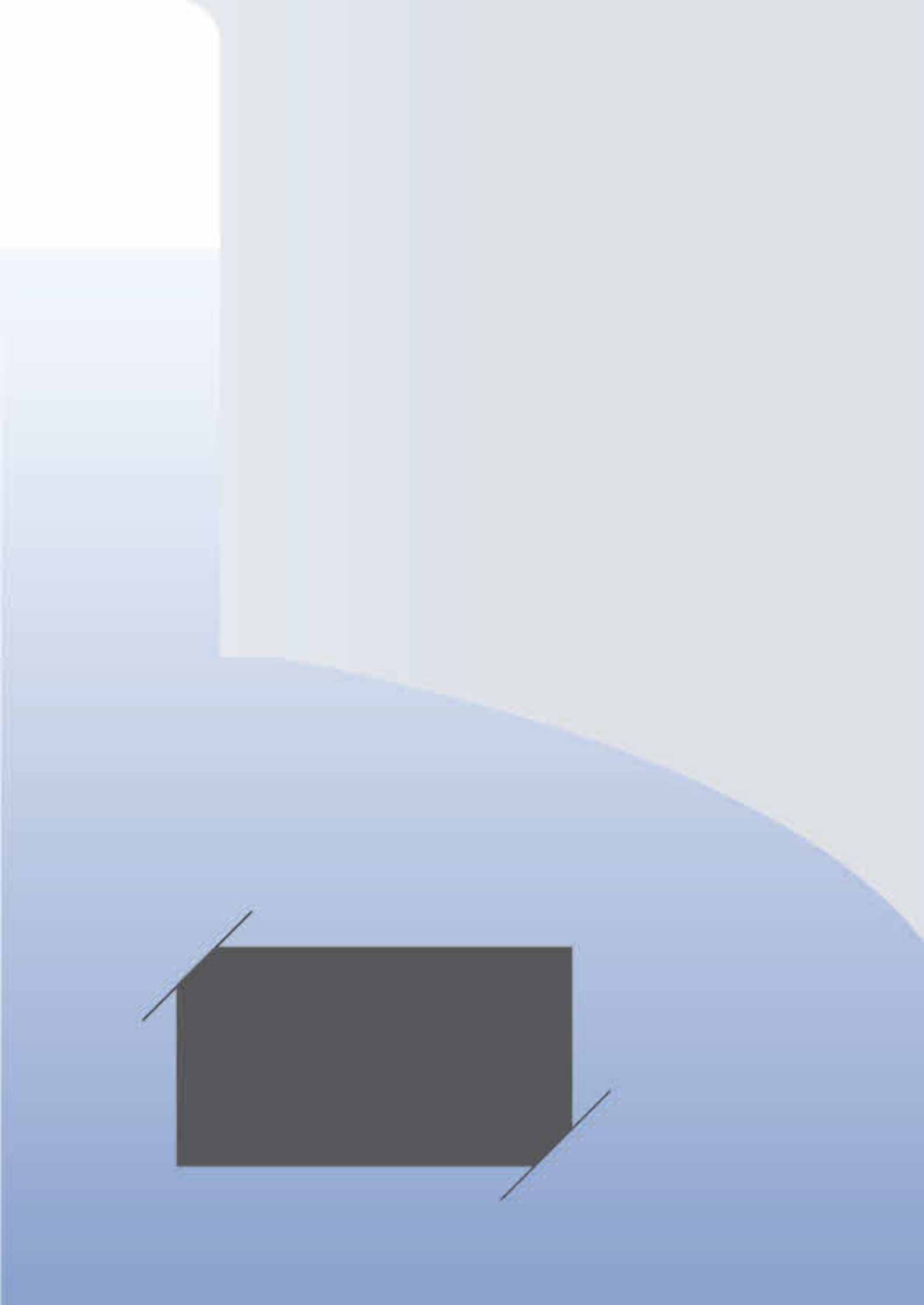


# OTDS UK

Overhead Transmission Distribution Systems





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# COMPANY INFORMATION

## Overhead Transmission Distribution Systems

**Overhead Transmission Distribution Systems is a UK based leader in power distribution materials throughout Europe, Africa & the Middle East.**

Established in 1978, OTDS has vast experience with a range of power distribution networks, supplying the Oil, Gas, Utility & Mining industries in the UK & Overseas.

Over 30 years of experience gives OTDS knowledge to perform in any situation, developing solutions tailored to our customer's requirements.

Through our customers, OTDS power distribution solutions facilitate the delivery of electricity to homes & businesses worldwide.

OTDS operate by supplying complete distribution networks between 240v – 132kV.

We can design your entire electrical distribution network & supply all the required materials to get your project live, whatever the size.





We manufacture overhead line materials, power transformers, cabling, accessories & low voltage equipment, for a comprehensive, fully compatible, care free installation.

Within OTDS, our primary focus is to provide an excellent service to customers. We offer a complete product portfolio with a wide scope of services, our excellence is based on a long tradition of expertise, coupled with state of the art technology to meet the most demanding customer specifications of today.

At OTDS, quality, safety and protection of our environment is paramount; from the selection of materials right through manufacturing and the final inspection. All our products are monitored to meet the most stringent requirements.

At our UK offices & warehouses we hold stock of all the materials required for implementing a new distribution system. Wooden & steel poles, power transformers, overhead line hardware, termination kits and conductor, are all held in our warehouses for a quick delivery to site for emergency projects worldwide.

Small enough to care but big enough to perform, OTDS has the capability and capacity to work on any contracts, large or small. OTDS enables our clients to reach their customers worldwide.

Whatever the application, OTDS reputation is based on engineering brilliant solutions, competitively, quickly and on time.



# PRODUCT INFORMATION

## Overhead Transmission Distribution Systems

**OTDS offers a wide range of materials for complete distribution networks, whether a 1km or 100km line, we can supply all the materials for you to reach your final destination.**

### **DISTRIBUTION POLES**

At OTDS, we believe the most effective method of distribution is via poles, weather steel or wood, our engineers will design the various positions according to terrain & our customers' requirements. If supplying a power transformer, switchgear, oil well or motor, we will advise the most practical design.

Our ranges of distribution poles are used for low and medium voltage overhead lines. We offer poles in different heights as per the design requirements and in voltages up to 33kV in single and double circuit categories. We offer Creosoted poles, Tanlaith E treated and Wolmanit CX8 treated depending on installation site and customer requirements. Some examples of various positions that we have designed & supplied are



#### **STRAIGHT LINE POSITION**

In this installation we have used a creosoted wooden pole as per BS1990, galvanised steel crossarm complete with 33kv post insulators and associated accessories.



#### **TENSION POSITION**

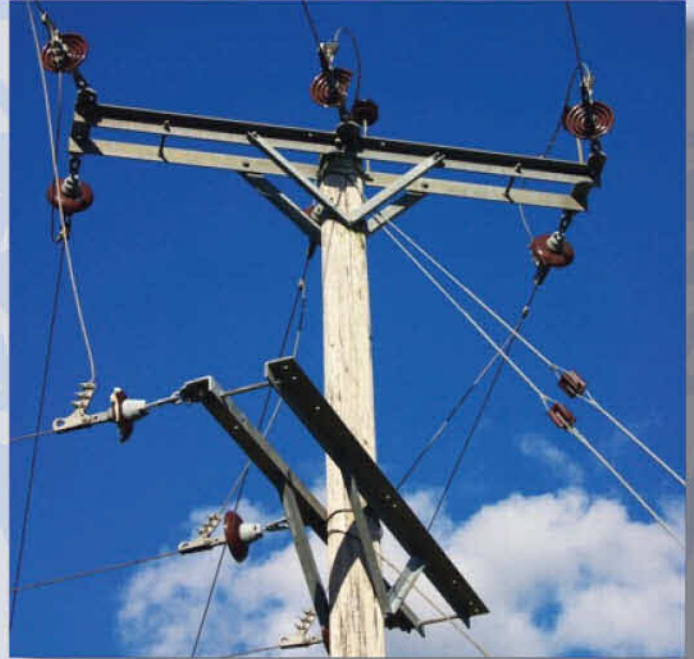
Tension positions are used to pull the conductor to the required tension, and are placed along the line at intervals according to the specification of the line and conductor.

## H POLE TENSION



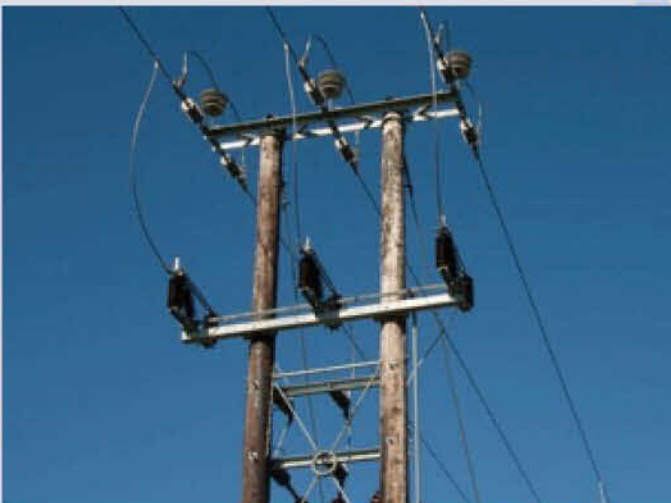
H Pole Tension position, complete with porcelain disc insulators, tension accessories and stay sets

## ANGLE POSITION



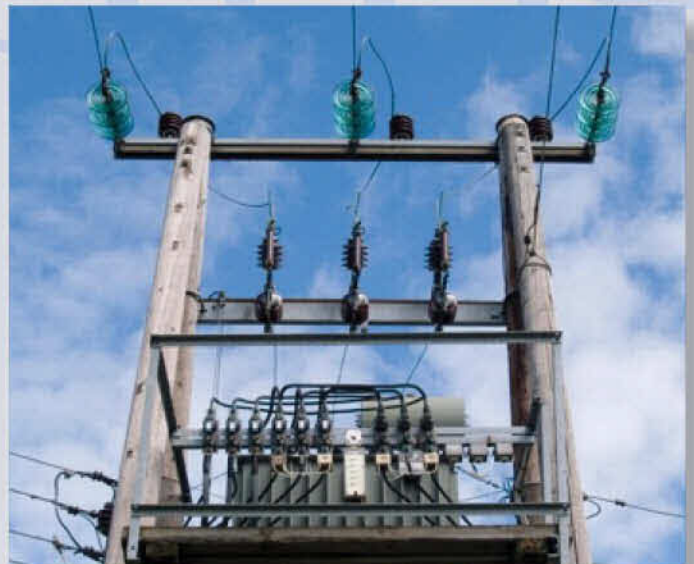
Angle positions are used when a change of direction is needed in the overhead line. Standard positions are 0-15°/15 - 60°/60 - 90°. Depending on the line specifications our engineers will design the position complete with all the required accessories

## SECTION POSITION



Section positions are installed in the line to tap a 33kV feed. In this example installed in North Africa, the tension section position was installed to supply a ground mounted 2000kVA transformer. We also included 33kV surge arresters for transformer protection

## TERMINAL POSITION



Terminal positions are installed at the beginning or end of the line. In this installation we have a terminal pole, which incorporates 33kV fuse protection and a 250kVA, hermetically sealed oil type, 33kV - 415V distribution transformer



# STEEL DISTRIBUTION POLES



We supply poles hot dip galvanized in a bath of molten zinc in compliance with BS EN ISO 1461 or ASTM 123 or any other special coating required by the customer.

## Transmission Monopoles

Our ranges of transmission monopoles - tapered, polygonal, octagonal and stepped - are available in different heights as per the design requirement and voltages up to 230kV in single and double circuit category.

OTDS's engineering section designs these monopoles, with the help of latest software, to ensure that users get the most convenient solution both technologically and economically.

Due to the material used, these poles are able to withstand exceptional conditions. These monopoles are excellent for setting up overhead transmission lines in towns and areas where space is restricted. Strict quality control norms are set and observed at every stage of production process of these poles.

## A number advantages of Tubular Steel poles

Due to the surface curvature of tubular poles, wind loads acting on them are lower than those on other surfaces of the same protected areas.

The distribution of metal in the cross-section of tubular poles gives them the same strength in every direction. Properly designed tubular steel poles subjected to harsh conditions will bend but not break under the load. An outward chain reaction from the point of failure would occur with the poles yielding to a lesser degree as the reaction progressed outwards. In Practice the reaction would be neutralised at about the fifth pole on each side of the break.

The smooth surface of tubular poles reduces to a minimum the liability to corrosion as compared with other conventional structural sections in which crevices abound.

In suitable ground the holes required for planting the poles need to be only slightly larger than the diameter of the poles. This is special significance in built up areas where extensive digging operations are undesirable.



# WOODEN DISTRIBUTION POLES



**POLES STACKED FOR SEASONING**



**DRESSED AND PEELED POLES AWAITING TREATMENT**



**CRESOTED POLES DRYING**



**TIMBER BREAK BULK SHIPMENT**

Within our industry wooden poles are a vital means of electrical distribution and have been for over a century. OTDS have been supplying wooden poles for over 20 years. We offer quality workmanship, with support you would expect from a UK company.

We supply mostly *Pinus Sylvestris* from Scandinavia with lengths between 6m "C 24m. All our poles are treated within Europe at various of our partner treatment plants, depending on the treatment required by the customer and final destination.

Thirty years of experience in timber treatment and an unwavering commitment to high standards in the industry are an assurance to OTDS customers. Our treated timber products will provide lifetime service, whether they are treated with creosote, tanalith E or wolmanit. The amount of preservative chemical that is impregnated into the timber is determined by the required specification and hazard class. This is always in accordance to the clients own specific requirement or specification.

OTDS is a experienced supplier of wooden poles to the utility industry and has a total commitment to quality, which is manifested in its ISO 9001:2000 certification.





# OVERHEAD LINE HARDWARE AND ACCESSORIES

OTDS manufactures its own hardware and accessories for perfect fitment with our overhead line packages.

All our hardware, insulators & overhead line switches are made in our plants in Spain & Italy.

We supply a very large range of accessories to meet any requirement.

OTDS Terminal pole complete with tension sets, tension glass 11kV insulators, galvanised crossarm, stay sets and insulators, surge arresters, drop out switch and terminal box supplying an 11kV Underground cable

## OTHER ACCESORIES OFFERED

- Earthing accessories
- Drop out fuses
- Rocking switches and disconnections
- ABC cable & accessories
- Wide range of Porcelain and Composite insulators rated between 1kV – 440kV
- All types of overhead clamps and fittings
- Complete sets of installation tools, hand operated & hydraulic
- Light fittings
- Cable accessories such as termination kits, glands kits & lugs.

OTDS Terminal pole complete with tension sets, tension glass 11kV insulators, galvanised crossarm, stay sets and insulators, surge arresters, drop out switch and terminal box supplying an 11kV Underground cable

Please see the other photos within our brochure for more examples of hardware and accessories



# INSULATORS

## Overhead Transmission Distribution Systems

OTDS UK manufacture porcelain insulators suitable for all overhead line applications ranging from low voltage, using one piece service insulators to pin insulators and cap and pin type disc insulators for high and medium voltage use.

All insulators are manufactured to the highest standard from high grade wet process porcelain and are usually glazed brown.

Our insulators are designed to meet the onerous test requirements of all national and international test specifications.

A comprehensive stock of insulators is maintained to enable OTDS to respond quickly and effectively to customer requirements.

### DISC INSULATORS

Features;

Flexible but positive ball and socket connection provide a quick and easy coupling of insulators. Ball & socket arrangements confirm to IEC, ANSI, BS and other international standards.

Ball and socket insulators are provided with R Clip or W Clip to prevent uncoupling of insulators in a string.

A fine resilient bitumen coating on the inside cap and surface of the ball pin in contact with cement is applied to absorb stresses developed due to thermal expansion. It also protects metal parts against corrosion from cement.

Application of sandgrit on shell helps in uniform





transfer of static and dynamic stresses by providing firm gripping service for the cement which is used as filler between porcelain and metal parts

OTDS insulators ensure maximum creepage path due to their distinctive geometrical configuration.

Smooth rounded contours of the shell provide protection against chipping

Caps are made of malleable cast iron and pins of forged steel. These are galvanised to provide better protection against corrosion.

The glaze applied is comprehensive in nature and formulated to provide a smooth surface for self cleaning under contamination

Each shell undergoes rigorous hydraulic, high frequency tests before assembly.

Each insulator is proof tested at 50% of its EMS rating and thereafter each unit receives a rigorous power-frequency electrical flashover test.

## **PIN INSULATORS**

Features;

A steel pin with threaded head is required to mount a pin insulator. To accommodate the pin, a non ferrous metal insert is cemented inside the pin hole. This is called the 'thimble' and is made of lead, zinc or copper. Depending on the mechanical strength requirement is classified as small or large head.

The pin height from the cross arm plays an important role. If too low it may influence the flashover and withstand voltage of insulators. This pin height is measured from the top of the cross arm to the top of the pin head. Bird faults can be a major problem with birds sitting on the crossarm. This can be minimised by the use of a pin insulator with extra clearance from the cross arm to avoid bird contact with the conductors.



Normally the area around the pin insulator where the conductor is supported is charged and the corona discharge even at working voltages produce radio interference. This scintillating activity produced by virtue of an air gap between the conductor preformed





terminations and the insulator head groove may also cause radio interference noise. Radio noise can be minimised by providing a semiconducting glaze, normally black in colour, on and around top portions of the porcelain surface, including the conductor groove, tie wire groove etc.

## **SOLID CORE POST INSULATORS**

The solid core insulators are the substitute for the conventional suspension or tension disc insulators. These insulators are superior in many respects. For example, excellent pollution performance, reliable mechanical strength, better flashover characteristics and are totally puncture proof. Solid core insulators have just about two areas of cement joints for the hardware assembly and as hardware's are externally attached, this takes care of cement growth problems.



Porcelain sections which otherwise might be subjected to high electrical stresses in the conventional type are avoided in solid core insulators. Due to its construction the internal puncture path and external flashover path is nearly the same. And because of absence of any conductivity material inside the insulator body, solid core insulators with flashover rather than puncture when subjected to excessive voltage.

In solid core insulators' porcelain column has short and sturdy skirt, which keeps the power arc away from the insulators body under sever arcing. Even under severe electrical stresses though power arc may destroy top and bottom skirts yet it leaves the middle intact, and even if all the skirts are damaged the arc-over distance of insulators does not decrease significantly.



As there is no conductive metal part inside and due to low capacitance, the charging current is reduced to the minimum possible level, this characteristic raises levels of corona inception voltage , reducing radio noise.

The solid line and post insulators have to perform in combination of tension, torsion, compression or cantilever loadings under metal fixings. Due to the simple uniform shape, the insulators can be mounted, upright, horizontal or even under hang without sacrificing mechanical strength.

Solid core insulators have proved their superiority in polluted conditions and difficult operating locations. Leakage path of solid core insulators is always even. As their width is uniform between consecutive sheds it allows clearing action of the air to minimise dust deposition on the insulator surface.



## HARDWARE

OTDS manufactures a huge range of overhead line hardware and fittings for all types of conductor and voltages. All our items are UK manufactured and undergo a strict quality control process. We hold a large range of stock to meet emergency and urgent requirements.





# BARE CONDUCTORS

OTDS will advise the correct conductor to be used with your overhead line. Our engineers will calculate the type and size according to location, required power & support type. OTDS manufacture the following types of overhead line conductor;



## ACAR

Applications Aluminium Conductor Alloy Reinforced conductor is used as bare overhead transmission cable and as primary and secondary distribution cable. A good strength-to-weight ratio makes ACAR applicable where both ampacity and strength are prime considerations in line design. For equal weight ACAR offers higher strength and ampacity than ACSR.

## AAAC

Applications All Aluminium Alloy Conductor is used as bare overhead conductor for primary and secondary distribution. Designed utilizing a high strength aluminium alloy to achieve a high strength-to-weight ratio; affords better sag characteristics. Aluminium alloy gives AAAC higher resistance to corrosion than ACSR

## AAC

Applications Classes 1 AA and A are used primarily for overhead transmission and primary and secondary distribution, where ampacity must be maintained and a lighter conductor (compared to ACSR) is desired, when conductor strength is not a critical factor. Classes B and C are used primarily as bus, apparatus connectors and jumpers, where additional flexibility is required.

## ACSR

Applications Aluminium Conductor, Steel Reinforced conductor is used as bare overhead transmission cable and as primary and secondary distribution cable. ACSR offers optimal strength for line design. Variable steel core stranding enables desired strength to be achieved without sacrificing ampacity.

Listed above are the main conductors used, however, we are able to manufacture many other type including ACSR/AW / TW, ACSS in all standard UK, US & European sizes.



# POWER CABLE



cable, BS6883 cable, IEC 60331 cable, IEC 60332 cable and festoon cable

Utilities: 33kv cable, 22kv cable, 11kv cable, bare copper cable, bus cable, earth cable, pump cable, utility cable & triplex cable

OTDS is a leading UK cable supplier and cable distributor including, computer cable, power cable, network cable, electrical cable and cable accessories. From an immediate demand to an integrated Project Cable Management Package, OTDS can help.

Oil & Gas: lead cable, EEMUA cable, instrument cables, BS5308 cable, EN50288 cable, thermocouple cable, high temperature cable, welding cable, coil lead cable, cable glands & UK00A cable

Fire & Safety: fire performance cable, BS6387 cable, BS7629 cable, fire alarm cable, emergency lighting cable, mineral cable, cwz cable & fire cable

Telecoms: data cable, coaxial cable, telephone cable, fibre optic cable, cat 5e cable, cat 6 cable, cat 7 cable, structured cabling, patch lead, BT cable, RS232 cable, CW1308 cable, ESI cable, microphone cable, electronics cable, audio cable, ethernet cable & telemetry cable



OTDS has a huge and diverse stock profile supplying electric cables to many industries:

Construction: building wiring, power cable, twin & earth cable, mains cables, BS5467 cable, control cable, crane cable and SWA cable

Onshore & Offshore: ship wiring, boat cable, NEK 606 cable, ship cable, IEC 60092





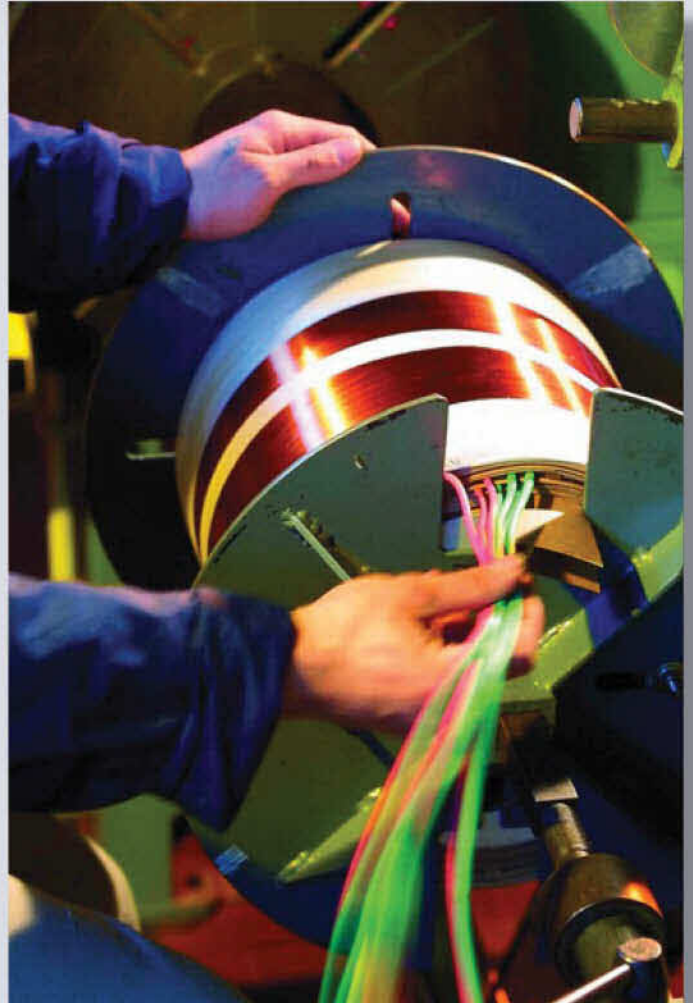
# POWER TRANSFORMERS

Since 1998 OTDS has manufactured its own transformers in our plant based in Northern Italy. Our plant has a capacity of 1200 pieces per year and employ over 60 people, with an annual turnover in excess of €15m.

The current range of manufacture extends from 15kVA single phase pole mounting type distribution transformers and package substations up to large power transformers at several MVA. Oil type, Cast resin & Dry type transformers, hermetically sealed or conservator designed are all within our standard manufacturing range.

OTDS Power Transformers are used worldwide in some of the harshest environments. Our units are designed and comply with the national standards of a each market.

OTDS Power Transformers offers standardised transformers used by utility and industries, enabling us to provide competitive pricing along with excellent lead times.



Pole mounted 200kva transformers awaiting collection



# OIL TYPE TRANSFORMERS

## DESIGN AND STANDARD EQUIPMENT

- Brown porcelain bushings for HV
- Brown porcelain bushings for LV and neutral
- Tap changer, cover mounted, no load
- Thermometer pocket
- Lifting lugs
- Oil conservator (from 1000kVA to 3000kVA)
- Oil lever (transformers with conservator)
- Silica gel breather (transformers with conservator)
- Bursting valve
  - relief valve for conservator transformers
  - Overpressure valve for hermetically sealed units
- Rollers or skids
- Drain valve
- Earthing terminal
- Name plate



Radiators type with conservator



Corrugated hermetically sealed type



Corrugated type with conservator

## DESIGN AND FITTINGS BY REQUEST

- Thermometer with two connections N.O
- Bucholz relay (Conservator transformers)
- DGPT2 device

- Double HV
- Double LV
- Various losses / voltages
- Connection group variation
- 60Hz frequency
- HV disconnecting bushings
- Air cable boxes HV / LV
- Auxiliary terminal box
- Silicone fillings
- Sheet screen between HV / LV windings



Notes:

Between 25kVA to 800kVA oil type transformers are hermitically designed as standard

Between 1000kVA & 1600kVA oil type transformers are conservator designed with corrugated tanks

For 2000kVA & larger oil type transformers, standard design is radiators and conservator

## **CAST RESIN TRANSFORMERS**

### DESIGN AND STANDARD EQUIPMENT

Primary voltage up to 24kV

Secondary voltage up to 0.5kV

Insulation class up to 24kV

Connection delta star with neutral

Group Dyn11 or Dyn5

50Hz

Core with orientated grain

Cast resin HV windings

Impregnated LV windings

Plate for LV connection

Rollers

Lifting lugs

Earthing terminal

3 nos temp sensors PT100

Electronic temperature monitoring unit

Name plate

Protection degree IP00

### **DESIGN AND FITTINGS BY REQUEST**

Double primary voltage

Double secondary voltage

Various losses / voltages

Connection group variation

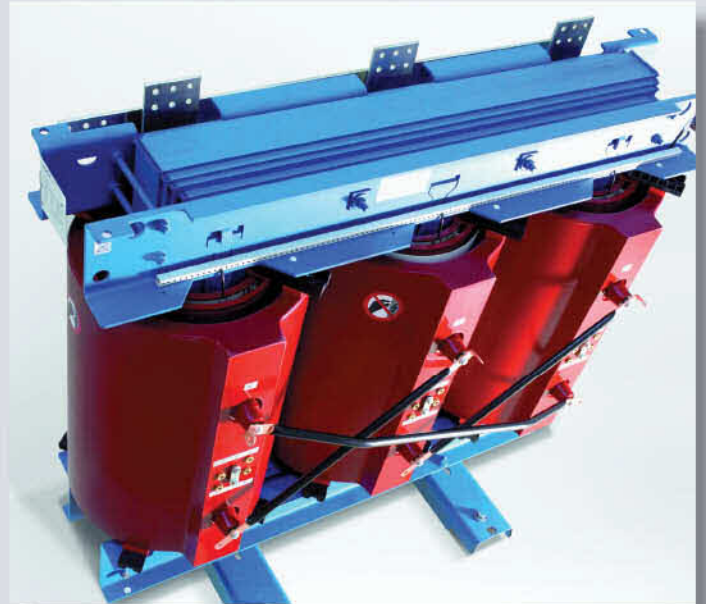
60Hz frequency

Sheet screen between HV/LV windings

HV disconnecting bushings

Cooling fans

IP31 protection box

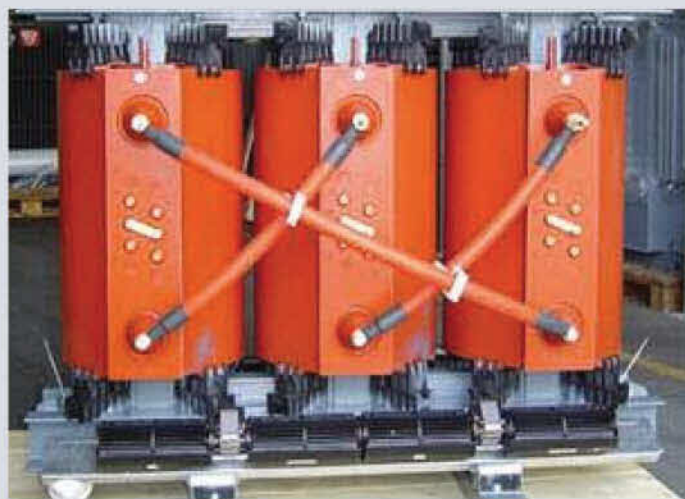






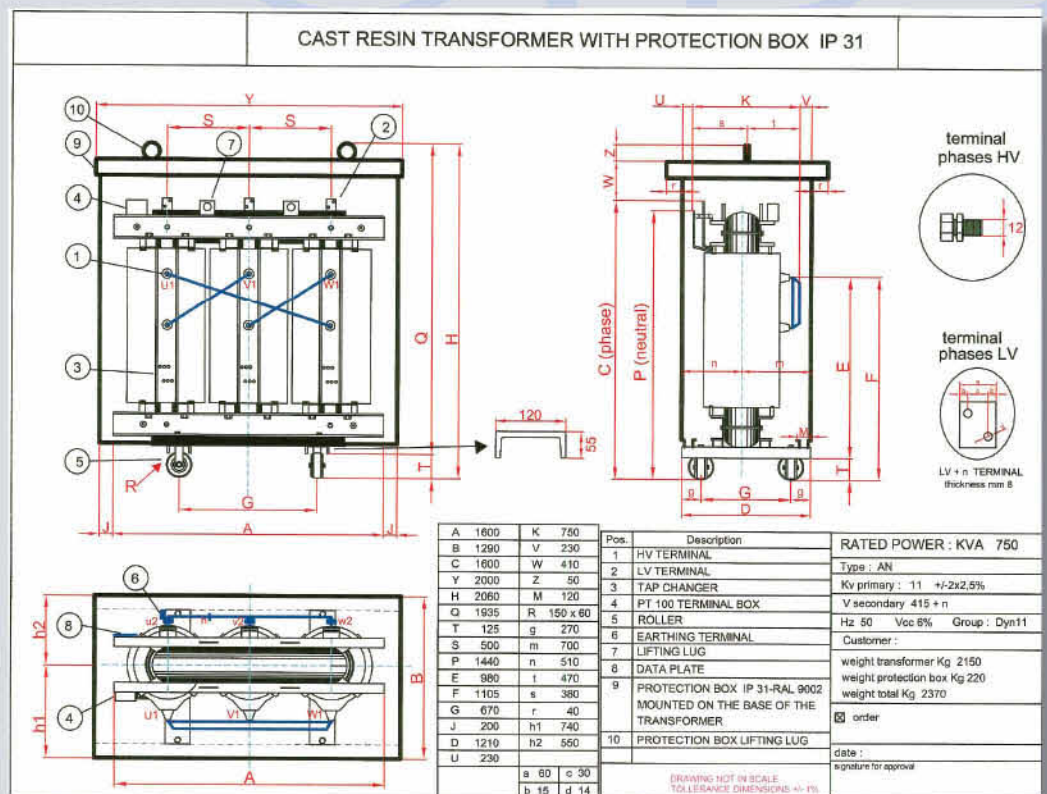
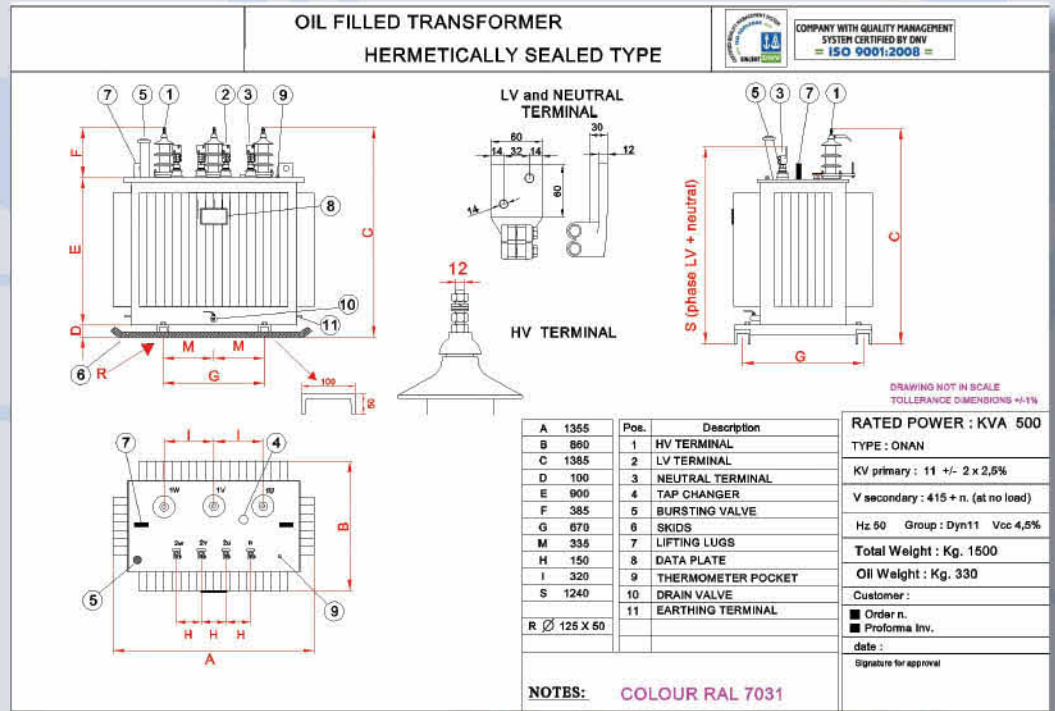


# CAST RESIN ACCESSORIES



2MVA Cast resin transformer with forced ventilation

# STANDARD DRAWINGS





# CASE STUDY

Overhead Transmission Distribution Systems



## **LIBERIAN ELECTRICAL COMPANY**

## **EMERGENCY REHABILITATION OF THE TRANSMISSION & DISTRIBUTION NETWORK**

**CUSTOMER: LIBERIAN ELECTRICAL COMPANY**

**YEAR: 2010 – 2011**

**VALUE: \$3.8M USD**

### **INTRODUCTION:**

After almost 10 years of Civil War, much of the capital of Monrovia had its electrical network destroyed.

The Electricity company Of Liberia, released tenders in early 2010 in conjunction with the Government of Norway to enhance the energy sector in Liberia and specifically focusing on the remaining gaps in the electrical distribution network in and around the capital city of Monrovia.

OTDS was awarded the contract after winning the opening bidding process, which was overseen by the Government of Norway Delegation in Monrovia. The materials were for the delivery to the LEC.

The contract covered the supply of all materials required for the complete rehabilitation of the Monrovia Capital.



Items supplied included;

- LV METERS
- LV INSTALLATION ACCESSORIES
- ABC FITTINGS
- STREET LIGHT FIXTURES
- DISCONNECT SWITCHES
- 24kV AIR BREAK SWITCHES
- COMPOSITE & PORCELAIN INSUALTORS
- SURGE ARRESTORS
- OHL CLAMPS & FITTINGS
- CROSSARMS
- STEEL WORK
- TERMINATION KITS
- TOOLS & DEVICES
- AAAC BARE CONDUCTOR, 110 KM
- PVC INSULATED ALUMINIUM STRANDED CONDUCTORS, 310 KM

**Since 2007, we have supplied in addition, over \$3m of wooden poles, transformers & overhead line accessories to the LEC and continue to be one of their regular suppliers.**

## **RESULTS**

Firstly OTDS were able to finance the whole project ourselves, thereby removing the requirement for any advance payments and achieving the best possible delivery of materials.

OTDS was able to oversee the entire supply process; from the sourcing and ordering of products, through to the consolidation and inspection of products at our warehouses.

When our customer asked if we could help them source containers to store all the materials, we were quickly able to supply over 50 \* 40' containers for safe storage in Monrovia during installation.

OTDS provided additional engineering expertise throughout the whole project. Although we had a list of materials to work from, we found a number of flaws in the design and specifications of materials that were requested by the end user. Using our knowledge, we were able to point out these discrepancies and arrange a different solution, which would work as a package once arriving on site! OTDS is a tried and tested engineering company & manufacturer that will ensure that all the materials supplied are of the highest quality, delivered on time & work first time.

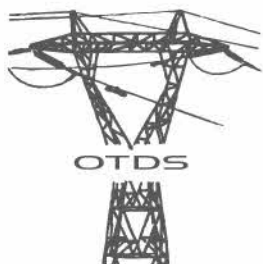


# REFERENCES OF RECENT PROJECTS COMPLETED

COMPANY	COUNTRY	PROJECT	DATE	VALUE
MITTAL STEEL	Liberia	Mine Electrification, complete package of design and supply	2011	€ 785,000
ARABIAN GULF COMPANY	Libya	Electrification of Oil Wells Complete 11kV overhead line design and supply of steel poles	2011	€ 1,900,000
STANTON METAL COMPANY	UK	Complete 11kV overhead line design and supply	2011	€ 1,600,000
HAROUGE OIL COMPANY	Libya	Supply of 22 transformers for ESP Reda well electrification	2011	€ 380,000
MES INTERNATIONAL	UK	Supply of complete package for a 5km line	2011	€ 78,000
ARABIAN GULF COMPANY	Libya	Complete package, walk in substation for Sarir Field, 3.3kv Underground cable, power transformer , 800kva gen set & installation	2010	€ 820,000
CEC ENGINEERING	Sierra Leone	CEC Engineering Sierra Leone Marampa Power Development Project, 11kv OHL complete package	2010	€ 485,000
LIBERIA ELECTRIC COMPANY	Liberia	Monrovia Gaps Project, complete MV & LV material supply	2010	\$ 3,800,000
MAN FERROSTAAL	Germany	Complete 11kV overhead line design and supply of steel poles for well electrification	2010	€ 690,000

<b>COMPANY</b>	<b>COUNTRY</b>	<b>PROJECT</b>	<b>DATE</b>	<b>VALUE</b>
PETROLCOMET	Libya	Supply of 10 power transformers, 12km of 36kV underground cable	2010	€ 620,000
TSI LTD	UK	Supply of 52 different types of 0.6/1kV cable for a water well project	2010	€ 280,000
GENTEC	UK	Supply of complete OHL package using 14m steel H poles	2010	€ 160,000
USAID	Liberia	Supply of 50 22kV – 400v power transformers for an emergency power project	2010	\$ 680,000
USAID	Liberia	Supply of 22kv OHL equipment to Bushrod Island, Monrovia	2010	\$ 740,000
HAROUGE OIL COMPANY	Libya	Supply of various LV materials for desert facilities	2010	€ 290,000
ARAB POTASH COMPANY	Jordan	Complete OHL Package using 16m wooden poles	2009 - 2010	€ 1,280,000
HAROUGE OIL COMPANY	Libya	Supply of OHL package, design and supply, Ghani Area	2009	€ 420,000
HAROUGE OIL COMPANY	Libya	Supply of OHL package, design and supply, Ghani Area	2009	€ 390,000
WAHA OIL COMPANY	Libya	Supply of 38kV Current transformers	2009	€ 540,000
ZUEITINA OIL COMPANY	Libya	Supply of various OHL materials used for spares and replacement in oil fields	2009	€ 385,000
WAHA OIL COMPANY	Libya	Supply of 34.5kV Electrical Relay panels	2009	€ 270,000
SUIRENG	Ireland	Supply of wooden Distribution poles, 18m – 24m for EIRCOM Ireland	2009	€ 410,000





**OTDS LTD**

[T] +44 (0) 208 6811223 [F] +44 (0) 208 680 0400

[E] [sales@otds.co.uk](mailto:sales@otds.co.uk) [W] [www.otds.co.uk](http://www.otds.co.uk)

Unit 11, Spitfire Business Park, Hawker Road, Croydon, CR0 4WD, UK