Apar’s Cable Division (Uniflex Cables) – An overview
“Tomorrow’s Progress Today”

Providing Key Building Blocks to the Power Industry

POWERLINE® - Aluminium and Alloy Conductors
POWEROIL® – Transformer Oils and Speciality Oils
UNICAB® – Power and Telecom Cables

APAR, a Technology driven Customer focused Company, acknowledged for its Reliability, Adaptability and Innovation
**Apar – Business Segments**

<table>
<thead>
<tr>
<th>Products</th>
<th>Speciality oils</th>
<th>Conductors</th>
<th>Cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Rs 5000 Cr</td>
<td>• Pioneer in manufacturing Transformer oils in India since 1969.</td>
<td>• One of the largest manufacturer of conductors in India, amongst</td>
<td>• Widest range of Medium &amp; Low Voltage XLPE cable, Elastomeric</td>
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<td>(USD 800 Million)</td>
<td>• Largest Indian player in the Power Transformer segment, especially in EHV</td>
<td>one of the few largest in the world by volume.</td>
<td>cables, Fiber Optic cables and Specialty cables</td>
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<td>segment (220 KV to 765KV).</td>
<td>• Export to over 65 countries, Registered export house by Ministry of</td>
<td>• Growing at CAGR &gt; 25%</td>
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<td>• Successful manufacturing &amp; distribution tie-ups in South Africa, Australia &amp;</td>
<td>Commerce.</td>
<td>• Export to over 25 countries.</td>
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<td>Turkey.</td>
<td>• Vertically integrated producer, full product range of ACSR and AAAC</td>
<td>• Manufactures specialty cables with Integrated Fiber Optics, Heavy</td>
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<td>• Exports of Transformer Oils and White Oils to over 65 countries.</td>
<td>up to 1200 KV.</td>
<td>&amp; Low Tow cables, Torpedo cables, Solar &amp; Windmill Cables etc</td>
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<td>• Key OEM approvals of all major global transformer OEM's.</td>
<td>• Leader in (HTLS) High Temperature conductors, it will be a paradigm</td>
<td>• Set up Electron Beam Irradiation facility (1.5 MeV and 3.0 MeV)</td>
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<td>• License agreement with ENI to manufacture world famous AGIP lubricants,</td>
<td>shift in the market in a few years.</td>
<td>• Key approvals from several Utilities, Consultants and EPC contractors</td>
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<tr>
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<td>positioned at the upper end of the market.</td>
<td>• Key approvals from several global Utilities and EPC contractors –</td>
<td>• Several Innovative products</td>
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<td>allows larger market participation.</td>
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<td>Plant Locations</td>
<td>Rabale, Silvassa and Hamriyah Total Capacity 450,000 KL</td>
<td>Silvassa, Athola, Jharsaguda. Total Capacity 200,000 MTPA</td>
<td>Umbergaon &amp; Khatalwad</td>
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<td>24,000 MT Aluminum and 6,000 MT Copper</td>
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<td>Sales Rs 1050 Cr (USD 160 million)</td>
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</table>

We are a **Technology driven Customer Focused** company characterized by **Reliability, Adaptability, Innovation & Leadership** in our product categories.
About the Cable Division

- Experience in Cable manufacture since 1981 serving a broad customer base in India and Overseas.
- A vast manufacturing infrastructure of 130,000 SqM. (Built Up Area over 70000 sq Meter) manufacturing several special varieties of cables.
- The cable division enjoys a very high reputation for its quality with its customers in its entire product range.
The plants are ideally located 150 Km from Mumbai.
Cables Segment

Product Range

- Power Cables LT & HT up to 66 kV
- Elastomeric / Flexible cables
- Fiber optic cables
- Specialty / Hybrid cables
- Electron Beam Irradiated Cables

New Cable Product Developments

- Special Cables for Indian Navy.
- Concentric Anti-Theft Cable
- Medium Voltage Covered Conductors
- EHV Cables 66 kV
- 33 KV Elastomer Cables for Windmill and for Export
- 40 year Cable life & radiation resistant products for nuclear power plants

Rs/Cr, Growth CAGR > 25%
Our VISION

- We at Apar are a Technology driven Customer focused group of professionals firmly believing in our Company’s vision:

  “Tomorrow’s Progress Today”

Our MISSION

- To build a strong brand through business ethics, Technological expertise, long terms relationship with our esteemed customers and maintain superior quality product for customers satisfaction.

Our QUALITY POLICY

We are dedicated to manufacture best quality products at affordable prices to our customers’ entire satisfaction in Power, Control, Telecommunication sectors through Employee Motivation, continual improvement and Product Innovation.
The Technical Dept is manned by several engineers having rich experience. Senior and middle level engineer managers are responsible to ensure technical compliance and quality.

A centralized laboratory supports:
- Incoming Raw Material Testing,
- In-Process Testing
- Finished goods Testing
- Internal & External Inspection.

Cables are periodically Type Tested in-house & at Independent laboratories for design compliance.

In-house manufacture of PVC and Elastomeric compounds give a competitive edge to ensure product quality.

The company lays emphasis on investing in latest test and measuring equipments and training its personnel.
The Cables are manufactured and tested as per customer requirements. The following are most commonly used specifications:

IS: 1554 (Part-I) for LT PVC Cables
IS: 1554 (Part-II) for 11 KV PVC Cables
IS: 7098 (Part-I) for LT XLPE
IS: 7098 (Part-II) for MV XLPE 33 KV
IS: 7098 (Part-III) for 66 KV Cables
IS: 14255 for LT ABC Cables
IS: 9968 (Part-I) for LT Elastomer Cables
IS: 9968 (Part-II) for HT Elastomer Cables
IS: 14494 (FT7) Elastomer Mining Cables
IS: 9857 for Welding Cables
IS: 694 for Flexible Cables
IS: 398 (Part-I, II, IV, V) for Conductors
TEC Specs for OFC Cables

For International customers, cables as per relevant specs are manufactured and tested. Commonly used specs are:
- IEC 60502 (Part-I & II) / VDE 0273/
- BS 6007/ BS:7870/ BS EN 50525/
- BS 5467, BS 7846, BS 6724,
- NF C 33-209, NF C 33-226
- SS EN 50397-1 SS 424 14 64
- IEC 60227, IEC 60092

Cables can be manufactured for any other International specifications or as per Customer specifications.
Few Testing Facilities

- Chemical Testing
- Oxygen Index Testing
- Physical Test Lab
- Tensile Testing M/c
- Electrical Test Apparatus
- Partial Discharge / Tan δ
Manufacturing Infrastructure

• Wire Drawing Machines from Niehoff Germany for Rod Breakdown and for Multi-Wire Drawing supported by 600 MT/month Electroplating-Tinning facility (OTOMEC Italy) and Cab Devices. Facility includes 8/16/32 Multi Wire Niehoff Machines for almost 800 MT/month.

• Royale USA & Scholz/Supermac CCV (Dry Cure Dry Cool) Line for XLPE Cables up to 66 KV.

• State of the art extruders from highly reputed manufacturers viz. Troester, Covema, Royale, Rosendahl, Nextrom, Supermac, etc for high quality extrusion.

• Stranding, Drum Twisters, Laying up machines, Armouring and other manufacturing equipments from most reputed machine manufacturers.

• Twin Screw, Intermix and Palletizing equipments etc for in-house manufacture of almost all compounds including Ebeam compounds to maintain quality standards.

• High Quality Test & Measuring equipments and Laboratory equipments, manned by highly experienced Technical personnel.

• Electron Beam (3.0 MeV & 1.5 MeV) Irradiation facility.

• PTFE Recycling facility includes Alpine Hosokowa Grinder.

• State of the art Fiber Optic Cable plant, including Ribbon Cable manufacturing.

• Highly experienced Managerial & Technical personnel supported by highly skilled work force.

• Plant capacities expanded in 2009, in 2013 and in 2016 to support increasing volume.

• Stranded/Compacted/Flexible Conductor manufacturing facility For Copper & Aluminium.
Manufacturing Infrastructure

FLEXIBLE WIRE BUNCHER

EXTRUDER PANEL

ROTATING CATERPILLAR

Ebeam Cable Handling System
# Cables Product Range

## Electrical Cables
PVC Cables upto 3.3 KV  
XLPE Cables upto 66 KV  
LT & HT ABC Cables  
Instrumentation Cables  
Concentric Core Cables  
Flexible Cables & Wires  
FR/FRLS/LSOH Cables  
Fire Survival Cables  
Under Water Cables  
Other Speciality Cables

## Elastomer & Electron Beam Irradiated Cables
Solar & Wind Mill Cables  
Locomotive Cables  
Ship Wiring Cables  
Trailing Cables  
Welding Cables  
Mining Cables  
LFH Cables & Wires  
Fire Survival Cables  
EPR, Silicon, EVA  
Speciality Cables

## OFC & Specialty Products
Optical Fiber Cables  
Loose Tube & Unitube  
Ribbon Type  
Multi-mode/Single Mode  
Armoured/Duct/Aerial/ADSS  
Torpedo Cable  
TOW Cables  
Composite Cables with Integrated Fiber Optics
<table>
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<tr>
<th>Sr. No.</th>
<th>Cable Product Category</th>
<th>Annual Production Capacity</th>
</tr>
</thead>
</table>
| 1      | Elastomeric (Rubber) Cables upto 33 KV, single Core upto 1000 sqmm and multi core upto 400 Sq. mm Copper, Aluminium and Copper Clad Aluminium | 12000 CKm/Yr for ≥120 sqmm  
87500 CKm/Yr for ≤ 95 sqmm |
| 2      | XLPE Power Cables Upto 66 KV, Single core upto 1000 Alum, 630 sqmm Copper Multi Core upto 630 Sq. mm. Alum and 400 sqmm Cu | 15000 Core Km/Year HT Cables  
25000 Core Km/Year LT Cables  
90000 CKm/Yr LT Control Cable |
| 3      | Optical Fiber Cables [upto 432 Fiber Cables] UniTube & Loose tube Armoured/DUCT/ADSS/Aerial Fig.8 | 90000 Km/Year (Loose Tube)  
120000 Km/Year (UniTube) |
| 4      | Fluoroplastic PVC/PE cables [including FRLS/FS and high temperature screened instrumentation cables and wires] | 24000 Cable Km/ Year |
| 5      | Electron Beam Irradiated Cables | 60000 Cable KM/Year |
| 6      | PTFE Micro Powder | 120 MT/year |
**XLPE CABLES**
- 1 KV to 66 KV
- Control Cables up to 61 Cores
- Single Core cables up to 1000 mm Sq.
- Multi core cables up to 400 mm Sq.
- Armored or Unarmored type
- HT / LT Aerial Bunched Cables
- Jacketing Material–FR/FRLS PVC, PE, LSOH
- Fire Survival, Under Water Cables

**PVC CABLES**
- Power Cables up to 1.1 KV
- Control Cables up to 61 Cores
- Railways Signaling & Auto Cables
- Screened instrumentation Cables
- House wiring and Flexible cables
- Flat Cables for submersible pumps
- Airport lighting and mining cables.
- FRLS / FR / HR / Fire Survival Cables
- *Ebeam Cross Linked PVC and LSZH cables*
• Capability to offer Thermoset Elastomeric Insulation and sheaths Vulcanized by Chemical curing, Hot Air curing and Electron Beam curing and for Various Compounds viz. EPR, CSP, CPE, PCP, EVA etc. Braiding of Tinned Copper, Glass/Nylon/Cotton, Polyester Yarn etc.
• Cables up to 33 KV
• Elastomeric Insulated Cables, Flexible cords, heavy duty HOFR Cables, Welding Cables (General Purpose and HOFR)
• Ship wiring cables, Pressure Tight Cables and cables for submerged connection.
• Railways locomotives and coach wiring cables.
• Mining Cables – Flexible Trailing, coal cutter, pliable armoured and land line cables
• Silicone Rubber and specialty high temperature cable.
• Ebeam Irradiated Thin Wall Cables for Wind Mills / Solar PV, Railway Locomotives & Coach wiring, Shipping, Automotives, Mining etc
Solar Cables

Complete range of cables for Solar Projects

- Cables 2.5 to 300 sqmm with Electron Beam Cross-Linking technology as per TUV 2007 & 2012 and EN 50618
- Solar PV cables with Rodent resistant feature also available
- Solar PV cables with Flexible Aluminium conductor also available
- Aluminium Armoured Cables with Corrugated steel tape as well as Flat strip/Round Wire armouring for Combiner Box to Inverter available

- Electron Beam Irradiated LT XLPE cables suitable up to 120°C operating Temp available. These cables can offer 15% extra current rating over conventional LT XLPE
- Medium Voltage cables up to 66 KV
- RS 485 and Fiber Optic Cables
Wind Mill Cables

- Major supplier of Wind Mill Cables in India
- Wide range of Cables for Wind Mill sector
  - LT Elastomer Cables with Chemical Cross Linking
  - LT Elastomer Cables with EBeam Cross Linking
  - MV Elastomer Cables up to 33 KV &
  - XLPE Insulated Cables up to 66 KV
  - LT PVC & XLPE cables
- The product range includes cables for Nacelle that withstand Torsion, for Tower (both Copper & Aluminium) and others.
- Bare or Annealed Tinned Copper or Aluminium Flexible conductors as per requirements
- EPR Insulated and sheath Options PCP, CSP, CPE
- Flame retardant Sheaths available
- Operating range from -20°C (-40°C optional) up to 90°C
- Operating Temp. range upto 145°C by Ebeam process
- Major supplier in India to Suzlon, Wind World, Gamesa etc
Cable for Nuclear Plants

- Apar is a major supplier for cables in India to Nuclear Power Industry

- Cables to meet 40-60 year life expectancy
- Cables meet Thermal ageing followed by Radiation resistance tests, LOCA test, MSLB meeting IEEE-383, and associated Fire performance and environmental performance tests
- Major supplies made to various Atomic Power Plants at Narora, Rajasthan (RAPP), Tarapore, Kakrapar, Kundakulam, Kalpakkam, Madras, Kaiga etc
Overview:
• Apar project set up over 75000 SqM land area.
• Only site in India starting with 2 Electron Beams: 1.5 MeV and 3.0 MeV to cover wide range of cables and handling system
• Under Beam handling system for several other products viz. PTFE Powder, Foam PE sheets, Heat Shrink Tubes & Moulded parts, PE Pipes, Packaging sheets etc

Technology:
➢ An Electron Gun is housed in a thick vessel where electrons are accelerated in an acceleration tube and are directed to a scanning device magnetically to scan
➢ The Cables are passed under the beam thru set of under-beam equipments

Benefits:
▪ Superior cross linking of polymers
▪ Superior Thermal & Mechanical properties
Cables
- Locomotive Cables
- Ship Wiring Cables
- Windmill Cables
- Solar Cables
- Automotive wires
- Building wires
- Fire Survival wires & Cables
- Mining Cables
- Appliance Cables/Wires
- PVC insulated winding wires
- Aerial Bunch Cables

Service Centre Products
- Heat Shrink Tubes
- Thin wall sleeves/tubes
- Wrap around sleeves
- Bus bar sleeves
- Moulded components & O-Rings
- Foam PE & PE Sheets
- Polymeric Insulators
- Diamond Irradiation
- Hot Water Tubes
- PE Pipes, Hoses etc
- Medical Sterilization
- Teflon powder
APAR ANUSHAKTI Flexible Wires

- Can take >40% extra current loading for continuous use, a cushion for future loading or possible size reduction
- Non-softening, Infusible & non-dripping under overload and short circuit conditions to prevent Short Circuit thus ensure Fire safety
- Does not melt easily in contact with hot objects.
- High Oxygen & Temperature Index for improved fire retardancy: Self extinguishing and does not spread fire
- High Insulation Resistance, avoids any electric shock
- Rugged mechanical properties—superior abrasion, cut through & crush resistance. Better ageing property thus longer life of wires

<table>
<thead>
<tr>
<th>Cross sectional area (sqmm)</th>
<th>Number/ Nominal Diameter of each strand</th>
<th>Nominal Thickness of Insulation</th>
<th>Approx Wire Outer Diameter</th>
<th>Max. DC Resistance of conductor at 20°C (Ω/Km)</th>
<th>Current Carrying capacity for “APAR ANUSHAKTI” FR PVC Insulated wires, 2 wires, single phase (40% extra current loading for continuous use assured)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In-Conduit Amps</td>
<td>un-enclosed Amps</td>
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</tr>
<tr>
<td>0.75 sqmm</td>
<td>11/0.3</td>
<td>0.6</td>
<td>2.4</td>
<td>26.00</td>
<td>9 / 14</td>
</tr>
<tr>
<td>1.00 sqmm</td>
<td>14/0.3</td>
<td>0.6</td>
<td>2.6</td>
<td>18.10</td>
<td>16 / 24</td>
</tr>
<tr>
<td>1.50 sqmm</td>
<td>22/0.3</td>
<td>0.6</td>
<td>3.1</td>
<td>12.10</td>
<td>20 / 32</td>
</tr>
<tr>
<td>2.50 sqmm</td>
<td>36/0.3</td>
<td>0.8</td>
<td>3.8</td>
<td>7.41</td>
<td>27 / 44</td>
</tr>
<tr>
<td>4.00 sqmm</td>
<td>56/0.3</td>
<td>0.8</td>
<td>4.4</td>
<td>4.95</td>
<td>36 / 58</td>
</tr>
<tr>
<td>6.00 sqmm</td>
<td>84/0.3</td>
<td>0.8</td>
<td>5.0</td>
<td>3.30</td>
<td>47 / 74</td>
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</tbody>
</table>
Aerial Bunched Cables

11 KV Aerial Bunched Cable

Service Drop Aerial LT Cable

LT ABC Cable
UNIDAC Cables
(Prevent Theft of Electricity)

- Small overall diameter – concentric design
- Light weight – due to smaller diameter
- Increased safety
- Temper & vandal proof
- Unauthorized access to phase conductor inhibited by concentric layer
- Sizes 1x6/6, 1x10/10, 1x16/16, 1x25/25
  Higher sizes on request
- Can be offered in Aluminium or Copper
- CNE & SNE Options
Medium Voltage Covered Conductors

- No interruptions by contact of Tree branches.
- No faults with short duration touching of phase conductors during wind conditions.
- Phase to Phase conductor distance can be reduced (reduce the Tower costs)
- Ideal and safer solution for installations for River/Lake/Railway/Road Crossings and in populated areas.
- Can protect Big birds like Peacocks, Flamingos etc, ideal for installations in Forest areas and in Bird sanctuaries
- Covered conductors are a cheaper alternative to underground cable and also to ABC cables, especially in difficult terrain and in densely populated areas.
- Lines near to areas where the public visit are not so dangerous because of accidental touching
- Overcomes costly Right of Way issues and Line can be commissioned faster

A – Semicon Tape & Extrusion
B – XLPE Insulation
C – UV Protection and Anti-Tracking HDPE or XLPE covering

Also developed 66 KV, 110 KV and 132 KV Covered Conductors
Instrumentation Cables

- Cables in Pair/Triad/Quad construction
- Individually and / or Overall screened
- Armoured/Unarmoured construction
- Screening of Aluminium Mylar Tape & Drain Wire (and / or Screening of ATC Braid)
Fiber Optic Cables

- Loose tube Cables from 2 to 432 Fibres and Unitube Cables upto 24 Fiber in Various constructions viz. Duct, Armoured, Aerial, FTTH, Indoor Types etc.
- Ribbon Cables up to 512 F
- SM: G652B / G652D / G655 / G657A / DSF & Multimode Fibers (OM1, OM2, OM3, OM4)
- Self Supporting ADSS & Fig.8 Aerial Cables
- Composite & Hybrid Cables
- Custom built cables designed for specific applications eg. Heavy / Light Density Tow cables for Sonar & Mine sweeping, Torpedo Cables
Associated with DRDO/NPOL for over 15 years for development of specialized import substitution cable products.

Some of the cables developed are for:
- Heavy Tow & Low Tow Cables for NPOL
- Mareech cable for NPOL and for BEL
- Hybrid Fiber Optic Cables (25 Km Length) for UWR Goa
- Electromechanical Cables for NIOT Chennai
- Tether Cable for ADRDE Agra for Air Surveillance Balloon system
- Torpedo Fiber Optic cable (50 Km Length) for NSTL
- Tactical Fiber Optic Cable for Army
- Pressure Tight and Non-Pressure Tight cables upto 60 BAR
LIGHT TOW CABLE
(Under Water Neutral Buoyancy Cable)
Commendation from DRDO

Golden Jubilee Year - 2008

COMMENDATION CERTIFICATE

awarded to

Uniflex Cables Ltd., Mumbai

in recognition of valuable contribution in productionisation of

- Optical Fiber Armored Tow Cables
- Elastomeric & Telecom Cables
- XLPE Cables

based on DRDO Technology

Dr. A. Sivathanu Pillai
Distinguished Scientist
Chief Controller, R&D
Defence Research & Development Organisation
13 December, 2008
Custom Designed Composite Cables

Fiber Optic Festoon Elastomer Cable

Electro Mech Subsea Cable

13x16 + 14x2.5 + 6Prx2.5

7x50 + 8x2.5 + 6Px2.5 + 6 Optical Fiber

11 KV 3x95 + 3x95/3

Heavy TOW Subsea Cable
Our Customers: Renewable Energy
Our Customers: Industry Sector
Our Customers: Industry Sector
Our Customers – Exports Sector
Exporting to Countries

- Senegal
- Nigeria
- Sudan
- Angola
- Tunisia
- Mozambique
- Zimbabwe
- Kenya
- Ethiopia
- Uganda
- Tanzania
- Burkina Faso
- Congo

- Mauritius
- Zambia
- UAE
- Oman
- Syria
- Yemen
- Iraq
- U.K
- Spain
- Malaysia
- Bangladesh
- Nepal
- Srilanka

- Seychelles
- Rwanda
- Morrocco
- Colombia
- Haiti
- China
- Chile
- Italy
- Australia
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Thank you for your patience