Steel Chimneys for Heat Recovery Steam Generators (HRSG), Industrial Boilers, auxiliary boilers and other flue gas exhaust applications.
- Selective Catalytic Reduction (SCR) systems
 - Ammonia Injection system
 - Ceramic catalyst (Honeycomb & Plate type) for NOx emission control
- Selective Non-Catalytic Reduction (SNCR) systems
 - Urea& Ammonia handling systems

SOOT BLOWERS

- Long retractable soot blowers (LRSB) for travel upto 12.2m
- Furnace temperature probe (FTP) for travel length 6.9m and 8.3m
- Long Retractable Non-rotating (LRNR) soot blowers with forward blowing for Air heaters
- Ash discharge valve for CFBC boiler application
- Soot blowers with integral starters
- Soot blower Sequential PLC control panel
- Rack type Long Retractable Soot blowers
- Wall blowers
- Rotary Soot blowers

VALVES

- High and Low-pressure Turbines Bypass Valves & hydraulic system for utilities and industrial application
- High and medium-pressure Valves, Cast and Forged Steel Valves of Gate, Globe, Non-Return (Swing-Check and Piston Lift-Check) types for steam, oil and gas duties up to 950 mm diameter, maximum pressure class 4500 (791 kg/cm²) and 650 °C temperature.
- Hot reheat and cold reheat Isolating Devices up to 900 mm pipe size class 1500 and steam of 650°C temperature.
- High capacity Spring Loaded Safety Valves for set pressure up to 372 kg/cm² and temperature up to 630°C, and automatic electrically operated pressure relief valves for set pressure up to 210 kg/cm² and temperature up to 593°C
- Safety relief valves for applications in power, process and other industries for set pressure up to 421 kg/cm²



and temperature up to 537° C.

- Reactive cum absorptive type vent Silencers maximum diameter of 2700 mm.
- Direct Water Level Gauges
- Angle Drain Valves - Single & Multi Stage for Turbine Drain Application
- Severe Service Control Valves for RH & SH Spray Lines
- Quick Closing Non return Valves for Extraction lines and Cold Reheat Non Return valves, up to 800mm diameter, 158 kg/cm² pressure and 540°C temperature.

PIPING SYSTEMS

- Power cycle piping, Constant load Hangers, Variable spring Hangers, Hanger components, Low Pressure piping including Circulating Water Piping for power stations up to 1000 MW capacity including Super Critical sets
- Piping systems for Nuclear Power Stations, Combined Cycle Power Plants & Industrial boilers and for power plants in Process Industries

SEAMLESS STEEL TUBES

- Hot-finished and cold-drawn seamless steel tubes with a range varying from outer diameter of 19 to 133 mm and wall thickness of 2 to 14 mm, in carbon steel and low-alloy steels to suit ASTM/API and other international specifications including Rifled tubes and Spiral finned tubes.

STEAM TURBINES

- Steam Turbines of higher ratings upto 1000 MW for thermal Sets conforming to international Specifications.
- Steam turbines for 700MW, 500 MW & 236 MW with auxiliaries Nuclear Power Plants.

TURBOGENERATORS

- Turbogenerators of higher rating upto 1000 MW supercritical parameters.
- Turbogenerators for 270MW, 540 MW and 700 MW Nuclear Power Plants.

INDUSTRIAL SETS

- Steam Turbine based Captive Power Plants
 - STG/Boilers/BTG/EPC: Unit rating upto 200 MW
 - Non Reheat upto 120 MW unit rating
 - Reheat upto 200 MW unit rating
- Gas Turbine based Captive Power Plants
 - GTG/HRSG/EPC: Fr-5 (26 MW) to Fr-9E (126 MW)
 - Open, Cogen & Combined Cycle

CASTINGS AND FORGINGS

- Sophisticated heavy castings and forgings of creep resistant alloy steels, stainless steel and other grades of alloy steels meeting stringent international specifications for components of sub critical, supercritical and Ultra-super critical technology.

CONDENSER AND HEAT EXCHANGERS

- Surface Condenser:
 - 236 MW, 500 MW & 700 MW for Nuclear power plants
 - 12.5 MW Marine applications
 - Industrial Condensers
- Feed Water Heaters (HP Heaters, LP Heaters, Drain Coolers, Duplex Heater, De-Super Heaters, etc.)
 - Thermal : 7 to 500 MW (sub-critical) & 300-800 MW (super critical with single stream)
 - Nuclear 236 MW, 500 MW and 700 MW rating
- Moisture Separator & Reheater (MSR):
 - 236 MW, 500 MW & 700 MW Nuclear sets
- Live Steam Reheater (LSR):
 - 500 MW FBR Nuclear sets
- Auxiliary Heat Exchangers for Turbo and Hydro Generators :
 - Air Coolers (Frame & Tube Type)
 - Oil Coolers (Shell & Tube Type and Plug In Type)
 - Hydrogen Coolers (Frame & Tube Type)
- Auxiliary Heat Exchangers for Transformers :
 - Oil Coolers (Shell & Tube Type Single Tube or Concentric Double Tube Type) (Frame & Tube Type)
- Auxiliary Heat Exchangers for General Application
 - Water - Water Coolers (Shell & Tube Type)
- Industrial Heat Exchangers for Cement, Sugar, Refineries, Petro-Chemicals & Fertilizers industries.
- Flash Tanks for thermal & nuclear sets
- Service Tanks, Storage Tanks & Pressure vessels for Thermal, Nuclear sets of all ratings & industrial applications
- CS/SS/Non-ferrous shell and tube heat exchangers and pressure vessels
(For all applications irrespective of rating)
- Air-cooled heat exchangers for GTG uptoFr-9E, and Compressor applications of all ratings
- Steam jet air ejectors for all condensers upto 150 MW
- Deaerators from 7 MW to 800 MW
- Gland steam condensers 7 MW to 150 MW
- Gas coolers for all possible compressor applications
- Oil coolers- STG upto 150 MW, GTG uptoFr-9E,
- Generator Air coolers upto 150 MW STG and GTG up to 9 FA



PUMPS

- Pumps for various utility power plant applications up to a capacity of 1000 MW:
 - Boiler feed pumps (motor or steam turbine driven) and Boiler feed booster pumps.
 - Condensate extraction pumps.
 - Circulating water pumps (also known as Cooling water Pumps)

COMPRESSORS

- Multi stage Centrifugal compressors along with auxiliary system for various applications are manufactured and supplied with following configuration & parameters
 - Model –
 - Horizontally split type up to 40 bar design pressure
 - Vertically split type up to 350 bar design pressure
 - Capacity – 300000 m³/hr
 - Gas – Air, CO₂, N₂, H₂, NH₃, Natural Gas, Wet Gas, Propylene etc.,
 - Sealing system – Dry Gas Seal
 - Industry – Refineries, Fertilizers, Oil & Gas, Steel, Power and Natural Gas Transportation.
 - International standard – API 617
 - Testing capability – MRT, Performance test, Full load, full pressure full speed test, Complete Unit Test
 - Driver – Steam Turbine, Gas Turbine, Motor

SOLAR PHOTOVOLTAICS

- Mono/ Multi Crystalline Solar Cells (156 mm)
- Mono/ Multi Crystalline PV Modules (upto 330 Wp)
- Power Conditioning Unit (upto 1.25 MW)
- SCADA (Supervisory Control and Data Acquisition)
- Switchgear panels (all kV ratings)
- Power Transformers (15 MVA and above)
- Passive Solar Tracking System
- Space grade solar panels
- Space grade Batteries

AUTOMATION AND CONTROL SYSTEMS

- Steam Generator/ Boiler Controls including Boiler Protection
- Steam Turbine Controls
- Boiler Feed Pump (BFP) Drive Turbine Control
- Station Control and Instrumentation/ DCS
- Offsite/Off base controls/ Balance of Plant Controls
 - Ash Handling Plant (AHP)
 - Coal Handling Plant(CHP)
 - Water System for power plant
 - Mill Reject System (MRS)



- Condensate On-Load Tube Cleaning system (COLTCS)
- Gas Booster Compressor (GBC)
- Condensate Polishing Unit (CPU)
- Heating, Ventilation & Air conditioning (HVAC)
- Fuel Oil Unloading System (FOUS)
- Hydro Power Plant Control System
- Gas Turbine Control System
- Nuclear Power Plant Turbine & Secondary Cycle control system
- Nuclear Power Plant Primary Cycle Control Centre Instrumentation Package(CCIP)
- Power block of solar thermal power plant
- Industrial Automation
- Sub-Station Automation (SAS) and Supervisory Control & data Acquisition System (SCADA) for Substation & PV Plants
- Non-FST HVDC control panels
- Electrical Control System (ECS) for Refineries
- Energy Management System (EMS) for Power Plant
- Electrical Interface System for MV/LV Switchgear

POWER ELECTRONICS

- Excitation system
- AC Drive System
- Static Starters
- Induction Heating Equipment

TRANSMISSION SYSTEMS CONTROL

- EHV & UHV Sub-stations/switchyards both AIS & GIS type ranging from 33kV to 765kV.
- HVDC transmission systems.
- Flexible AC Transmission system (FACTS) solutions
 - Fixed Series Compensation(FSC)
 - Static VAR Compensation (SVC)
 - STATCOM
 - Controlled Shunt Reactor (CSR)
 - Phase Shifting Transformer (PST)
- Power system studies, Feasibility studies & Insulation Coordination
- Converter Valves and controls for HVDC & FACTS.

POWER SEMICONDUCTOR DEVICES

- Diodes- Ranging from 1400-4400V/250-2000A
- Thyristors- Ranging from 1400-7000V/150-4950A
- Rotating Diodes for Turbo generators.

SOFTWARE SYSTEM SOLUTION

- Merit Order rating
- Performance Analysis, Diagnostics & Optimization (PADO) for Thermal Utilities

- Performance Calculation & Optimization system
- OPC connectivity from DCS to third party systems
- Enterprise Asset Management System (EAMS)
- Enterprise Resource Planning (ERP)
- Operator Training Simulator
- Power House intranet software
- Alarm Analysis system
- Real Time Performance Data Monitoring system
- Historical Replay System

SWITCHGEAR

Medium Voltage Vacuum Switchgear of various types for indoor and outdoor applications for voltage ratings up to 36 kV and Gas insulated switchgears (36 KV, 145 KV, 420KV)

- Indoor switchgears up to 12 kV, 50 kA, 4000 Amp for thermal, nuclear, hydro and combined cycle Power Plant Projects
- Indoor switchgears up to 36 kV, 40 kA, 2500 Amp for Industries, solar power plants and refineries
- Indoor Compact switchgear 12 kV, 25 kA, 1250 Amp for distribution system
- Outdoor Vacuum circuit breakers (12 kV, 25 kA, 1250 Amp / 36 kV, 25 kA , 2000 Amp / 25 kV, 25 kA, 1600 Amp) for distribution network/ track side railway application
- Outdoor pole mounted 12 KV Autorecloser / sectionaliser / capacitor switch for rural segment
- Gas insulated switchgears (36 KV, 40kA, 2500 Amp/ 145 kV, 40 kA, 2500 Amp/ 420kV,40kA, 3150 Amp) for transmission & distribution network, Refineries / hydro station / metro.
- SF6 circuit breakers ((145kV, 40 kA,3150A), (420 kV, 50kA,4000A))

BUS DUCTS

- Bus-ducts with associated equipment to suit generator power output of utilities of up to 800 MW capacity.

TRANSFORMERS & REACTORS

- Power transformers for voltage upto 1200 kV
 - Generator transformers (up to 500 MVA, 400 kV, 3 Ph / 400 MVA, 765 kV, 1 Ph/400 MVA, 400 kV, 1 Ph)
 - Auto transformers (up to 1000 MVA, 400 kV, 3 Ph / 600 MVA, 400 kV, 1 Ph / 1000 MVA, 765 kV, 1 Ph / 1000 MVA, 1200 kV, 1 Ph)
- Converter Transformers / Smoothing Reactors (up to 600 MVA , ±800 kV) / (up to 254 MVar, ± 500 kV) for power station
- Shunt Reactors (up to 150 MVar, 420 kV, 3 Ph / 110 MVar, 765 kV, 1 Ph)
- Controlled Shunt Reactors for EHV applications.



- Phase Shifting Transformers (up to 500 MVA, 400 kV, 3 Ph; Up to 500 MVA 420 kV 1 Ph, PST (1500 MVA Bank in 3 Ph) for transmission lines
- Instrument transformers
 - Current transformers upto 400 kV
 - Electro-magnetic voltage transformers upto 220 kV
 - Capacitor voltage transformers (33KV to 1200 kV)
- Special Transformers
 - Rectifier transformer (Upto 120 kA, 132 kV)
 - Furnace transformer (Upto 33 kV, 60 MVA)
- ESP transformers up to 95 kvp, 1600 mA
- Smoothing reactors upto 3.3 mH , 2700 Amp.
- Dry Type reactor upto 300 mH , 120 Amp.
- DC Choke upto 0.5 mH , 4600 Amp.
- Dry type transformers up to 15 MVA 33 kV.
- Composite Monitoring System for Power Transformers

CAPACITORS

- H.T. Capacitors for Power factor correction (Motor Capacitors) 3.3 to 11 kV delta connected Capacitor banks
- H.T. Capacitors for Shunt, Series & SVC (Static VAR compensation), Harmonic filter & HVDC applications (3.3 kV to 500 kV, 1 Ph/ 3 Ph capacitor banks of rating 0.5 MVAr to 250 MVAr)
- Capacitor Divider for CVT
- Coupling Capacitor for PLCC
- Surge Capacitor for protection of Generators & Transformers (11kV to 40 kV)
- Roof Capacitor for traction locomotive
 - Capacitor Divider for CVT up to 1200 kV
 - Coupling Capacitor for PLCC upto 400kV

BUSHINGS

- 52 to 400 kV OIP condenser bushings for transformer applications
- 25 kV Locomotive bushings
- Special application bushings like Oil cable box, wall bushing, higher creepage, high cantilever load, High altitude bushing

ON LOAD TAP CHANGERS (OLTC)

On Load Tap Changer for various application like Power Transformer, Furnace Transformer, Station Transformer, Rectifier Transformer etc.

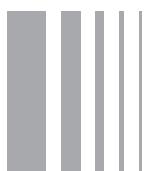
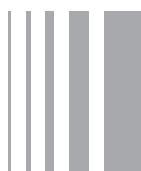
- On Load Tap Changer up to 765 kV class Transformer
- Off Circuit Tap Switch up to 765 kV class Transformer

CONTROL GEAR

- Industrial Control Gear
 - Electronic controllers for industries/ power plants
 - Digital Excitation control system (1000 A , 400 V DC/, 400 V DC with redundant thyristor stacks & DC field breaker)
 - Large current rectifiers with PLC Based digital controls
 - Digital Hydraulic/ compact Governors
 - Digital AVR (1 Ph, 300 V DC/ 3 Ph, 400 V DC)
 - Control panels and cubicles for applications in steel, aluminium, cement, paper, rubber, mining, sugar and petrochemical industries
- Contactors
 - LT air break type AC for voltages up to 660 V
 - LT air break type DC contactors for voltages up to 600 V
 - HT vacuum type AC for voltages up to 11kV
- Control and Relay Panels
 - Control & Protection Panels (up to 400 kV) For EHV Transmission projects
 - Synchronizing Trolley / Swing Panels
 - Protection panels for large Generators up to 800 MW for thermal, nuclear, hydro and combined cycle Power Plant Projects
 - Remote Control and relay panels for MV Switchgear
 - Turbine gauge panels for hydro sets
 - Outdoor type control panels and marshalling kiosks
 - Remote Transformer Tap-Changer Control panels
 - LT Switchgear, SCAP, Thyristor, RAPCON and STATCON Panels.

INSULATORS

- Porcelain Insulators
 - High-tension Porcelain Disc insulators for AC/ DC applications, ranging from 70kN to 420 kN electro-mechanical strength, for clean and polluted atmospheres, Suitable for application upto 1200kV AC & ±800kV HVDC transmission line & Sub-stations.
 - Hollow porcelains up to 765 kV for Transformers & SF6 circuit breakers.
 - Solid core insulators up to 400 kV for Bus Post & Isolators for substation applications.
- Composite Insulators
 - For 25 kV Railway Traction.
 - Long Rod insulator up to 765 kV for transmission lines.
 - Hollow Insulators upto 765 kV for Instrument Transformers.



- Wear Resistant Material (CERALIN)
 - Ceramic Liners for Wear Resistant Application in Thermal Power Station and other various applications.
 - Ceramic Liners for Ash Slurry Application.

INDUSTRIAL AND SPECIAL CERAMICS

- EWLI –Electronic Water Level Indicators used in Boiler Drum Water Level Monitoring (BHELVISION system)
- Ceramic and Tungsten Carbide Flow Beans for Christmas tree valves.
- Grinding Media for Pulverizing in Thermal Power Plant.

ELECTRICAL MACHINES

AC Squirrel cage, Slip ring, Synchronous, Variable speed motors; Industrial Alternators and Motors for Hazardous areas are manufactured as per range summarized below. Special-purpose machines are manufactured on request.

- Voltage - AC - 415 V to 13800 V
- Frequency - 50 Hz & 60 Hz
- Enclosure - SPDP, TETV, TEFC, CACW, CACA & Duct Ventilated
- AC Machines for Safe Area Application
 - Induction Motors
 - Squirrel cage motors -150 kW to 22000 kW
 - Slip ring motors - 150 kW to 10000 kW
 - Synchronous motors- 1000 kW to 25000 kW
 - Variable speed Motors 150 kW to 22000 kW (Squirrel cage motors)
 - Variable speed Motors 1000 kW to 25000 kW (Synchronous motors)
- AC Machines for Hazardous Area Application (Fixed speed or with VFD)
 - Flame-proof squirrel cage Induction motors (Ex 'd') (150 kW to 1500 kW)
 - Non-sparking squirrel cage Induction motors (Ex 'n') (150 kW to 4000 kW (higher ratings on request))
 - Increased safety squirrel cage Induction motors (Ex 'e') (150 kW to 4000 kW (higher ratings on request))
 - Pressurized motors (Ex 'p') 150 kW to 22000 kW (Squirrel cage motors)
 - Pressurized motors (Ex 'p') 1000 kW to 25000 kW (Synchronous motors)
- Mill Duty Motors (150 kW to 5000 kW with speed base speed > 150 rpm) for steel mills.
- Industrial Alternators (Steam turbine, Gas turbine and Diesel engine driven) (1500 kVA to 25000 kVA)
- Induction Generators (300 kVA to 6000 kVA) for mini/micro HEP.
- 2 Pole Gas Turbine driven Generators up to 330 MW and matching Exciters.

- 4 Pole Gas Turbine driven Generators up to 60 MW and matching Exciters.
- 2 Pole Steam Turbine driven Generators up to 330 MW and matching Exciters.
- 4 Pole Steam Turbine driven Generators up to 60 MW and matching Exciters.
- Permanent Magnet Based Generators up to 5 MW.
- Gas Turbine generators up to 270MW.

RAIL TRANSPORTATION

- Transportation Systems
 - AC electric locomotives (upto 5000 HP, 25 kV AC)
 - AC-DC dual voltage electric locomotives
 - ACEMU Coaches
 - Metro Coaches
 - Urban Transportation Systems
 - Traction Propulsion Systems for:
 - 6000 HP IGBT based AC Locomotives
 - 25 kV 3-phase IGBT based AC Electrical Multiple Units (EMUs)
 - Air-conditioned ACEMU
 - 1600HP IGBT based AC/AC DEMU
 - 25 kV 3-phase IGBT based MEMU
 - 1600HP Multi-Genset Locomotive
 - Diesel-Electric Shunting Locomotives (upto 1400 HP)
 - Battery powered locomotive
 - OHE recording-cum-test car
 - Battery Powered Road Vehicles
 - Dynamic track stabilizers
 - Rail cum Road vehicle
 - Diesel Electric Tower Car
 - Utility vehicle

TRANSPORTATION EQUIPMENT

- Traction Converter
- Auxiliary Converter
- Vehicle Control Electronics
- Hotel Load Converter
- Traction Transformer (upto 5400 kVA) for conventional locomotives & upto (7775 KVA) for 3 phase drive locomotives.
- Traction transformers (upto 1050 KVA) conventional AC EMU/ MEMUs & (upto 1578 kVA) for 3 phase EMU
- AC Traction Motors (upto 1200 kW) for Locomotives & EMUs
- DC Traction Motors (upto 630 kW) for Locomotives & EMUs
- AC Traction alternators (upto 3860 kW) for Locomotives & EMUs



- Traction generators up to 2000 kW
- Motor Generator sets (upto 25 kW) for auxiliary requirements
- Auxiliary generators and excitors (upto 50kW)
- Eddy current clutch
- DC blower motors (upto 50kW) for dynamic braking system
- Traction gears and pinions
- Wagon (Upto 28 axle, 296 Tonne)
- Control Gear equipment for conventional Rolling Stock
- Control cubicles
- Traction Rectifiers
- Bogie Frame
- Wheel & Axle Assembly

DEFENCE AND AEROSPACE

- Super Rapid Gun Mount (SRGM) 76/62 gun for naval ships
- Integrated Platform Management system (IPMS) for naval ships
- Integrated Bridge System (IBS)
- Static Main Motor Generator (SMMG)
- Training Simulator for Vehicles, platforms, radars, weapons, missiles and Computer Based Training (CBT) for all defence and para-military forces
- Turret Casting for T-72 Tanks
- Casting and forgings for ships
- Castings and forgings for special application
- Compact Heat Exchangers for various aircraft platforms
- Fuel Tanks and other components for Launch Vehicles and Satellites.
- Steam Turbines for Strategic applications
- Permanent Magnet Frequency converters
- Reserve Propulsion motor drives
- Compact Brushless Alternators

E-MOBILITY & ENERGY STORAGE SYSTEM

- Electric Bus
- Powertrains for Electric Vehicles
- Charging Infrastructure for Electric Vehicles
- Grid Storage Solutions including Power conditioning unit (PCU) and SCADA

OIL FIELD EQUIPMENT

- Oil Rigs – On-shore drilling rigs with AC-VFD and AC-SCR technology for drilling up to depths of 9,000 metres, work-over rigs for servicing up to depths of 6,100 metres, mobile rigs for drilling up to depths of 3,000 metres, complete with matching draw-works and hoisting equipment including:

- Mast and substructure
- Rotating equipment : Draw works ; Rotary ; Swivels; Travelling Blocks
- Independent Rotary drive unit
- Mud System including pumps
- Power packs and rig electrics
- Rig instrumentation
- Rig utilities and accessories
- Refurbishment and up gradation of BHEL and Non BHEL make Oil Rigs
- 3-phase Oil rig motor upto 1150 HP
- DC Oil rig motors of all required ranges
- Oil rig alternators of all required ranges
- Well heads and X-mas Trees up to 10,000 psi, Mud Line Suspension, Choke and Kill manifold, CBM Wellheads, DSPM H- Manifold Assembly, Mud valves, ESP hangers, Block type X-mas Trees & Landing Bases for Casing Heads.
- Oil Rig Controls
 - AC Power Control Room
 - DC Power Control Room
 - AC Power Pack upto 1430 kVA for DG sets
 - AC Control Module
 - DC Control Module
 - Driller's Console
 - Cable set, cable trays, cable box and crew room for oil rigs.
 - Mobile lightening Tower, Rig Lightening Tower
 - DG set for Oil rig application (63/ 250/ 380/500 KVA)
 - STATCOM for power Factor improvement in AC SCR Rigs

FABRICATED EQUIPMENT AND MECHANICAL PACKAGES

- Air separation Units for extraction of Nitrogen, Oxygen, Argon, etc.
- Cryogenic systems for liquid Nitrogen, Oxygen, Argon, etc.
- Cryogenic storage tanks, Mounded storage systems and storage spheres
- Column and Reactors for Petrochemical plants
- Pressure Vessels, Shell and Tube type and Air Fin Type Heat Exchangers
- Fired Heaters
- Purge Gas Recovery Unit for Fertilizer Industry



POWER SECTOR

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